PRINT FORM SUBMIT

GROSSMONT-CUYAMACA
COMMUNITY COLLEGE DISTRICT

Education Master Plan
Information Submission Form

The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resources allocation.

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Please answer the following questions for each document you submit:

(Feel free to submit as many of these forms as you would like)

1) What is the name of the document? Academically Adrift

2) Author: Richard Arum, Josipa Roksa

3) Source: University of Chicago Press, 2011

4) Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

5) Relevance: recent research looking at the recent effectiveness of colleges

6) Page/Section: see attached powerpoint .pdf

7) **Attach Document/Place URL Here:**

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Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

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Academically Adrift: Findings & Lessons for Improvement

Thursday, March 24, 2011

Presented by:

Richard Arum
Josipa Roksa

Richard Arum, PhD is a professor in the Department of Sociology with a joint appointment in the Steinhardt School of Education at New York University. He is also director of the Education Research Program of the Social Science Research Council. Professor Arum is a co-author of *Academically Adrift: Limited Learning on College Campuses* (University of Chicago Press, 2011).

Josipa Roksa is assistant professor in the Department of Sociology at the University of Virginia (UVA), with a courtesy appointment in the Curry School of Education. She is also a Fellow of the National Forum on the Future of Liberal Education. Professor Roksa's primary research interests are in social inequality and higher education. She has written on a range of topics, from inequality in access and attainment in higher education, to life course transitions and labor market outcomes of college graduates. Professor Roksa is a co-author of *Academically Adrift: Limited Learning on College Campuses* (University of Chicago Press, 2011).

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Academically Adrift: Findings & Lessons for Improvement

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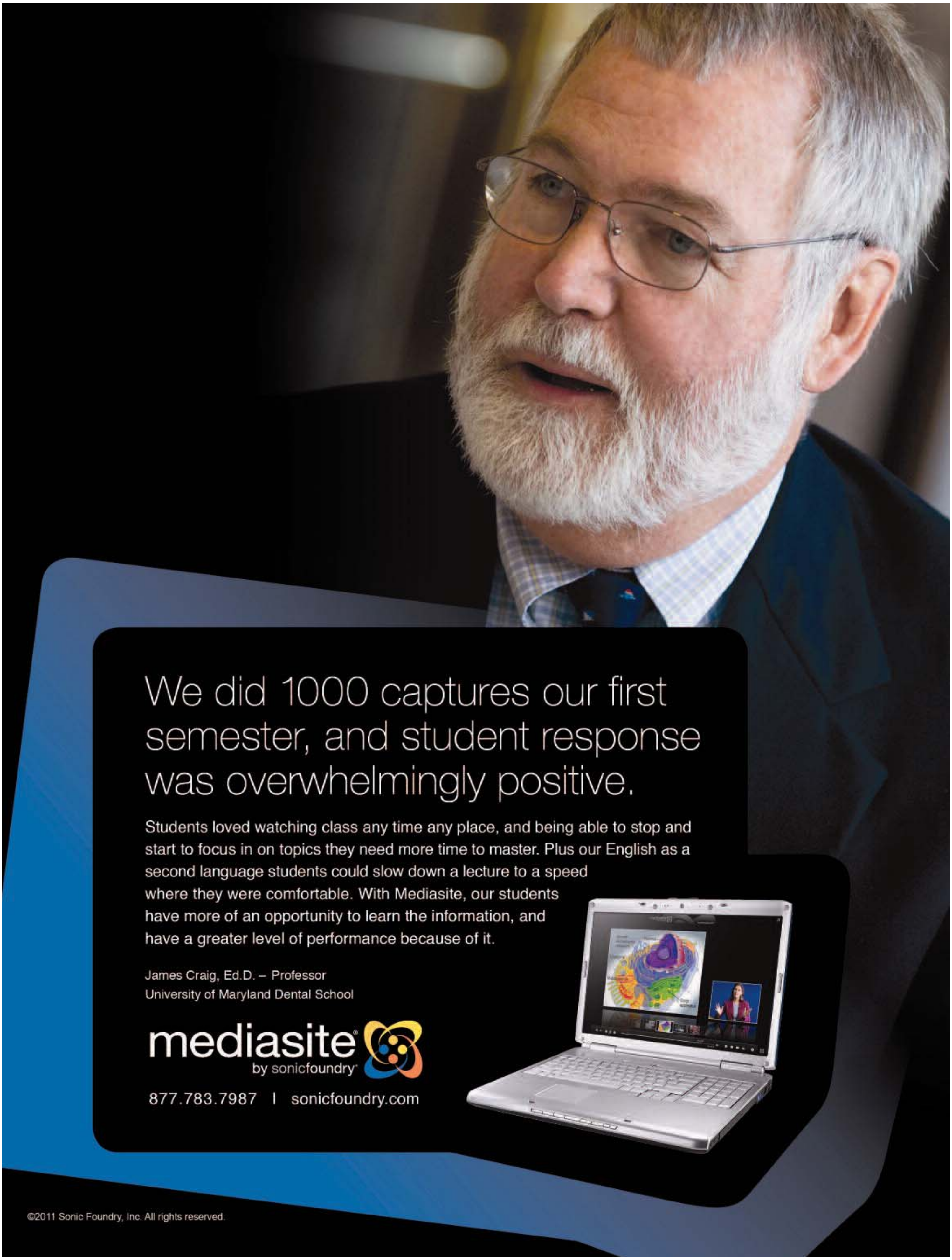
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March 24, 2011

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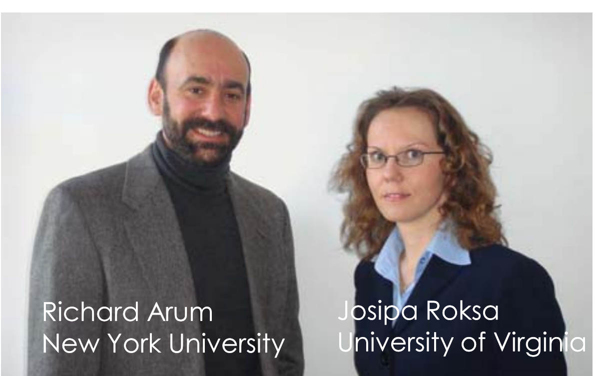
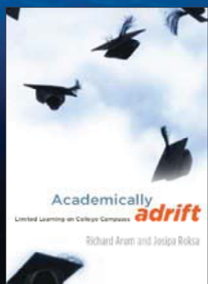


Our Presenters

3

Source (University of Chicago Press, January 2011):



We thank the Carnegie Corp. of New York and the Lumina, Ford and Teagle Foundations for their generous financial support and the Council for Aid to Education for collaboration and assistance with data collection.

- A brief summary of our research
- Our recommendations
- Questions from the audience

Overview

Polling Question #1:

How many hours do you think students study per day at your college or university?

A. About 1 or 2
B. About 2 or 3
C. About 3 to 5
D. More than 6

Research Questions

Are students improving their critical thinking, complex reasoning, and writing skills during college?

What specific experiences and college contexts are associated with student learning?

How do disadvantaged groups of students fare in college with respect to learning?

Determinants Of College Learning Dataset

Longitudinal Design

Fall 2005, Spring 2007, Spring 2009, *Spring 2010, Spring 2011 (planned)*

Large Scale

2005-2007: 24 diverse four-year institutions; 2,341 students

2005-2009: 29 diverse four-year institutions, 1,666 students

Determinants Of College Learning Dataset, Cont.

Breadth of Information

Family background and high school information, college experiences and contexts, college transcripts, Collegiate Learning Assessment (CLA)

Collegiate Learning Assessment (CLA)

- Dimensions of learning assessed
  - critical thinking, complex reasoning, and written communication
- Distinguishing characteristics
  - Direct measures (as opposed to student reports)
  - NOT multiple choice
  - Holistic assessment based on open-ended prompts representing "real-world" scenarios

Collegiate Learning Assessment (CLA), cont.

- Used in other contexts
  - One of the measures of learning used by VSA
  - Will be utilized in 2016 by OECD-AHELO project

Performance Task (example)

Jamie Eager is a candidate who is opposing Pat Stone for reelection. Eager critiques the mayor's solution to reducing crime by increasing the number of police officers.

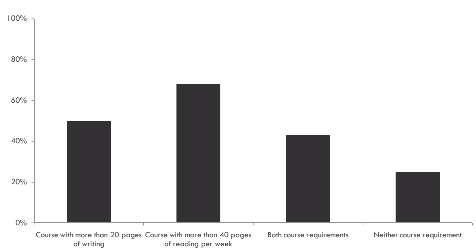
Eager proposes the city support a drug education program for addicts because, according to Eager, addicts are the major source of the city's crime problem.

Performance Task, cont.

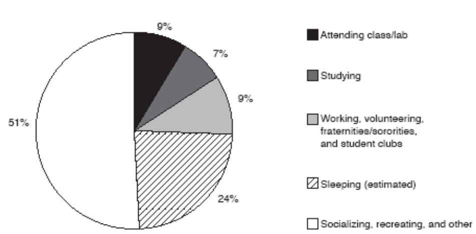
Students are provided with a set of materials (e.g. newspaper articles, crime and drug statistics, research briefs, internal administrative memos, etc.) and asked to prepare a memo that addresses several issues, including a) evaluate the validity of Eager's proposal, and b) assess the validity of Eager's criticism of the mayor's plan to increase the number of officers.

http://www.collegiatelearningassessment.org/

Course Requirements

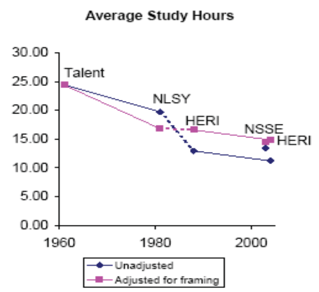


Students' Time Use



Academic Commitment Over Time

(source: Phillip Babcock and Mindy Marks, *forthcoming* 2010)



CLA Gains 2005-2007 (Performance Task)

0.18 standard deviations – 7 percentile point gain (0.47 sd, 18 percentile points, 2005-2009)

No statistically significant gains in critical thinking, complex reasoning and writing skills for 45 percent of the students in the sample (36 percent, 2005-2009)

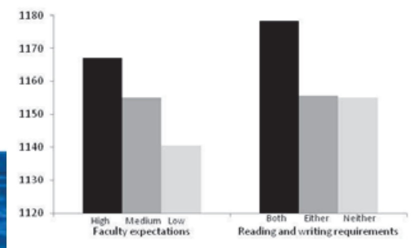
Polling Question #2:

What is the primary reason students show low gains on this measure?

Select only one of the following:

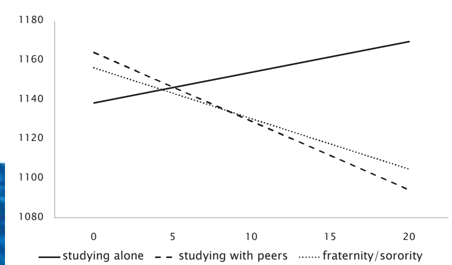
A. Students are inadequately prepared.
B. Students are busy with other things
C. Faculty are not adequately prepared to teach
D. Institutional incentives do not emphasize undergraduate learning

CLA Performance:
Faculty Expectations and Reading/Writing Requirements



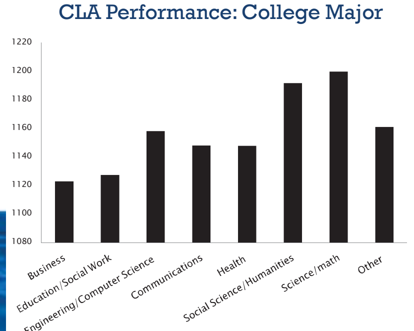
Note: Predicting 2007 CLA scores while controlling for 2005 CLA scores, student characteristics, and institutions attended.

CLA Performance:
Studying and Fraternities/Sororities



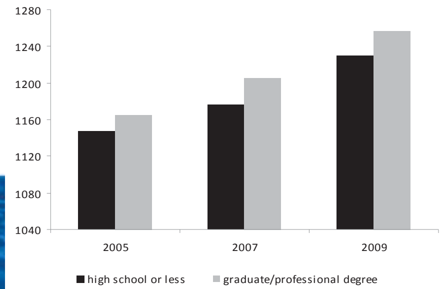
Note: Predicting 2007 CLA scores while controlling for 2005 CLA scores, student characteristics, and institutions attended.

CLA Performance: College Major



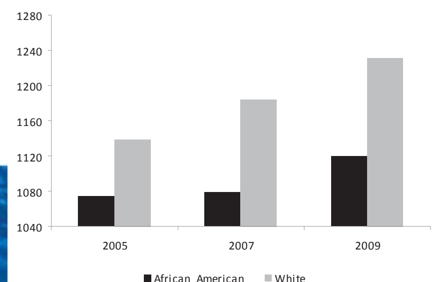
Note: Predicting 2007 CLA scores while controlling for 2005 CLA scores.

Inequality in CLA Performance: Parental Education



Note: Based on a 3-level HLM model, controlling for a range of demographic/family characteristics.

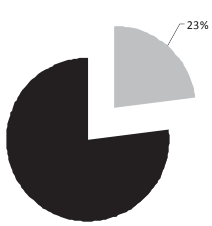
Inequality in CLA Performance: African American vs. White



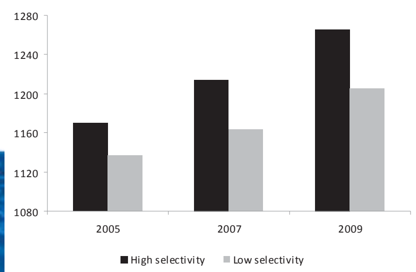
Note: Based on a 3-level HLM model, controlling for a range of demographic/family characteristics.

Institutional Variation

23 percent of CLA growth between 2005 and 2009 occurs across institutions



College Selectivity and CLA Performance



Note: Based on a 3-level HLM model, controlling for a range of demographic/family characteristics.

Summary of Findings

- Students experiencing low (and likely declining) levels of academic rigor.
- Gains in student performance are disturbingly low in U.S. higher education.

Summary of Findings, cont.

- Learning in U.S. higher education is characterized by persisting and/or growing inequality with respect to individual characteristics.
- There is notable inequality in experiences and outcomes across U.S. institutions associated with college selectivity.

Policy Recommendations

Federally imposed accountability would be counterproductive (existing measurements are imperfect; unintended consequences likely)

Federal resources could provide incentives for institutional improvement, innovation and assessment

Policy Recommendations, cont.

- Federal resources are needed to develop research infrastructure to advance scientific knowledge of learning in higher education
- Accountability should operate at lower levels in the system

Recommendations for Institutional Improvement:

□ □dministrative Leadership
□ □ac□lty Leadership
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Polling Question #3:

To what extent are student course evaluations used to assess teaching quality on your campus?

A. They are a primary consideration
B. They are a secondary consideration
C. They are not considered at all.

Administrative Leadership

Promote organizational cultures emphasizing student learning – both symbolically and substantively:

- Evaluate internal incentive structures
- Support ongoing assessment of program quality and student learning outcomes
- Develop plans for improvement
- Monitor implementation of improvement plans
- Align resource allocation decisions with academic goals

Administrative Leadership, Cont.

Work collaboratively – improvement of academic rigor and undergraduate learning are issues that faculty, students and administrators should work on together.

Faculty Leadership

Faculty must assume individual & collective responsibility for ensuring adequate academic rigor across programs and classes – with reviews at course, department and school level:

- course requirements (e.g., levels of reading and writing)
- course expectations (i.e., study hours)
- grading standards
- core curriculum

Faculty Leadership, Cont.

Faculty should have high expectations for their students and communicate expectations clearly and consistently

Review Faculty Evaluation Criteria

Internal deliberations warranted to review criteria used for decisions related to tenure, promotion and compensation:

Do we have the right balance in our weighting of faculty teaching, research and service?

Review Faculty Evaluation Criteria, cont.

Are we using multiple indicators to assess teaching quality (e.g., syllabi review, peer observation, samples of student work)?

Are the measures of instructional quality used properly aligned with the goal of promoting academic rigor and student learning outcomes (i.e., not simply measures of student satisfaction)?

Administrative Support Services

Institutional research required for ongoing assessment of student academic experiences and learning outcomes. [Since students move across programs, institutional-level mechanisms required to monitor overall student academic experiences/outcomes].

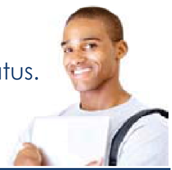
Administrative Support Services

Institutional teaching and learning support services for faculty improvement efforts. [Since faculty often are not trained to teach in their graduate programs].

Align student support services with goal of promoting student academic performance, not just social engagement or student retention, wellbeing and consumer satisfaction.

Students

Communicate clearly and consistently to students the value of academic engagement and the goal of promoting attitudes, dispositions and *higher order skills* (i.e., not just subject specific knowledge) essential for economic success, civic engagement and adult status.



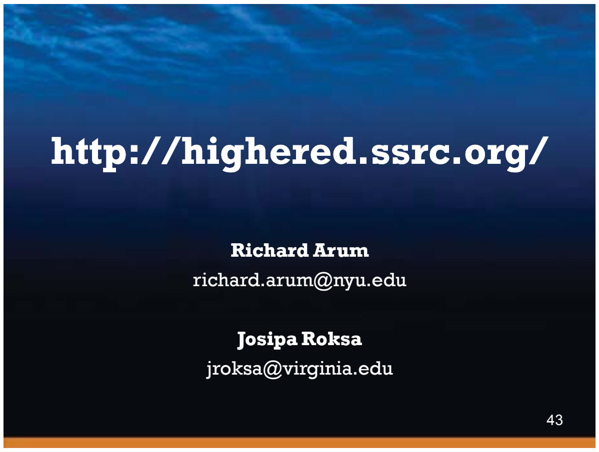
Students, Cont.

Communicate clearly and consistently high expectations and that students ultimately have to take responsibility for their own learning.

What Do You Think about These Recommendations? Do You Have Recommendations of Your Own to Share with Us?

During our live presentation, please go to the conversation bubble icon at the bottom right of your screen.

After the presentation, please join the conversation at http://www.facultyfocus.com/topic/adrift /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Richard Arum
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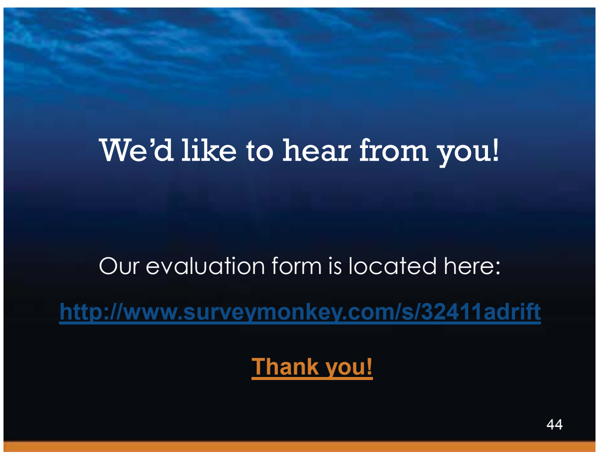
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Our evaluation form is located here:
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2. Author: William Flynn

3. Source: Planning for Higher Education

4. Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

5. Relevance:

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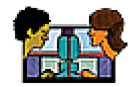
Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

The Future of Learning: 12 Views on Emerging Trends in Higher Education

by William J. Flynn and Jeff Vredevoogd

On behalf of our campuses, we need to seek out change; to be more flexible, more thoughtful, and more open to student decision making; and to build outcomes measurement feedback into integrated planning.



Note: In 2005, Herman Miller, Inc., a Zeeland, Michigan-based furniture manufacturer, convened a series of leadership roundtables in an attempt to predict what trends would affect higher education in the year 2015. Representatives from research universities, state colleges, community colleges, private institutions, and architectural and design firms participated in exercises designed to brainstorm about the future. Their collective thoughts were combined into a list of 12 predictions, which were revised in 2009 to reflect the current global economic situation.

Faced with diminishing resources, advances in technology, and increasing enrollments, colleges and universities are striving to find a balance between innovation and tradition to remain relevant and current in a rapidly evolving world. These 12 predictions have been identified to inform and assist colleges and universities in that endeavor.

1. Globalization will influence and shape all aspects of teaching and learning.

Global higher education mobility is a rapidly growing phenomenon, with over 2.9 million students seeking an education outside their home country—a 57 percent increase since 1999 (Institute of International Education 2009).

Thomas Friedman (2005), in his best-selling book, The World is Flat: A Brief History of the Twenty-First Century, offers this observation about globalization and the contributing role of technology: “Never before in the

page 5

5 6 7 8 9 10
{click on a page number above to go

William J. Flynn and Jeff Vredevoogd. 2010. The Future of Learning: 1
Education . *Planning for Higher Education.* 38(2): 5–10.

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2. Author: Bullough, Robert Jr

3. Source: *EDUCATIONAL RESEARCHER* 2006 35: 3

4. Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

5. Relevance: Argues the humanities provide a bridge to create true interdisciplinary discourse and research

6. Page/Section:

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Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

Developing Interdisciplinary Researchers: What Ever Happened to the Humanities in Education?

by Robert V. Bullough, Jr.

In response to changing federal priorities, much discussion has taken place recently about the need for graduate education programs to firmly embrace interdisciplinary research, or "interdisciplinary integration across related fields" (National Research Council, 2004, p. 6). The related fields usually are understood to be certain social and behavioral sciences. From the perspective of the humanities, the author challenges an emerging view, widely regarded as commonsensical, about the proper nature of interdisciplinarity in education and what counts as good education research (Hostetler, 2005). He devotes particular attention to the problem of determining and distinguishing ends and means and the dangers of narrowness, and provides examples of the value of the humanities to education research.

Virtually no one would argue against the centrality of graduate education in socializing future generations into the values and commitments of academic work, despite deep disagreements about the nature of the work to be done and most especially about the nature of inquiry in education and the value of the various approaches to it. Representing an increasingly powerful point of view, Margaret Eisenhart and Robert DeHaan (2005), for example, have made a strong case for the importance of socializing neophyte education researchers into the norms of what they describe as scientific inquiry (p. 5). Arguing that the "general processes of inquiry in interpretative and experimental sciences are virtually identical" (p. 5), they propose a doctoral program that includes four components: core courses (almost exclusively research methods courses); research experience; teaching experience; and interdisciplinary collaborations. When viewed in the light of the presumed unity of all forms of inquiry and the common examples used to make the argument, the plea for interdisciplinary collaborations appears to be more for multidisciplinarity than for interdisciplinarity. In the latter, fields outside the social and certain physical sciences are discounted, and disciplinary frameworks are maintained while insights are borrowed from other frameworks, all more or less residing within the same conceptual and methodological family, when an impasse is reached within one's own. What seems neglected is the value of the tension arising from intense conversations across differing worldviews or patterns of sense-making about some puzzle or problem that is recognized in some way as shared. In such conversations, disciplinary boundaries are made permeable and interpretative horizons jarred and then forced outward.

Educational Researcher, Vol. 35, No. 8, pp. 3–10

While reading *Advancing Scientific Research in Education* (National Research Council, 2004) and noting what appears to be a celebration of the methods of scientific problem solving, I was reminded of a statement that John Dewey made as he explored the significance of scientific inquiry to human affairs in his Gifford Lectures, published as *The Quest for Certainty* (1929):

> In principle, the history of the construction of suitable operations in the scientific field is not different from that of their evolution in industry. Something needed to be done *to accomplish an end;* various devices and methods of operation were tried. Experiences of success and failure gradually improved the means used. More economical and effective ways of acting were found—that is, operations which gave the desired kind of result with greater ease, less irrelevancy and less ambiguity, greater security. Each forward step of a tool suggested operations not in mind when it was invented and thus carried the perfecting of operations still further. There is thus no *a priori* test or rule for determination of the operations which define ideas. They are themselves experimentally developed in the course of actual inquiries. They originated in what men naturally do and are tested and improved in the course of doing. (p. 124)

One phrase caught my eye in the quotation above, which I have italicized: *"to accomplish an end."* This phrase stands out starkly for two reasons: Interdisciplinarity itself appears to be understood as a research procedure or means; and, most important, in the current debates over what counts as good research, there has been little discussion of ends (see Willinsky, 2005). We fail to question the purposes of research. In part, it is this failure that underpins Erickson's recent charge that the NRC report "ends up justifying scientism rather than science" (2005, p. 4).

Making their case for the development of research "expertise," Eisenhart and DeHaan argue that core courses should be offered and that these must be "scholarly, rigorous, and intense enough to bear the burden of familiarizing students with the orienting concepts in each field, the culture of scientific inquiry, and the special demands of research in education" (2005, p. 10). Where, one wonders, will these young aspiring experts learn what makes a question worthy of inquiry and educationally important, and where will they gain the courage to go outside established bounds when dissent is needed and necessary? (This point admittedly is linked to Eisenhart and DeHaan's belief in the value of interdisciplinarity, as will become clear later.) Another apt comment by Dewey comes to mind: "That a man may grow in efficiency as a burglar, as a gangster, or as a corrupt politician, cannot be doubted. But from the standpoint of growth as education and education as growth the question is whether growth in this direction promotes or retards growth in general" (1938, pp. 28–29).

What About Ends?

While I puzzled over why there has been so little discussion of ends, of "questions of human well-being" (Hostetler, 2005, p. 16), a quick response came to mind. Perhaps there is now no need for thinking directly about ends, because neophyte researchers, through experience and education, already are well acquainted with what are the significant educational questions. For, as John Goodlad comments, "today's educational problems and issues are much the same as they were when I entered the first grade" (2004, p. 256). This reason does not hold, however. It is true that educational problems are persistent, but it is also certainly the case that, as the wider social and political context changes the way that these otherwise persistent problems are understood, what is taken as a satisfactory response to them also changes, sometimes dramatically. What is recognized as problematic and how it is framed as a problem makes all the difference in how it is resolved and on what counts as an adequate resolution.

Is it the case that good, researchable questions will emerge from being socialized into a research culture? Perhaps, but perhaps not. In a highly controversial statement, Paul Feyerabend (1975) captures what often happens in the process of the socialization of scientists: "Just as a well-trained pet will obey his master no matter how great the confusion in which he finds himself, and no matter how urgent the need to adopt new patterns of behavior, so in the very same way a well-trained rationalist will obey the mental image of *his* master, he will conform to the standards of argumentation he has learned, he will adhere to these standards no matter how great the confusion in which he finds himself, and he will be quite incapable of realizing that what he regards as the 'voice of reason' is but a *causal after-effect* of the training he has received" (p. 25). Kestenbaum (2002) makes the point more gently: "Habits of mind and the reductions they permit become natural . . . [and are] sources of blindness" (p. 81). This is precisely the origin of normal science, a concept noted by Eisenhart and DeHaan and associated with the work of Thomas Kuhn (1962). In the social sciences, studies by Richard Hamilton (1996) of the power of disciplinary orthodoxy to elevate nonsense to good sense, to divert attention from contrary facts, and to deter formation of alternative explanations, forcefully underscore the point: Despite common belief, the Panopticon that Foucault found so disturbing and placed at the center of his critique was never built; unemployed workers did not support the Nazis, and, closer to home, boys are not outperforming girls in school. Advocacy of an accepted position often comes to replace critical originality, and "[f]or the sake of intellectual convenience people hang on to cherished organizing principles" (1996, p. 200). Of course, convenience is not the only reason for embracing a wrong-headed orthodoxy. Well-funded advocacy groups may and often do promote narrow self-interest.

The philosopher Walter Kaufmann uses the term "scholasticism" to point to the operation of a sort of normal science within the humanities. His description nicely captures much that is done within the academy to sustain orthodoxy, Right and Left. For the scholastic scholar, Kaufmann argues, work becomes, "[i]n Einstein's phrase, a kind of 'sport,' if not a game, or a racket" (1977, p. 45). For scholastics, as in normal science, others set purposes. It is the game—expressed through skilled employment of established methods—and playing it well and within bounds that is important. Lacking a sense of wider context, what is left is instrumental reason, a sharp focus on means, methods, and ideology, what some years ago my colleagues and I described as "technocratic-mindedness" (Bullough, Goldstein, & Holt, 1984). The problem, as Garrison (1997) reminds us, is that ends and means cannot be separated: "[T]o desire some good, some ideal 'end-in-view,' is to simultaneously desire the means or operations needed to actualize the good" (p. 34). Attempts at separation produce harmful consequences; and the "game" produces its own ends.

Another troubling reason for ignoring ends comes to mind: Perhaps ends are ignored because they can be taken for granted. Perhaps it is assumed that the debate over the purposes of schooling in the United States is now closed: Education ends are clearly set and well established, and there is nothing much to discuss except means. Raise those test scores! Multiple stories could be told that support this view, from the history of the rise and triumph of standardized testing, the origins of which are fascinatingly described in Zenderland's biography of Henry Goddard (2001), to the reduction of all educational purposes, including the cultivation of democratic values and commitments, to economic values, a view underpinning the assumptions of the President's Commission on Excellence in Education that produced *A Nation at Risk* (1983).

On Interdisciplinarity

Generally speaking and as noted, calls of the sort made by Eisenhart and DeHaan for interdisciplinary work in education tend to be contained by social science and natural science frames of reference. The social science frame is rooted in an unfulfilled and deep longing for the status and authority of the hard physical sciences. This said, interdisciplinarity in generous or constricted forms is to be embraced because of its generative promise, the promise of fresh insight, of new metaphors and models for making meaning. As such, interdisciplinarity stands simultaneously as a research method, loosely conceived as a way of engaging a problem, and as an aim in its own right as a form of education. Its promise as a form of education is constrained, however, when the boundaries to be crossed are circumscribed by the assumptions and research methods of the sciences (see Schneider, 2004) and their "range of convenience" (Kestenbaum, 2002, p. 82), to the exclusion of other potentially promising and provocative worldviews and methodologies.

Ironically, despite a century of longing for full membership, education—at least a large portion of it—finds only an unsettled and uncomfortable place within the social sciences despite bold talk about "education science" (Committee on Scientific Principles for Education Research, 2002). Nevertheless, education as a field of inquiry is commonly thought of as a social science by educators and by those who engage in and seek to foster education research and who advocate a reorientation of graduate studies in education. Interdisciplinarity (really multidisciplinarity), when understood in these narrow terms—as bounded by certain sciences or social sciences and the assumptions they share about the nature and purposes of inquiry—is unlikely to get far outside established research biases, habits of mind, and social commitments. Given such narrowness, the likely research outcomes are triviality, confirmation, and conformity—predictable sameness—

in the quest for administrative convenience (see Popkewitz, 2004). What is needed in the face of expanding cultural pluralism is a research community committed to "greater effective theoretical pluralism" (Hamilton, 1996, p. 218). This requires reaching beyond the guiding assumptions and methods of the physical, behavioral, and social sciences, which, in any case, are far less sure than has been argued in both *Scientific Research in Education* (Committee on Scientific Principles in Education Research, 2002) and *Advancing Scientific Research in Education* (National Academy of Sciences, 2004). Alternative traditions and modes of inquiry are called for—not as replacements, but as complicating additions and helpful correctives.

Here, again, Feyerabend (1975) proves provocative. He argues for "counter-induction" and against what he describes as the inherently conservative "consistency condition"—that interpretations and insights must confirm previously established conclusions—a point central to claims for "verisimilitude," or the "appearance of truth" as a standard for judging meaning in the human sciences (Polkinghorne, 1988, p. 176). Feyerabend asserts that bias and blindness are found through contrast and comparison: "[P]rejudices are found by contrast, not by analysis" (Feyerabend, 1975, p. 31). Yet within-paradigm analysis continues to hold sway. The challenge of examining "something we are using all the time" to reveal presuppositions and to open alternatives requires stepping outside and embracing an "*external* standard of criticism, [a] set of alternative assumptions . . . constituting . . . an entire alternative world" (p. 32). What is required is a firm but playful embrace of otherness, of counter-cultural research assumptions, of stepping out of a comfortable research paradigm with attendant theories and into an uncomfortable one, even if for only as long as it takes to finish reading a helpfully disquieting book.

> The first step in our criticism of familiar concepts and procedures, the first step in our criticism of "facts", must therefore be an attempt to break the circle. We must invent [or seek out and engage] a new conceptual system that suspends, or clashes with the most carefully established observational results, confounds the most plausible theoretical principles, and introduces perceptions that cannot form part of the existing perceptual world. This step is . . . counterinductive. (1975, p. 32)

For education researchers, the humanities present abundant opportunities for breaking the circle, inviting counter-inductive moments into lives lived otherwise well within the conceptual boundaries of an aspiring educational science. There is, of course, a long and rich critical tradition in education that draws on the humanities and that is counter-inductive and counter-cultural in the sense of speaking outside of but to dominant discourses, with the aim of recasting the purposes and practices of schooling and thereby altering what counts as a legitimate avenue for inquiry. Numerous authors and their works come to mind, each work offering in its time a contrary voice and a pointed challenge to researchers. I shall mention only a few familiar works, starting with a personal favorite: In February, 1932, George Counts spoke at the annual conference of the Progressive Education Association. His address was entitled, "Dare Progressive Education Be Progressive?" and was later included in *Dare the School Build a New Social Order?* (1932). The address stunned members of the association and initiated a lively and intense discussion of the purposes of public schooling in America that, over time, became a central concern of a wing of educational progressivism, including those educators connected to the Eight-Year Study (see Kridel & Bullough, in press).

More recently, drawing on insights from literature and existentialism, Maxine Greene's *Teacher as Stranger* (1973) opened up for consideration the inner life of teachers in new and fresh ways that helped set the stage for a large and still emerging body of research on the inner and emotional life of teachers. Two years later, *Curriculum Theory: The Reconceptualists* (Pinar, 1975) marked a shift in curriculum thinking, and legitimated and offered alternative directions for scholars, particularly young scholars whose work was leading them outside traditional curriculum questions—objectives, sequencing of activities, evaluation. The publication of *Ideology and Curriculum* (Apple, 1979) encouraged a veritable deluge of studies of the "hidden curriculum"—the buried and sometimes pernicious influences of schooling on the young—first explored by Antonio Gramsi (see Entwhistle, 1979). *Caring: A Feminine Approach to Ethics and Moral Education* (Noddings, 1984) led to a fundamental reconsideration of the nature of teaching and being with and for students, and has encouraged an abundant and growing research literature. Elizabeth Ellsworth's (1989) provocative article "Why Doesn't This Feel Empowering? Working Through the Repressive Myths of Critical Pedagogy" shook up the educational Left, revealing a fundamental blind spot that continues to be explored. In looking outside established education discourses, each of these authors turned toward the humanities for fresh questions and critical insights into established practices, trying to make better sense of what they were witnessing and experiencing as educators and scholars. Unfortunately, all of these authors stand at the margins of education research. But, as Feyerabend suggests, fundamental insights are born at the margins, outside of normal science.

Marginalizing the humanities or dismissing them as inconsequential to graduate study and research in education has had, and will continue to have, far-reaching and unfortunate consequences. Not that the work will end, for certainly it will not. Rather, with marginalization of the humanities, whatever science of education is created will be to some degree impoverished. Unable to hear the still, small voice of dissent, it will be narrowed, driven by too many of the wrong sorts of questions and miss many opportunities for gaining transformational insights. Recall, it was the humanities that first formed, then articulated, the questions of equality and justice that loom so large in the thinking of many of those now working toward a science of education but who wish to equalize test scores as a surrogate measure.

Considering the Humanities

It is important to recall that the humanities were not always tangential to educational inquiry. As an incipient university study, the foundational disciplines of education included psychology, history, and philosophy, as well as various practical studies (Lucas, 1999). To be sure, as education graduate students rubbed up against history and philosophy, they probably felt a surge of self-worth arising from association with these older, well-established, disciplines. But more important, these disciplines broadened understanding and expanded the range of what was considered worthy of inquiry.

The aim of building a science of education is not new but represents a long and often-frustrated ambition.[1] Early in the last century, education stood between the humanities and the social sciences. At least in principle, it embraced simultaneously technical and emancipatory aims (Habermas, 1971): the aim of gaining and learning how to gain the compliance of students to achieve specific outcomes, and the aim of assuring their social participation and encouraging self- and social-transcendence. Historically, within the field of education, the humanities have been the keepers of the emancipatory aim, part of a grand moral tradition and social ambition evident in the works cited above. But standing between the humanities and the social sciences has proved difficult. As C. P. Snow (1959) long ago noted, finding a middle position between (disciplinary) cultures is seldom successful, yet much is lost in operating only within a single conceptual world, which offers an illusion of certainty and encourages hubris. As it stands, education as a graduate study has failed in the attempt; and sides were long ago chosen.

The State of the Humanities

It is the ideal of the humanities, more than current practice within them, that supports the value and promise of a rich and generous educational interdisciplinarity. To be sure, arguing for the value of humanities to education researchers in the current historical moment is no mean task, in part because the humanities, themselves, have done little to help the cause. There is no doubt that the state of the humanities has contributed to their relative weakness within the university. A quick review of that state is in order.

The sharpest criticism of the humanities comes from those who love them best. Seeking repair, Joan Scott (1995) observes that the humanities as a field of study has few allies within the academy; and she makes the surprising claim that champions of diversity have done terrific harm to them, adding immeasurably to a sense of crisis. She argues that within the university the aim of empowerment has found expression in the presenting of knowledge that affirms students' life experiences, that reflects them "as they already know themselves to be" (p. 300). Echoing a form of fundamentalism and embracing disengagement, an appeal is made to self-confirming "familiarity" and personal identification as the basis for motivation, for judging content, and even for evaluating a professor's worth as a teacher and researcher. Otherness is dismissed rather than embraced. As representatives of shared and recognized categories, individuals meet and are confirmed, not challenged; "identity is the only foundation for learning" (p. 300).

> Ruled out as possible stimuli for the desire to learn are the challenge of the new and fundamentally unfamiliar, or a sense of frustration, or an inability to identify, or a purely cognitive interaction, or the sheer pleasure of acquiring mastery. Indeed these are taken as "disempowering. . . ." (p. 300)

One result is that those who are taught become increasingly alike, as do those who do the teaching and, it is important to note, the researching. Orthodoxy and fights among orthodoxies over agenda, resources, position, and prestige dominate the humanities, where it is increasingly difficult to make the case for "the value of critical intellectual work—work typically associated with the humanistic disciplines" (p. 301).

Framed in opposition to a common, idealized, and objectified "other" as enemy, identity politics brings feelings of belonging but tends to slide "toward the premise that social groups have essential identities" (Gitlin, 1995, p. 309). Without pretense, research is reduced to politics and disciplines to self-contained interest groups, just the sort of thing that brings the scorn of social scientists and raises questions about the possibility of interdisciplinary work. What remains is a radically fragmented university where those on the Right and Left talk in closed circles, backs turned outward, as though they and they alone understand and occupy the world, and struggle for power to impose their own versions of order on others through "programmed schools of commitment" (Bromwich, 1997, p. 239).

Given this state of affairs and supported by a robust vocationalism, perhaps it is not surprising that on campus the humanities have been pushed aside in favor of the sciences, which seem to offer at least the possibility of making a truth claim and of adding up to an effect of some kind. This said, I doubt that many educators are even aware of the decades-long turmoil that is the humanities. As a practical study, education has an advantage not enjoyed by the humanities—there is, by definition, an overarching moral imperative, a center: the well-being of children and young people. Certainly, education has its own problems with fragmentation and fundamentalism, and numerous diversions prove enticing when one seeks to make a career; there is no question but that education is replete with scholastics, and narrow and seductive research specializations abound. Still, I suspect that most education researchers understand their work as inextricably linked to this moral center and, because of it, take seriously the challenge of otherness and, if pushed, would feel a failure when playing at the sidelines even if engaged in "antidisciplinary" work. No other explanation can adequately account for the persistence of university–public school partnerships despite the near-insurmountable difficulties and high personal costs involved in sustaining them.

By being concerned primarily with generalizations, accumulation, and patterns of consistency or congruence, science has never been very good at attending to otherness or to difference. It is here that the humanities, as historically and traditionally understood, have particular value despite their recent institutional slippage into parochialism. The humanities call attention to alterity, difference, relationship, morality, and purpose, and by acknowledging human frailty offer means for softening the "fundamental pain of . . . loneliness" (Hoffman, 2005, p. 29) and fulfilling the passion for connectedness and meaning that envelop all educational endeavors. The humanities elevate and embrace the outlier, through whose eyes central tendencies are best understood. No one learns in the abstract, no one has public experiences. Unlike the quest for the holy grail of "best practice" that consumes the science of education, confrontation with the questions that animate the humanities, at least traditionally, illuminate distinctive, remarkable, interesting, provocative, disconcerting, and sometimes even shocking ways of being and interacting, each representing a form of human practice and interrelatedness of importance to schooling and teaching. Indeed, issues related to teaching and learning speak directly to the deepest longings of humanity. In contrast, "best practice" represents a call to training, where outcomes are predictable and contextual and personal differences are of relatively minor consequence. Better to speak of promising or better practices than "best." Training, as R. S. Peters once wrote, "always suggests confinement" (1967, p. 7). The humanities press against confinement and invite reconsideration and reconstitution of the self and the projects that define the self, especially during dark times. Clearly, researchers ought not confuse training with education or try to substitute one for the other, even when training and its perfection are rightly needed and called for.

Imagination and Humanistic Traditions: So, What Sort of Mindedness Do We Wish to Nurture?

Describing those who work in the humanities, Kaufmann (1977) identifies four "types" of mind, each embracing a very different conception of what counts as research and each well represented in schools of education. In addition to the scholastic mind, which he sees as lacking perspective, Kaufmann identifies journalistic, visionary, and Socratic minds (critics). He is unabashed in his criticism of the "mindedness" of the academic journalist, who is a teller of others' stories and personal anecdotes; and, while lamenting the dominance of the scholastic mind in higher education, Kaufmann recognizes that scholastic minds may and often do play an important and valuable role in cultivating a rich territory staked out by others. In contrast, Kaufmann asserts that visionaries and Socratics are crucially important to the health of the humanities, providing perspective, pressing against easy consensus when a point of view or theory becomes too convenient, and revealing alternatives: optional yet valuable ways of encountering and making a world. This is the stuff of imagination, whose power "lies in its capacity to multiply perspectives rapidly" (Garrison, 1997, p. 15).

Socratic minds—the minds of Counts, Greene, Pinar, Apple, Noddings, and Ellsworth—reject both dogmatism and naive relativism and seek to nurture a "critical spirit [that] immunizes students against the facile notion that any view is as good, or bad, as any other. Students are taught to distinguish clearly untenable views from the few positions that appear to be defensible" (Kaufmann, 1977, p. 33). For the Socratic and visionary mind, questions of ends, of the good, are front and center in research as they invite others to engage in the struggle with what ought to be done, even as outcomes are inevitably uncertain, almost happily so. Asking such questions and then taking them seriously inspires humility, demanding of researchers the habit of pausing and wondering about oneself and about one's project as well as about the other. It requires, at least for a time, the setting-aside of instrumental rationality, the drive to move ahead quickly before knowing the reasons for acting. In contrast, scholastics quickly rush on to their work as sport, seeking to win praise and garner influence. Both the Socratic and the visionary understand the importance of the pause, of not writing before one has anything worth saying and, when writing, of striving to say just what one means. This is the stuff of philosophy, religion, literature, history, and, also of art and music, the traditional humanities, that makes pausing purposeful, productive, and necessary.

Harry Broudy (1988) provides another way of thinking about the importance of perspective and interdisciplinarity to education research that is worth briefly noting here. He wrote as a philosopher and as a student of William Ernest Hocking. Broudy described four uses of schooling: associative, replicative, applicative, and interpretative. It is the last that is of concern here. The *interpretative* use of schooling is a "process related to application but far less specific and detailed" (Broudy, Smith, & Burnett, 1964, p. 54). Interpretation involves imposing order and form on experience, gaining perspective and getting oriented by using categories and concepts to name a situation in order to make sense of it. Language imposes order, and so do the central concepts of the disciplines. "Whenever we use our school learnings . . . to perceive, understand, or feel life situations, we say that we are using our learning primarily for interpretation, and not replicatively, associatively, or applicatively, although strictly speaking, these uses do not necessarily exclude each other" (p. 54). It is important to note that "in a sense . . . the interpretative use of knowledge is the most fundamental of all, for without a prior interpretation of the situation we are not sure what we shall replicate, associate, or apply" (p. 54).

So, we must ask, What sort of interpretations of the world—concepts, values, beliefs, attitudes—will be encouraged by a science of education and training within it? To be sure, interpretations will be made one way or the other, fruitless or fecund, generous or stingy. Probably it is in the interpretative uses of knowledge that the training of education researchers most often fails, not in the replicative or applicative uses, which now dominate debate. Yet, as noted, the interpretative lies behind the other uses of knowledge and reveals their power and sets their value. It is difficult to think broadly and complexly about an issue when there is nothing to think with—when one has methods without philosophy, techniques without history—or when what is there is severely limited by narrow and highly technical training, whereby science is reduced to process. Such training is most often directed by scholastics, the technocratically minded, and much of the teaching is done by would-be journalists. The danger is that graduate studies in education as Eisenhart and DeHaan conceive of it will, for the most part, produce scholastics. No group is less well suited to provide useful guidance during times of great uncertainty.

Interdisciplinarity and Perspective Taking

"Questions of research," as Popkewitz (2004) argues, "do not just arise from nowhere" (p. 65); they arise from the traditions in which researchers are educated. "Theories are formed within the intellectual tradition in which those theories work. . . . The unquestioned presuppositions orient how the researcher approaches the world to be known, shapes and fashions what is asked, and forms the objects that are investigated, and just as important, filters out other types of questions as sanctioned for inquiry" (Popkewitz, 2004, pp. 65–66). Although education, like the humanities, is filled with its own version of scholastics, there is also a smattering of Socratics and visionaries. The latter two types, however, must not be confused with either rightist or leftist preachers. Here I provide a few examples of the potential power of the humanities to enable what might best be described (drawing on Garrison, 1997) as "outlaw" thinking, or nonnormative discourse. These examples underscore the value of striving to reach beyond ourselves and our own mindset in our studies, our interactions, and our projects. I shall focus on a few persistent educational questions and seek to present them counter-inductively, as Feyerabend would say.

First, consider learning. Debates have raged within the social sciences over how students learn, and one still hears passionate pleadings from constructivists (constructivism comes in various flavors) who argue the virtue of their positions in contrast to some evil called behaviorism. For various reasons, it is difficult to get outside this interpretative circle. Drawing on the humanities is helpfully troubling; both views might well miss fundamental and crucial elements of what learning is (and, notably, how learning is experienced—a question too seldom considered). Clifford Mayes (2005a), for example, brings a broad and profoundly religious perspective to the question. Writing of "death and resurrection" in the classroom, Mayes argues for the importance of providing "sufficient opportunities" for students to fail. Referring to the biblical Mother Eve, he asserts: "Our first, great Mother-Teacher understood the need for both failure as well as success in the eternal maturation of the spirit. Following her example, spiritual teaching evidences [a balanced] mixture of the bitter with the sweet. . . . Not only does the spiritual teacher not let a student get caught in failure; [she] does not let him get caught in success" (pp. 68–69). Taking Mayes seriously, one begins to think about planning for what perhaps can best be described as "smart" failure, for confronting limitations and repenting and overcoming ignorance. In this way a student becomes increasingly teachable ("unteachability" being a source of common complaint among teachers) and learns how one learns, discovers the need for reliance on others when encountering difficulties. This is a radical notion. In another work, Mayes (2005b) draws on insights from Jungian mythology to rethink aspects of the nature of teacher-pupil relations; when predictability is the aim, such relations are often thought to be at their best when businesslike. Calling attention to the nature of transference and counter-transference, Mayes points to neglected but important and researchable aspects of how teachers and pupils interact. He raises the generally neglected question of what teachers gain from these relationships and how the relationships are formed to satisfy one or another compelling, and not always healthy, desire or need on the part of the teacher. Identifying and making these desires explicit may have a dramatic impact on the nature and quality of teacher-student relationships, revealing important aspects of those relationships that are most life-affirming for both parties, most likely to encourage learning, and, dare I say, most promising of higher test scores. From comparisons of this kind one discovers, drawing on an insight from Stephen Toulmin (2001), that the "eccentric can be used to explain the central, rather than the other way around" (p. 30). As noted, attending to outliers opens worlds of understanding by revealing what has been missed or intentionally ignored, possibly for good methodological reasons.

In a controversial piece about the teacher-student relationship, Bullough, Patterson and Mayes (2002) draw upon the work of the theologian Walter Brueggemann to explore ways in which teaching involves the prophetic.[2] Viewing teaching in this way sheds light on how teaching often is a "calling," to which one is "summoned, . . . impelled by a sense of inner necessity" (p. 315). Teachers who experience teaching as a calling may engage their work in unique ways reflecting their sense of investment in a deeply moral enterprise. This understanding may account for some aspects of a teachers' classroom and school behavior, most particularly how personal failure or success with students is experienced and understood, including failure to raise standardized test scores. For "called" teachers, facing threatening accountability measures puts the entire self at risk. In addition, the authors note a critical component of teaching as prophecy, where the teacher-prophet necessarily engages in criticism of the world "in order to reimagine [it]" (Bullough, Patterson, & Mayes, p. 325) and thereby help the young to reimagine themselves as learners. These authors call attention to an ever-present utopian impulse in teaching, where living ideals are always awaiting realization, ideals that may very well ground acts of teacher resistance as well as inspire willing self-sacrifice in service to the young. The authors also open a way for thinking about leadership as a form of service and of ministering grounded in truth-telling rather than as a set of skills taught in administration programs.

Consider yet another example, the nature of moral education. In *Moral Imagination* (1993), the philosopher Mark Johnson demolishes taken-for-granted Enlightenment moral theories grounded in laws and rules and argues for a theory set in four requirements: (1) the development of moral imagination; (2) gaining knowledge of our own moral understanding; (3) forming moral empathetic imagination; and (4) envisioning imaginative possibilities for taking action (pp. 198–203). Empirically testable, the implications of this theory for classroom disciplinary practices and for resolving student disputes through managing conflict are provocative and far-reaching. Discipline comes to be thought of as involving opportunities to develop students' imaginative moral capacities, including the ability to step into others' shoes, rather than as means for achieving compliance alone. Similarly, this theory points to often-neglected possibilities for perspective taking and practicing moral reasoning through student conflict management.

Questions and works of these sorts stand outside the interpretative circle set by a science of education. Yet, as I have suggested, they open up important areas for research and offer insights useful for reimagining and productively reframing the problems of teaching and learning.

Conclusion

Maxine Greene, writing more than three decades ago, warned of the dangers of a concept she often championed, "wide-awakeness," which has a direct bearing on the challenge of interdisciplinarity and the nature of perspective taking. Although she writes about teachers, her point holds for education researchers as well:

> One of the risks of "wide-awakeness" is that the sights and sounds of a culture in crisis may overwhelm. At one extreme, they may thrust the teacher back into reliance on precedent; defensively, he may become an automaton. At the other extreme, they may cause him deep disquietude. He may realize, as never before, that he is responsible for his moral choices, that—with dissonance afflicting him and no one to run to for a resolution—he is dreadfully free. . . . (1973, p. 183)

Researchers may recoil from such freedom, seduced by safe and relatively simple questions that assure career success, that are easily measurable; or they may embrace freedom in such a way that the academic life becomes a shared encounter with the unknown and not merely a scholastic's quest for professional standing or a journalist's quest for stories that will sell. Robert Coles (1989) observes that the "critical root" of the word "theory" is "'I behold, as in what we see when we go to the theater" (p. 20). In beholding, data (the " 'things' of the world") are created; and, by *re*-searching in ways suggested by Mayes's work, new data are beheld and old questions reconceived (Popkewitz, 2004, p. 72).

New forms of beholding, of interpreting the world, not only create new data but also alter practice by changing researchers' understandings of themselves.

Remarkably little educational history or philosophy are read these days. It is worth noting that it was David Tyack, in his landmark book *The One Best System* (1974), who warned of the dangers of single and simple solutions to complex educational problems. Education researchers fixated on finding "best practices" would do well to read this book, even as government-sponsored orthodoxies grow in influence and power and ever more researchers line up for service. I was amazed a few years ago to discover that not a single faculty member in my department (Ph.D.s all) had ever read Dewey's *Democracy and Education* (1916), a book that argues that democracy *is* a theory of education and has long been a fountainhead of profound questions. Books of this sort, which challenge and provoke, must find a prominent place in graduate education at its *core.* Too few of us who teach graduate education courses read broadly, but we must. Perhaps, like our students, we need to learn how to read.

Kaufmann (1977) argues for learning to read dialectically, an approach that fuses three elements. The first element is *Socratic:* We enlist the text in a process of examining our own "life, faith, and values." The second is *dialogical:* The "text is treated as a You and allowed to question us, as we question the text" (p. 62)—here we are committed to hearing and understanding what the author intended to say even when there is strong disagreement. The third is *historical-philosophical:* We attempt to understand the work and the author broadly and contextually, reaching beyond the minutiae that capture the scholastic mind. The argument Kaufmann makes is helpful for thinking about the nature of research training in education and the need to "read" not just texts, but also education, dialectically. A researcher ought to know why one or another research question is found to be compelling—what it promises for the researcher and for those the researcher serves, and what is missed by choosing to ask this question rather than another. Before research begins, one ought to develop a broad understanding of the problem. Doing so requires considering contrasts and comparisons of the sort that Feyerabend defends (an effort that is often missing in literature reviews); it also requires attending to and seeking alternatives, getting beyond oneself and one's position to imagine the problem as others understand and have understood it—and to do this requires engagement with others. Here, the visionary may enter, for visionaries in their wide-awakeness see the world as others do not and in so doing stretch and challenge imagination. In challenging the commonplace, they reveal fresh ways of understanding old problems, and they attack new questions that may involve acts of reclamation—for example, when good ideas have been forgotten or seemed to lose promise because a needed supporting technology was unavailable.

I have argued for an expanded and generous conception of interdisciplinarity, not multidisciplinarity, for graduate education, one that would support the sort of dialectics that Kaufmann envisions between and among researchers and that which is studied and researched. There is no doubt that this is a tall order. It requires the crossing of well-established intellectual divisions and social and institutional boundaries—divisions and boundaries that tend to encourage and reward insularity while often leaving policy analysis to the journalists and their friends. Given the practical moral intent of education research, crossing the boundaries and doing so with others should prove not nearly as difficult as in the social sciences, although perhaps not as easy as in the hard sciences, where mathematics provides a shared language. In any case, disciplinary boundaries are historical creations, habits of mind, and are subject to change over time despite faculty allegiance to and self-investment in them.

Perhaps more important, I argue for encouraging those who wish to engage in education research to read broadly and with others.[3] Graduate programs in education should be carefully crafted to include encounters with the humanities and to engage students from a wide range of social and intellectual backgrounds on shared and meaningful tasks. Those of us who teach in such programs will face a daunting challenge, for we may discover that we are not fully able to guide our students and are increasingly dependent on "interdisciplinary networks" (National Research Council, 2004, p. 67) and their collective expertise. The challenge brings with it rich opportunities to learn, relearn and—perhaps most important—unlearn our worlds, and to form new, more expansive visions.

NOTES

[1]A century ago, practical studies, for example, were defended as reflecting "scientific training rather than . . . practical applications" (Hinsdale, 1910, p. 400). Then, as now, and despite William James's warning, psychology in its various—and often narrowest—forms continues to enjoy first position as the avenue to a science of education. James said, "Psychology is a science, and teaching is an art: and sciences never generate arts directly out of themselves. An intermediary inventive mind must make the application, by using its originality" (1899, pp. 8–9). The prominence of psychology as a field has had many effects, including the reversal of the long-established relationship of curriculum and instruction and the near death of curriculum studies.

[2]Garrison's discussion of the prophetic in teaching is equally provocative: "Prophets are the finest poets and philosophers, for it is their task to call into existence the novel values that, if we truly desire them, will lead us toward a better destiny" (1997, p. 136).

[3]John Goodlad's Associates Program may provide a model for work of this kind (see Smith, 1999; Patterson & Hughes, 1999).

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COMMUNITY COLLEGE DISTRICT

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The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resource allocation.

As the first step in this planning process, everyone in the GCCCD community (faculty, staff, students and community members) are invited to identify and submit information sources to be reviewed for the trend analysis in one of six areas: society, technology, economy, environment, politics, and education. We are not asking you to do research, only to identify information you already have or that you encounter during the search period (March 21–April 2[illegible]) and bring it to our attention for review.

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Voices of Silence in Pedagogy: Art, Writing and Self-Encounter

ANGELO CARANFA

This article draws on the conclusion of the Commission on the Humanities in The Humanities in American Life *that the aim of a liberal arts education is to foster critical reasoning through the use of language or discourse. This paper maintains that the* critical method *is in itself insufficient to achieve its purpose. Its failure is in its exclusion of feeling and of silence from the thinking process. Hence, the ultimate object of my analysis is to correct and to complement the* critical method *with the* aesthetic method *of teaching the humanities. Central to the* aesthetic method *is art as a means to cultivate contemplative and creative skills. The essay brings out and examines the value of art as voices of silence in Plato, Aristotle, Augustine, Dionysius, Bonaventure, Maurice Merleau-Ponty and Paul Gauguin, and pays particular attention to the diaries of Eugène Delacroix. In the course of doing so, I shall be trying to make clear that art teaches us how to listen and how to encounter ourselves totally and completely. It goes on to suggest several pedagogical principles or consequences that flow from this aesthetic pedagogy.*

> [Art's] voice owes its power to the fact that it arises from a pregnant solitude [silence].
>
> —André Malraux, *The Voices of Silence*, p. 630.

> A poet who lives in solitude and produces a great deal can enjoy to the full the treasures which we carry in our hearts.
>
> —*The Journal of Eugène Delacroix*, 14 May 1824.[1]

The aim of a liberal arts education, observes the Commission on the Humanities in *The Humanities in American Life*, is to foster 'logical and analytical skills' (Commission on the Humanities, 1980, p. 43) that will enable students 'to analyze, criticize, and assess ethical problems, issues of public policy, and the question of value underlying science and technology' (p. 69). The Commission goes on to say that in order to achieve this end, 'the humanities employ a particular medium and turn of mind. The medium is language. Discourse sets in motion and supports reflection and judgment' (pp. 2–3).

These statements merit closer examination. First of all, they demonstrate that the humanities are essentially concerned with 'critical standards of judgment' (p. 109). Secondly, they claim that the humanities rely exclusively on language or discourse. Thirdly, they indicate that 'the critical method' (p. 71) of the humanities is indistinguishable from the methods of the social and the physical sciences.[2] Finally, they assert that the primary purpose of the humanities is to help students shape their democratic way of life: 'Each major branch of the humanities helps educate men and women for citizenship' (p. 70).

The failure of the *critical method* is not in its goals, but in its *exclusion* of feelings and of silence from the reflective or thinking process.[3] Although the Commission believes that 'effective instruction in the humanities encourages a creative interplay of fact and imagination . . . [and] helps students sense the aesthetic dimensions of their everyday lives' (p. 29), the Commission leaves much unsaid about the inclusion of art or of aesthetics in the standards or criteria of judgment.

The purpose of this essay is to correct and to complement the *critical method* with the *aesthetic method*. The claim I make here is that instruction in the humanities is as much about listening as it is about speaking; it is as much about unknowing as it is about knowing; and, finally, it is as much about the *vita contemplativa* as it is about the *vita activa*. To complement the *critical method* with the *aesthetic method*, I rely on art and writing. They emerge or develop out of solitude; they are the expressions of the harmonious unity of *conceptual intelligence* and of *imaginative intelligence*.

The outline I follow in the development of my thesis is: a sketch of the pedagogy of an *aesthetic of silence*; this is followed by a model for writing suggested by Eugène Delacroix, a model capable of developing in the students analytical and creative skills; finally, the essay concludes by emphasizing the instructional value of an *aesthetic of silence*.

A SKETCH OF THE PEDAGOGY OF AN AESTHETIC OF SILENCE

Learning to listen: art, contemplative silence and self-encounter

The proposed *aesthetic method* must begin with a clarification of the role of art in the understanding of the nature of human experience. Art has its source in the sensory modes of human experience; it develops out of the body's discourse with the world. Instruction based on the bodily functions of sense perception thus provides a way to analyse how we shape and are shaped by the world around us, as the senses constitute the passageways that connect the interior to the exterior world, the self and the other. In this way, any relationship or encounter is an aesthetic one.

It is precisely this aesthetic relationship that the *critical method* ignores, and this that has weakened the true place of art or of aesthetics in education. In Book III of *The Republic*, Plato makes clear the centrality of art in learning. There, Plato teaches us that a true education must harmonise the life of the mind with the life of the body in order to produce a healthy individual. Plato goes on to suggest that the true teacher is not the philosopher but the artist, for the artist alone can discern the true nature of the beautiful and of the graceful; and, therefore, of the Good. Through an education based on art, Plato concludes, 'youth will dwell in a land of health, amid fair sights and sounds, and receive the good in everything; and beauty, the effluence of fair works, shall flow into the eye and ear . . . [and] draw the soul from earliest years into likeness and sympathy with the beauty of reason' (Plato, 1937, p. 401).

The basis for instruction is art or aesthetics, according to Plato; it alone 'draw[s] the soul' from the early years along the path of the 'beauty of reason'; and when reason develops in later years, Plato observes, the individual 'becomes noble and good' (p. 402). Moreover, artistic-aesthetic learning alone finds its way 'into the inward place of the soul' (p. 401) imparting it with the 'spirit of harmony', thus rendering it capable of apprehending and of loving the loveliest and the fairest of sights and of sounds: 'The fairest indeed' (p. 402).

For Plato, then, art is supposed to beautify life, thus rendering our actions good, in that they flow from the 'spirit of harmony' that governs our soul. Similarly, Aristotle insists in Book VI of the *Nicomachean Ethics* that actions are good or virtuous when 'reasoning [is] true and the desire right' (in Aristotle, 1941, *Nicomachean Ethics*, book 6, chapter 2, 1139a, 25). Education, Aristotle goes on to say, should teach us how to act ethically or virtuously; for, when we learn how to be virtuous, we also learn how to justify rationally our emotions. Emotion or sensation brings us in contact with the object of desire, Aristotle explains, while reason knows whether the object brings us pleasure or pain. Hence reason cannot be divorced from sensation or emotion; otherwise it would exclude pleasure as a necessary element from the happy life as the final end of human actions. 'For pleasure is a state of *soul*, and to each man that of which he is said to be a lover is pleasant' (book 1, chapter 8, 1099a, 7–8).

Art, Aristotle explains in his *Poetics*, functions, in part, as a way of promoting moral skills, much like the practical sciences of ethics and politics. Therefore it follows that a work of art is both instructive and brings us pleasure; 'the reason of the delight in seeing a picture is that one is at the same time learning' (Aristotle, 1941, *Poetics*, chapter 4, 1448b, pp. 15–16). Learning attains its highest level in the contemplative life; it alone, Aristotle writes, 'would seem to be loved for its own sake; for nothing arises from it apart from the contemplating, while from practical activities we gain more or less apart from the action' (*Nicomachean Ethics*, book 10, chapter 7, 1177b, 1–4). Contemplation leads to the blessed and happy life of God (1178b, 9–35).

Edgar de Bruyne tells us that the writers of the Middle Ages incorporated into their aesthetic systems the ideas of Plato and Aristotle, thus Christianising the philosophy of art. Art, in de Bruyne's view, becomes justified 'by the spiritual quality of the joys of contemplation' (de Bruyne, 1969, p. 170). The joy of contemplating God in the material world requires an act of silence, Saint Augustine observes in Book IX of *The Confessions*. So that God 'Himself alone were to speak . . . in His own, and we were to hear His word . . . in all [the] things we love' (Augustine, 1963, p. 202). And the things of this world we love, Augustine goes on to say, should be seen or used as signs pointing to the 'invisible [things of] God' (p. 203). Thus when Augustine instructs us to silence 'the images of earth . . . the soul herself . . . every tongue, every sign . . . or allegory' in order to make 'contact with that eternal wisdom which abides above all things' (p. 202), he is stressing the idea that silence encloses all things, including speech, or language, or discourse, or any form of expression.

Art is thus essentially a grammar or a rhetoric of silence, for Saint Augustine; it instructs us in matters of the Divine or Eternal Art, according to which it was said at the beginning of creation: '*Let there be light, and there was light*' (p. 318). As soon as God proclaimed these words, Augustine insists, creation, once formless, dark, and disorderly, became converted or oriented to Him; '*now it is light in the Lord* . . . [and] *our darkness be as the noonday*' (p. 321). To perceive the Creator's light shining in things and in us, Saint Augustine points out, we must bring ourselves into a state of solitude, so that God's light can illumine our hearts, stirring them to see that all things are good and beautiful. As we look into our hearts, the Bishop of Hippo reminds us, we discover that the 'most beautiful order of things that are *very good* will finish its course and pass away' (p. 349) but eternal life is without ending—filled with joy, peace, quiet, serenity and radiance in the Silence itself.

This Augustinian language of silence stands behind Dionysius the Areopagite's mystical experience of God in the contemplation of the divine words or names or powers. Like Augustine, Dionysius searches to find a language capable of signifying God's creative word from which all things originate. And, similar to Augustine, Dionysius believes that the way to God is 'by no discourse, by no intuition, by no name' (Dionysius, 1978, *The Divine Names*, chapter 1, 50). Every name, every discourse, every intuition or thought, and, indeed, everything visible disappears in the darkness or the abyss of God who 'is beyond assertion and denial' (chapter 5, 141). For Dionysius, as for Augustine, the way to God is by silence and by unknowing. Dionysius notes that human language falters before 'him who is indescribable' (chapter 3, 139) and that human knowledge is incapable of understanding the Unknown and the Transcendent One. He uses the example of the sculptor to convey the creative act of unfolding the hidden or transcendental image or beauty in things, which is God's light radiating from 'the brilliant darkness of a hidden silence' (chapter 3, 135). He writes: 'They [Sculptors] remove every obstacle to the pure view of the hidden image, and simply by this act of clearing aside they show up the beauty which is hidden' (chapter 3, 138).

This is the foundation from which an *aesthetic of silence* arises as a *via negativiva* to render clear or visible the 'hidden image' that transcends all visible and intellectual images, and to listen to the 'hidden silence' that sounds in all the words. The only recourse that Dionysius and Augustine have to this hidden meaning in things is the symbol (Eco, 1986, chapter 5). In *The Celestial Hierarchy*, Dionysius instructs us that things of God should be symbolized by 'incongruous dissimilarities', because they 'offer due homage to the divine things', and also because they can lead us 'beyond appearances to those upliftings which are not of this world' (Dionysius, 1978, *The Celestial Hierarchy*, chapter 2, 152–153). In the incongruity of the symbol, the invisible is connected to the visible, and the human self can be uplifted beyond appearances to the point that lies beyond all dissimilarities: God's beauty as center that reconciles all things to itself. 'This is what unites everything', concludes Dionysius, 'begetting and producing the harmonies and the agreement of all things' (*The Divine Names*, chapter 11, 121).

Saint Bonaventure further articulates this Augustinian-Dionysian theological or mystical aesthetics in *The Soul's Journey into God*. In fact, this work is nothing but a symbolic understanding or interpretation of the soul's uplifting to God's world of silence. In the Prologue, Bonaventure informs us that he withdrew to Mount La Verna in search of peace and serenity. There, a vision came to him that resolved the miracle of the winged Seraph that appeared to Saint Francis: 'I saw at once that this vision represented our father's rapture in contemplation and the road by which this rapture is reached' (Bonaventure, 1978, p. 54). This vision, then, symbolizes 'the six levels of illumination by which, as if by steps or stages, the soul can pass over to peace through ecstatic elevations of Christian wisdom' (ibid.). For Bonaventure, as for Dionysius and Augustine, the path to God is through the contemplation of the crucified Christ. But no one, Bonaventure soon adds, is disposed for 'divine contemplation that leads to mystical ecstasy' (p. 55) unless we are persons of desires. Desires, Bonaventure writes, 'are enkindled in us . . . by an outcry of prayer . . . and by the flash of insight by which the mind turns most directly and intently toward the rays of light' (ibid.).

Contemplative silence, then, is the source of the soul's ascent. Bonaventure teaches us that by contemplating the visible world as a mirror that reflects the wisdom, the goodness, the beauty and the light of God, we can ascent, step by step, until we reach the 'superluminous darkness of a silence' where are hidden 'the unchangeable mysteries of theology' (p. 114). This journey to the summit of mystical ecstasy consists, in the words of Dionysius, in 'clearing aside' everything of the sensible and of the rational, so as to attain union with God 'who is above all essence and knowledge' (p. 115). So, 'Let us impose silence upon our cares, our desires and our imaginings' (p. 116). Let us, in the end, silence everything, Bonaventure insists, so that we can hear through our eyes the Eternal Art of God 'by which, through which and according to which all beautiful things are formed' (p. 74). Thus, to Bonaventure, all things signify the creative or 'ordering art' (p. 76) of God; for everything is by nature 'a kind of effigy and likeness of the eternal Wisdom' (p. 77).

What emerges from this theological or mystical aesthetics of Bonaventure, Dionysius and Augustine is the necessity of feeling or intuition or imagining, and of contemplative silence in learning or in knowing. In the contemplation of God's 'hidden image' in things, we ascent to the divine—that is, to the *creative*—way of doing and of knowing. By seeing all things in God, and by ordaining all things to Him, we pass beyond the visible to the invisible, beyond the temporal to the eternal, beyond the material to the spiritual, beyond darkness to light, and thus become transmuted into the likeness of 'the supreme Craftsman' (p. 63). Bonaventure, Dionysius and Augustine believe that there is nothing in the visible world that does not symbolise or signify God's craftsmanship—marvellous, ineffable and hidden from eternity in the divine darkness of silence.

This leads Edgar de Bruyne to conclude: 'All of the medieval aesthetic systems are types of symbolism' (de Bruyne, 1969, p. 68). And Johan Huizinga informs us in *The Waning of the Middle Ages* that medieval aesthetic symbolism opens art to 'forms full of colour and melody, and yet vague and implicit, so that by these the profoundest intuitions might soar towards the ineffable' (Huizinga, 1954, p. 207). In particular, medieval artists were not interested in mimic nature; their forms were vague and implicit for the purpose of leading the viewer to an encounter with the ineffable Word of God as silence from which it came. Medieval icons, Vladimir Lossky observes, are 'expressions of the inexpressible' (Ouspensky and Lossky, 1989, p. 14). As such, they depict in forms of colours and in melodies of gestures and actions the ineffable splendour of God's Divine Light—the inexpressible or indefinable Word of God made definable or incarnate in Christ. In short, Leonid Ouspensky writes, the icons express 'the transfigured state of man . . . his sanctification by uncreated Divine light' (p. 38). But this sanctification—of which the light is shown in the icons by the halo—cannot be transmitted by human language: silence alone can communicate it, 'since it is totally indescribable and inexpressible' (ibid.). Thus in the icon, Leonid Ouspensky concludes, every manifestation of human nature acquires meaning, becomes illumined, finds its true place and significance: 'All human feelings, thoughts and actions, as well as the body itself, are given their full value . . . The icon is both the way and the means; it is prayer [contemplation, silence] itself' (p. 39).

To the extent, and in the way, that the icon gives full value to human feelings, thoughts and actions, we receive the same value from any form of visual representation. According to Aristotle, the habits of feeling pleasure or pain, of thinking and of moral choices that we experience in looking at a work of art are the same as those we experience in real life: 'for example, if any one delights in the sight of a statue for its beauty only, it necessarily follows that the sight of the original will be pleasant to him' (Aristotle, 1941, *Politics*, book 8, chapter 5, 1340a, pp. 25–28; see also Eaton, 1989, chapter 7). Therefore an encounter with a work of art is, in the words of Hans-Georg Gadamer, total, complete and authentic; it involves 'the task of integrating it into the whole of one's orientation to a world and one's own self-understanding' (Gadamer, 1976, p. 102). This self-understanding with which art is concerned has not only temporal orientation, as John Dewey argues in *Art as Experience*, but also a timeless truth. 'The observer', writes Albert Hofstadter in *Truth and Art*, 'is able to enter into the truth of the spiritual being that has become articulated in the work and thus participate in such truth on his own account' (Hofstadter, 1965, p. 186). This participation in the spiritual, this total and complete self-encounter, is accomplished by silence. 'Language speaks, and the voices of painting are the voices of silence', writes Maurice Merleau-Ponty in *Signs* (Merleau-Ponty, 1964, p. 81).

Language, Merleau-Ponty explains in *The Visible and the Invisible*, is the world of the visible; painting is the world of the invisible. Language is the voice of logic or reason, while painting is the logic of colour, line and form. Language, Merleau-Ponty goes on to say, is a departure from the world of silence, while painting reabsorbs the silence of the world into itself. Furthermore, language is a way of knowing by questioning or interrogation, while painting is a knowing by intuition or sentiment. In short, for Merleau-Ponty, philosophical language does not give us a true, genuine knowledge of the visible world. On the contrary, it robs the world of its invisible essence. Merleau-Ponty concludes by saying that any knowledge or language that does not take into account silence is inadequate: it merely stands for, or symbolises, that which we seek to say or know. But, Merleau-Ponty adds, 'the words most charged with philosophy are not necessarily those that contain what they say, but rather those that [do not contain what they say or speak]' (Merleau-Ponty, 1968, p. 102). Hence, 'The philosopher speaks, but this is a weakness in him, and an inexplicable weakness: he should keep silent' (p. 125). Or, the philosopher should speak with a certain silence he hears within himself, since silence alone places him or her in contact with the being of Being. 'Philosophy is . . . that language that can be known only from within, through its exercise, is open upon the things, called forth by the voices of silence, and continues an effort of articulation which is the Being of every being . . . Philosophy is the reconversion of silence and speech into one another' (pp. 126–127, 129).

So it is that art and philosophy intersect; or, any distinction between language, philosophy and art is blurred, for all three are manifestations of the invisible in the visible, of the unknowable in the knowable and of silence in discourse; all three, in Merleau-Ponty's view, seek to return the visible or phenomenal world to the unfathomable, which is God and the Abyss. 'God's being is for us an abyss . . . The depth of the existing world and an unfathomable God no longer stand over against the flatness of "technicized" thought [as they do in the Cartesian world of thought]' (Merleau-Ponty, 1993, p. 137). Merleau-Ponty discovers this unity of the 'depth' of the world and of 'an unfathomable God' in art. 'The meaning of what the artist is going to say *does not exist* anywhere . . . It summons one away from the already constituted reason in which 'cultured men' are content to shut themselves, toward a reason which would embrace its own origins . . . toward the idea or project of an infinite [or a silent] Logos' (p. 69). The artist, Merleau-Ponty continues, wants to depict the coming of silence into being or into articulation, what things want to say without at the same time breaking 'the thread of silence from which the tissue of speech is woven' (pp. 63–64). What to the philosopher appear as contradictions or dichotomies become unities to the artist. 'Cézanne did not think he had to choose between feeling and thought, as if he were deciding between chaos and order. He did not want to separate the stable things which we see and the shifting way in which they appear; he wanted to depict matter as it takes on form . . . Cézanne wanted to paint this primordial world, and his pictures therefore seem to show nature pure' (ibid.).

Where philosophy cannot express 'nature pure', or where it cannot speak adequately of the 'primordial world', or, indeed, where it fails to give us complete knowledge of things, art comes to the rescue. By appropriating the silent language of art to his philosophy, Merleau-Ponty completes it by reconnecting it with the *via negativa*—the apophatic method in philosophy—of knowing. This negative way, Merleau-Ponty points out, 'is not hesitation, bad faith and bad dialectic'. Rather, 'it is a return to the abyss'. It alone conforms to the being of Being: '"negative philosophy" like "negative theology"' (p. 179).[4]

Like negative theology, Paul Gauguin's art narrates or signifies our encounter with 'an unfathomable God'. This encounter, says Gauguin, is more adequately rendered by eyes that contemplate or dream or remain closed than by eyes that think or that are opened, as his 1889 *Self-Portrait in Stoneware* reveals. The fruition of this 'complete silence' (in Thomson, 1993, p. 262) is that nature is filled 'with perfumes . . . [and] with something indescribably solemn and religious' (ibid.). Hence what enhances Gauguin's contemplative rapture is the hidden meaning of things: 'I *know not* [emphasis mine] what sacred horror I divine in the infinite' (ibid.). This is a knowing that dispenses with all visible or material and rational or literary images in order to attain 'the mystery of our origin and of our future' (ibid.). The mystery Gauguin speaks of is nothing but the primordial image—'nature pure' (Merleau-Ponty), or 'the pure view of the hidden image' (Dionysius)—which is a pure Void, a Nothing, the Unnameable. Lamenting over the disappearance of the Marquesan art due to the influence of the Christian missionaries, Gauguin writes:

> Seeing this leads me to think, or rather to dream, of the time when everything was absorbed, numb, prostrate in the slumber of the primordial, in germ. Principles invisible, indeterminate, indistinguishable at that time, all in the first inertia of their virtuality, without a perceptible or perceiving act, without active or passive reality or cohesion, possessing only one evident characteristic, that of nature itself, entire, without life, without expression, in solution, reduced to vacuity, swallowed up in the immensity of space which, without any form and as it were empty and penetrated to its very depths by night and silence, must have been a nameless void: this was chaos, the primeval nothingness, not of the Being but of life, afterwards to be called the empire of death, when life, produced from it, returns to it (in Brooks, 1968, p. 97).

But in order to represent or create in his work this primordial image of nature or of reality—where we, as observers, would find ourselves suspended and absorbed between knowing and unknowing, life and death, the depths of night and the radiance of day, the chaos of nothingness and the stillness of silence—Gauguin had to withdraw into solitude; he had to free himself from the distractions of others, so that could explore his own ideas or thoughts. 'That is why solitude is . . . to be recommended' (in Thomson, 1993, p. 283) for those working in art, writes Gauguin to Charles Morice in his letter of April 1903. Solitude is to be recommended in order to ensure personal knowledge: 'Everything I learned from other people merely stood in my way', concludes Gauguin. 'Thus I can say: no one taught me anything' (ibid.).

Solitude teaches us; and to be in solitude is to be with one's self, 'and thinking, therefore, though it may be the most solitary of all activities, is never altogether without a partner and without company' (Arendt, 1958, p. 76). And if art is the voices of silence, then, according to Eugène Delacroix, it can lead us into thinking: 'The beholder sees figures, the external appearances of nature, but inwardly he meditates; the true thinking that is common to all men' (*Journal*, 8 October 1822).

Like art, writing begins in solitude—the solitude that discloses the world of creative existence where the *vita contemplativa* and the *vita activa* are magnificently interwoven. In writing, we attempt to restore the world of silence behind our verbal life. The model for writing that Eugène Delacroix advances gives voice to silence; it is a by-product of a solitary life in search of a universal presence, indeed, of God (*Journal*, 12 October 1822). Delacroix writes in order to discover or to know himself as a creative being. On his journey to self-discovery, the reading of the great masters of literature and of all the other arts played an instructive role for him: it contributed towards his understanding of the *creative process* as the establishment of *unity* or of *harmony* among the various parts of the work, as well as among words, feelings and thoughts.

In his reading, Delacroix discovers certain basic principles or elements that he considers worthy of teaching to any student in any art for his or her creative development. These principles are: solitude, touch, thought, imagination, reason and unity or harmony. What follows is a brief explanation of each.

Delacroix's model for writing as a creative process

Solitude. The artist or writer, according to Delacroix, must remain solitary, must work in silence, so that he can let himself go toward the expression of what he holds deep within his heart. 'A poet who lives in solitude and produces a great deal can enjoy to the full the treasures which we carry in our hearts, but which forsake us when we give ourselves to others' (*Journal*, 14 May 1824). When we give ourselves entirely to the habits of daily existence, of the social other, it is difficult, if not impossible, to express 'the treasures which we carry in our hearts'. Over and over again, Delacroix reminds himself 'that I need to live a more solitary life. The loveliest and most precious moments of my life are slipping away in amusements which, in truth, bring me nothing but boredom' (*Journal*, 14 April 1824). Solitude enables Delacroix to awaken the treasures of his heart to such an intense feeling that he is led to create, to capture those privileged moments that otherwise might be taken away from him. For this reason, Delacroix instructs students 'to remain in solitude . . . even though this should mean self-annihilation' (*Journal*, 2 May 1855). In solitude, Delacroix concludes, one is drawn away from 'commonplace thoughts [to] great ideas' (*Journal*, 3 March 1824).

Touch. To the artist, touch or brush-stroke is a means that contributes towards 'rendering a thought in painting' (*Journal*, 13 January 1857). By means of touches or brush-strokes, the artist tries to achieve the desired effect—'They can render the bloom on a young girl's cheek, an old man's wrinkles, the softness of cloth, the transparency of water, the distance of skies and mountains' (ibid.). Thus a painting in which the touches are ingeniously placed and in which there are no visible traces of them is a well-executed work. With reference to Titian, Delacroix notes: 'The touch is so difficult to see in his work, the hand of the craftsman so completely concealed, that the steps he took to arrive at such perfection remain a mystery' (*Journal*, 25 January 1857).

But touch, Delacroix goes on to say, is a way in which the artist sees things. Hence touch is seeing; vision leads the hand of the artist to touch and retouch the work so as to fulfil or render thought. 'True execution is one that fulfils the thought by means of an apparently materialistic technical skill without which it would be incomplete' (ibid.).

Touch applies equally well in writing, according to Delacroix: 'It is the same with poetry as with pictures' (ibid.). Delacroix instructs writers 'to say only what needs to be said' (*Journal*, 5 October 1856), and to say it with great interest and simplicity (*Journal*, 13 January 1857). The admirable quality of Lord Byron, Delacroix explains, is that 'he goes over his poetry again and again with the greatest care' so as to reduce 'as much as two hundred lines . . . to twenty' (*Journal*, 26 June 1857). Delacroix discovers this same quality in Jean de La Fontaine, who 'says everything without redundant elaboration and without periphrasis' (*Journal*, 5 October 1856). Great writers not only say what needs to be said with interest, simplicity and without superfluous elaboration, but also 'give a characteristic twist to everyday speech' so as to complete or supplement it, since 'language (here I mean language in all the arts) is always imperfect' (*Journal*, 25 January 1857). But writers who do not know when to stop writing, when to say only what needs to be said, and when fail to improvise, are bad writers. Delacroix uses *The Count of Monte Cristo* by Alexander Dumas, and *Ursule Mirouet* by Honoré de Balzac to illustrate his point. Of the first work, Delacroix writes: 'It is most amusing, except for the interminable conversations that cover pages on end. However, when you've finished reading it, you've really read nothing at all' (*Journal*, 5 February 1847). And of Balzac's work, we read: 'He creates his people through the jargon of their trades, in other words, from the outside . . . But nothing could be less true than these too neat and wholly consistent characters' (*Journal*, 22 July 1860).

Thought. To paint or to write is a way in which the artist or the writer sees, touches and renders thought. 'Rubens traces the first idea [thought] of his subject with his brush, as Raphael or Poussin do with pen or pencil' (*Journal*, 25 January 1857). Rubens, Raphael and Poussin, Delacroix says, wrote 'a few swift lines upon the paper, not one of which appears unimportant' (ibid.). Everything these masters touched or wrote appeared before their eyes as though it were already developed or finished, and nothing in the subsequent development or execution would deviate from their original idea or thought. 'The first main outlines in which a skillful master indicates his thought contain the germ of every characteristic that the work will ultimately possess' (ibid.). A skillful master brings his idea or thought to light because he is dealing with something he understands. For instance, '[Rubens] clothed his thoughts in images that were always readily accessible to him, translating the sublime ideas that came to him in such variety into forms' (*Journal*, 27 January 1852). Great masters, Delacroix concludes, never had to search for sublime ideas; their difficulty 'was certainly not in giving birth to ideas, but in rendering them in the best possible way through their execution' (*Journal*, 15 February 1852).

To give birth to ideas is thus the main goal of writing. To write, or to compose, or to execute well, one must never break with the ideal; 'without the ideal there is neither painting, nor drawing, nor colour' (*Journal*, 15 July 1849). Nor is there any good writing. Modern writers, Delacroix explains, have not achieved 'this type of the *sublime*, this astonishing naïveté, which makes poetry of commonplace details and transforms them into *paintings* for the delight of the imagination' (*Journal*, 3 September 1859). According to Delacroix, the ideal disappears in modern writers under a flood of detail—as in certain romances by Cooper—and the result is that 'you have to read through an entire volume of conversation and description in order to find one interesting passage' (*Journal*, 1 September 1859). Walter Scott's novels have the same defect, in Delacroix's view, a defect that 'makes them exceedingly difficult to read; the mind wanders dully over pages of emptiness and monotony where the author seems perfectly happy to be talking to himself' (ibid.).

Imagination. Perhaps the most pivotal aspect of rendering thought is imagination: 'This is the paramount quality for an artist' (*Journal*, 25 January 1857). Delacroix writes that imagination allows artists 'to see objects in a vivid way', thus leading them, as it were, 'to the very root of things' (ibid.). More than perceiving the various objects in their roots, imagination 'combines them for the purpose which he [the artist] has in mind; it makes pictures, images that he arranges as he pleases' (ibid.). The achieved arrangement or combination is a *unity* or a *harmony*. According to Delacroix, harmony or unity is found in nature, and it should be the desired norm of painting or of any other art as well. 'This is a charm which painting seems unable to dispense with, and yet the majority of painters . . . paid little attention to it' (ibid.). Delacroix concludes that imagination alone constructs unity or harmony, and 'The sacrifices which painters and poets make for the sake of elegance, charm, and effect upon the imagination, excuse them for occasional faults in exact logic' (*Journal*, 14 June 1850). Exact logic is not art or poetry; good painting or good poetry is '*pleasing* or *expressive*' (*Journal*, 18 July 1850).

Delacroix further claims that imagination facilitates the unity or reconciliation of opposites: of the ideal with the real, of the universal with the particular, of the supernatural with the natural, of reason with feeling, and of the spiritual with the physical. Herein Delacroix discovers the glory of Titian and of Rubens. Of Titian, Delacroix writes: 'Life and logic abound in every part of his work . . . Whatever he does is done thoroughly and completely; when he paints eyes, for instance, they see, they are quickened by the fire of life' (*Journal*, 4 October 1854). And of Rubens: 'His painting . . . is dominated by the imagination' (*Journal*, 12 October 1853), thus 'he compels you to accept his so-called defects, that come from the impetus with which he is swept along, and wins you over . . . He dominates, he overwhelms you with so much liberty and audacity . . . What a magician!' (*Journal*, 21 October 1860).

Reason. Delacroix proceeds to contrast those artists whose work is the result of 'intelligence in using the imagination' (*Journal*, 12 Ocober 1853), with those who simply create according to their fancy. He writes that a great master encloses the imagination within reason or intelligence so as to prevent it from going astray from the real or the true into the realm of pure fantasy, as in Edgar Allan Poe, and in some artists from the North. 'Such people only care about what is beyond nature, or extra-natural, but the rest of us cannot lose our balance to such a degree; we must have some foundation of reason in all our vagaries' (*Journal*, 6 April 1856). Indeed, what distinguishes French masters is the unity of reason and feeling or imagination they bring to their work. For the French, Delacroix concludes, art is not a 'vague inspiration coming from nowhere, moving at random, and portraying merely . . . the external side of things' (*Journal*, 7 April 1849). Rather, art is 'pure reason embellished by genius [imagination], but following a set course and bound by higher laws' (ibid.). Here Delacroix appeals to Poussin and Molière. Poussin, Delacroix explains, carries reason or thought to the point of rendering his 'pictures intensely arid' (*Journal*, 6 June 1851) yet expressively beautiful: '[As a] poetic observer of history and the emotions of the human heart, Poussin is unique' (*Journal*, 28 April 1853). Unique is also Molière who knows how to combine the true, with the imaginative, reason, with feeling: 'We are often told that Molière, for example, could only have existed in France. I should think so! Was he not the heir of Rabelais, not to mention others?' (*Journal*, 3 March 1860).

Therefore in painting, as in writing, to create is to bring what the eyes see, the hand touches or writes, the intellect reasons or thinks, and the imagination imagines into a harmonious whole or unity.

Unity. Delacroix writes that in painting, as in any other art, the finished work is one in which the 'proportions between the different parts' (*Journal*, 13 January 1857) harmonise with and support each other so as to form a unified whole. Thus the unity of the work should flow naturally out of the 'logical arrangement' of the essential parts so as to enhance 'a sense of the *sublime*' (ibid.). In the works of great masters, Delacroix notes, 'proportion counts for a great deal' (*Journal*, 20 October 1853).

But proportion is not everything. Delacroix believes that it is possible to give rise to a sense of the sublime 'through want of proportion' (*Journal*, 25 January 1857), as for example in the works of Shakespeare, Michelangelo and Beethoven (*Journal*, 9 May 1853). Delacroix explains that from the perspective of its internal structure or composition, a work by Shakespeare or Beethoven lacks proportion, and a work by Michelangelo is filled with incongruities. Yet disproportion in any of these works does not take away from the general effect: the creation of an impression on the mind or imagination of the observer. Flawless or well-arranged works, such as those by Mozart, Cimarosa and Racine, do not create as much an impression on us as those by Shakespeare, Michelangelo and Beethoven, which seem less logical (*Journal*, 9 May 1853). Delacroix points out that the incongruities in Michelangelo, and the lack of proportion in Shakespeare and Beethoven, are intended to deliberately stir 'our emotions independently of the rest of the work' (*Journal*, 4 October 1854).

Yet Delacroix insists: 'each separate part, however brilliant, should contribute its quota to the general scheme' (*Journal*, 3 March 1860). And nothing in the general scheme should prevent the observer from being carried forward, not chiefly by 'the facility which the artist gains in handling his brush' (*Journal*, 25 January 1857), but also by the activity of the mind. 'He [the beholder] is moved because he sees nature through the eye of his memory while he looks at your picture. Your picture must already have been beautified, idealized . . . which memory thrusts willy-nilly into all our recollections' (*Journal*, 12 October 1854). It is thus that we are led into thinking: 'Precious realm of painting! That silent power that speaks at first only to the eyes and then seizes and captivates every faculty of the soul!' (*Journal*, 7 May 1824). Thinking, Delacroix goes on to say, 'does not depend on exact obedience to laws [of logic]' (*Journal*, 19 September 1847). Rather, it happens at once as we look at or respond to what we see or contemplate.

Contemplative wonder is—or should be—the main object of art and of writing, so that we continually 'learn to know ourselves, and of . . . displaying it in our works' (*Journal*, 14 May 1824). Art and writing are ways of displaying this knowledge of ourselves for others: 'The thought of communicating with other souls capable of understanding one's own, and thus of one's work becoming a meeting place for the souls of all men' (ibid.). Furthermore, to create or to write is to make oneself the voice of silence as the very heart and soul of learning or of knowing.

This leads me to the final part of the essay: the instructional value of an *aesthetic of silence*.

Instructional value of an aesthetic of silence

Several pedagogical principles seem to follow from the development traced here. First, an *aesthetic of silence* teaches *to listen* in a way that makes possible the *integration* of the moral, the intellectual and the spiritual dimensions of our life. As teachers, we must recognise that learning issues forth from listening, which silences what we think we know. What we know, we know *tacitly*, says Michael Polanyi in *Personal Knowledge*; and what we know tacitly, Polanyi goes on to say, is '*more than we can tell and we can tell nothing without relying on our awareness of things we may not be able to tell*' (Polanyi, 1964, Preface). Our failure to teach that there is 'more' to knowledge than what 'we can tell' is perhaps our greatest shortcoming as educators. The problem of education is a direct result of our failure to listen, to teach silence. To be alone and to listen should have priority over discourse and critical thinking.

This is not to say that silence is *opposed* to discourse or critical thinking, but that it is its very source. Without silence, critical thinking becomes empty words, merely a pretension to know. If an *aesthetic of silence* teaches us anything, it is this: dialogical or dialectical thought process is a journey into the interior, which culminates in the beholding of a truth, a good, a beauty and a love beyond thought and speech—one before which we remain silent, since it is incommunicable.

Second, an *aesthetic of silence* utilises art and writing *to enhance* the student's contemplative attitude and creative skills. To be alone is the condition for creative activity, as, for example, writing. Writing here is taught as a method of inquiry into the meaning of the self and of the world. Hence it shares the same method that the arts or the humanities use. As an art, writing is essentially *creative*; it is not a summary, or a description, or a logical process, as though pasted together. Rather, it is to put down one's own thoughts as naturally or as spontaneously as they come to us; 'He should not be afraid of contradicting himself', says Delacroix; 'there is more fruit to be harvest from a rich profusion of ideas, however contradictory, than from the neat, constricted, clipped pattern of a work' (*Journal*, 1 November 1852).

To write, then, is not to possess logic or reason but *to acquire* it; it is not a 'neat, constricted, clipped pattern' but a continuum, an expansion of thoughts and of emotions that leads to *self-encounter*. It is thus that writing is the most educational of all human activities, and a place in which the formation of the self can be seen. 'I consider writing', writes Laurel Richardson, 'a way of finding out about yourself and your topic . . . Writing is not just a mopping-up activity at the end of a research project. Writing is also a way of 'knowing'—a method of discovery' (Richardson, 2000, p. 923). Discovery, however, requires solitude, time, efforts, practice, trust, sincerity, patience, love and failure—none of which is emphasised in writing. In most undergraduate writing programmes, writing is not considered a focus of discovery, a place where one's thoughts and emotions shape and reshape themselves into what Polanyi calls 'a new moving vision of the world [and of ourselves in the world]' (Polanyi, 1975, p. 107).

Third, an *aesthetic of silence* promotes an encounter with the *other*; it is, in the words of Paul Ricoeur's work, '*Soi-même comme un autre* (*Oneself as Another*)'. This, it seems to me, captures the pedagogical core of an *aesthetic of silence*. The emphasis of our exposition has been on the necessity of 'self-annihilation' (Delacroix) as the dark moment of learning—the darkness of Bonaventure's interior ascent in which we grasp the wholly Other, or God. To enter this darkness demands, in the words of Dionysius, 'the act of clearing aside' everything, so that we can come to the 'pure view of the hidden image' (Dionysius, 1978, p. 138). In short, it demands utter solitude—which Delacroix, Gauguin, Bonaventure, Dionysius and Augustine sought above all. Only in such solitude, Delacroix concludes, can we discover the true meaning of 'justice and friendship, of divine emotions graven in the heart of man, and I no longer felt anything to be great in the universe, save man and his [C]reator' (*Journal*, 12 October 1822). It is thus that solitude becomes one with the moral meaning of justice, of friendship and of the Other. As the philosopher Emmanuel Levinas puts it in *Totality and Infinity*: 'Goodness consists in taking up a position in being such that the Other counts more than myself. Goodness thus involves the possibility for the I that is exposed to the alienation of its powers by death to not be for death' (Levinas, 1969, p. 247).

Today's teaching is hardly a discourse in which the teacher and the student *enter into* a relation with each other that manifests the presence of solitude, 'the alienation of [our] powers', and the loss of the egoistic self. Undue reliance upon critical discourse is the primary flaw in today's instructional approach to the Other as a phenomenon that can be captured or comprehended by language and by the methods of science. In an *aesthetic of silence*, the relationship between the teacher and the student is maintained by the mystery, the unknowability of the encounter; 'and when the soul opens, in the marvel of teaching', concludes Levinas, 'the transitivity of teaching is neither less nor more authentic than the freedom of the master and the student' (p. 181).

Fourth, the silent educational moment is not only transitive, authentic, and free, but also *ecstatic*.[5] The pleasure that results from being absorbed in the learning process is nothing but the desire *to go on with the search*, with *discovering* one's true self in the Divine, or in the Transcendent, which, according to Plato's *Phaedrus*, is 'beauty, wisdom, goodness, and the like; and by these . . . the soul is nourished' (Plato, 1937, p. 246). To nourish the soul, without utility, profit words, and the reasons of the mind, but with the love of the beautiful, this is the ultimate aim of an *aesthetic of silence* as method of learning. The student and the teacher learn to love the other selflessly and sincerely. This is the joy of what Gabriel Marcel calls *creative fidelity* (Marcel, 1964, chapter 8). It is the joy of opening ourselves to the beauty or to the mystery of the world; it is, in the words of Levinas, to perceive the world as 'a language without teaching, a silent language, an understanding without words, an expression . . . of the presence of the Other' (Levinas, 1969, p. 155).

Though no words are spoken, no teaching is taking place, and no understanding is revealed in our silent encounter with the world, we still *learn* many things. We learn, for example, *to contemplate* or *to listen to* its wonders, and to participate creatively in its continuous unfolding. 'Reality is a perpetual growth, a creation pursued without end', writes Henri Bergson in *Creative Evolution*. 'Our will already performs this miracle. Every human work in which there is invention, every voluntary act in which there is freedom, every moment of an organism that manifests spontaneity, brings something new into the world' (Bergson, 1911, p. 239).

But today's *critical method* renders it impossible for the *ecstatic impulse* to manifest itself. In part, this is because explanations and the objectivity of knowledge tend to suppress the transformative or creative power of personal knowledge, according to Michael Polanyi. 'Such knowledge', Polanyi writes, 'is totally ineffective unless it is known tacitly, that is, unless . . . it is simply dwelt in' (Polanyi, 1975, p. 41).[6] It seems to me that *indwelling* should be the true notion by which to consciously assess or measure the learning process, and with it bring our own thoughts and actions to bear in our productive or creative life. Polanyi maintains that *indwelling* accounts 'for a valid knowledge of the problem, for the individual's capacity to pursue it, guided by his sense of approaching its solution, and for a valid anticipation of the yet indeterminate implications of the discovery arrived at in the end' (Polanyi, 1966, p. 24).[7] In other words, learning based on an *aesthetic of silence* is intensely *practical* and is ecstatic. It is ecstatic not because its method is one of *detachment* but rather because it is one of *involvement*. As Martin Buber puts it in *I and Thou*: 'Creation—happens to us, burns into us, changes us, we tremble and swoon, we submit. Creation—we participate in it, we encounter the creator, offer ourselves to him, helpers and companions' (Buber, 1970, p. 130).

Finally, an *aesthetic of silence* can serve as *bridge* between science and the humanities, thus rendering the core curriculum *integral* or *whole*. Here the emphasis of teaching lies not in the epistemological cleavages between the rational methods of the sciences and the intuitive methods of the arts, but in the way in which we embody ourselves in the particular subjects or disciplines in achieving our knowledge of them and of ourselves through them. To Polanyi, this means that, like the arts, the sciences 'study man and society [not] in a *detached* manner' but by 'participation through indwelling' (Polanyi, 1975, p. 44)—by dwelling in our actions or efforts to understand our place in society. In short, to Polanyi, *indwelling* is an integral part of all knowledge; and all knowledge is a dynamic exchange between rational and imaginative thinking or understanding. 'That the various humanities are heavily entangled with the imagination has always been very clear to almost everyone', writes Polanyi; 'but that imagination has an essential role to play in science as well has rarely even been glimpsed' (ibid.).

If the imagination is essential in science as in the arts, then science, like the arts, can be taught as writing, as this paper suggests. Writing thus becomes the connecting thread that binds the curriculum together into a coherent whole; it shows the *indwelling* of our intellect and of our imagination; it shows, as Delacroix maintains, that the hand carries out the commands of the intelligent imagination. 'The search for words to express one's meaning may seem to be exactly what a poet [or a scientist] does and hence to be, perhaps, central to all art [or science]' (p. 98), according to Polanyi. Similarly, David Locke writes in *Science as Writing*: 'Both the poet and the scientist have their own individual experiences with life, and both try to express as well as they can what those experiences mean to them' (Locke, 1992, p. 86).

To correct and to complement the *critical method*, by way of conclusion, we need a pedagogy of an *aesthetic of silence*; it teaches us that knowing is ultimately unknowing, and that discourse is the voices of silence. Central to an *aesthetic of silence* are art and writing as means to cultivate contemplative and creative skills; indeed, as means of discovering ourselves, of becoming conscious of ourselves. This self-consciousness is nothing but oneself as the *other*; it is the self encountering the *other* in order to know or to understand oneself beyond itself—in the unsayable, the ineffable, the mystery, the unfathomable abyss.

An *aesthetic of silence* as instructional method embodies the idea that *to learn* or *to teach* is to remain in solitude; in solitude we learn to feel and to think beautiful thoughts on our own, and the teacher herself should be *contemplative*, moved not by endless explanations upon explanations but by endeavouring to remain silent before the unexplainable dimension of the human experience and of the world. Discourse or language, and critical or analytical skills, fail to make us see or hear the invisible in the visible, and they also fail to teach critical thinking as transcendence itself: by this we mean *philosophical ignorance*, as Socrates teaches us, and *mystical ignorance*, as Dionysius urges us to achieve.

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NOTES

1. *The Journal of Eugène Delacroix*, H. Wellington (ed.), 1980. This work will be cited as *Journal* in the text for all subsequent references, followed by the date of entry.
2. The Commission's report, it seems to me, echoes Auguste Comte's concept of education as an applied science. In his *Introduction to Positive Philosophy*, Comte maintains that the aim of education is 'to analyze correctly the circumstances of their [phenomena or experiences] production, and to connect them by normal relations of succession and similarity' (Comte, 1988, p. 8). Anything outside the domain or relation of cause and effect Comte abandons 'to the

imagination of the theologians or the subtleties of the metaphysicians' (p. 9). Comte's educational vision is made clear by Edward Thorndike in *The Principles of Teaching*. Like the Commission, Thorndike believes that the humanities should be studied from the scientific method, 'so [as] to make human beings intelligent and useful and noble' (Thorndike, 1906, p. 7). But this has yet to be achieved. On the contrary, this entails the abandonment of human freedom, dignity and creativity, as in *Beyond Freedom and Dignity* and *Walden II*, by Burrhus Frederic Skinner.

3. Today's exponents of the *critical method* fail in a similar way: they ignore the cognitive aspect of feelings and the epistemological dimension of silence in learning. See, for example, Nicholas Burbules and Rupert Berk, 'Critical Thinking and Critical Pedagogy: Relations, Differences, and Limits', in Burbules and Berk, pp. 45–65; Joan Boykoff Baron and Robert J. Sternberg, eds., *Teaching Thinking Skills: Theory and Practice*; Harvey Siegel, *Educating Reason: Rationality, Critical Thinking, and Education*; and John McPeck, *Critical Thinking and Education*.
4. Indeed, there is no doubt here of Merleau-Ponty's reminiscence of Paul Claudel, as the editor correctly points out. In fact, in his essay, 'On Claudel', Merleau-Ponty quotes the passage from Claudel's *Art poétique* that inspires him: 'Time is the means offered to everything whatsoever in order to be no longer. It is the *Invitation à mourir*, to every sentence to decompose in the explanatory, total harmony, to consummate the word of adoration in the ear of *Sigé* the Abyss' (Merleau-Ponty, *Signs*, p. 317). At the same time, however, we should point out that Merleau-Ponty himself, like Claudel, was captivated by rediscovering silence in the world and in us; and, like Claudel, he draws from the Christian mystical tradition—especially with respect to the themes of contemplation or the silence of perception, the mystery of the visible world, the need to re-enter ourselves, the importance of self-sacrifice and the notion of light—to establish the foundation of his negative philosophy. In short, what I am suggesting is that Merleau-Ponty's philosophy presupposes the Christian mystical tradition of which Paul Claudel is but one voice—Henry Bergson is another and Charles Péguy is yet another. As far as I know, there is no specific evidence in Merleau-Ponty's writings that links him to the poetic art of Paul Claudel. See, Caranfa (1989).
5. In this regard, see Leonard, 1968.

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GROSSMONT-CUYAMACA
COMMUNITY COLLEGE DISTRICT

PRINT FORM | SUBMIT

Education Master Plan
Information Submission Form

The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resource allocation.

As the first step in this planning process, everyone in the GCCCD community (faculty, staff, students and community members) are invited to identify and submit information sources to be reviewed for the trend analysis in one of six areas: society, technology, economy, environment, politics, and education. We are not asking you to do research, only to identify information you already have or that you encounter during the search period (March 21-April 2[illegible]) and bring it to our attention for review.

Please answer the following questions for each document you submit:

(Feel free to submit as many of these forms as you would like.)

1. What is the name of the document? Course Taking Patterns

2. Author: Calif Community Colleges Chancellor's Office

3. Source:

4. Which of the following areas does this document best address? (Please select only one.)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

5. Relevance:

6. Page/Section:

7. **Attach Document/Place URL Here:**

Download the free Adobe Reader ®: http://www.adobe.com/accessibility/products/reader/

To attach a document: **Reader 9: Use "Tools"-"Comments and Markups"-"Attach a File as a Comment"**
Reader X: Use "Comment" (upper right), then select the paper clip icon under "Annotations"

Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

Course-taking patterns, policies, and practices in developmental education in the California Community Colleges

A report to the California Community Colleges Chancellor's Office

June 2010

EdSource

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Appendices One through Eight and Works Cited are included as a separate document.

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About this study

In 2009, the California Community Colleges Chancellor's Office (CCCCO) contracted with EdSource to perform a study of developmental (or basic skills) course-taking patterns, practices, and policies within the community college system. The CCCCO provided the study team with ample independence to pursue and report on the research as we believed was best.

The research questions included:

- What key policies and decisions have shaped developmental education in California?
- How can we describe the remedial course-taking patterns of students within the California Community Colleges?
- Which remedial course-taking patterns correlate most highly with various student outcomes, and to what extent does this vary based on student characteristics?
- What are the current policies and practices related to remedial course-taking and developmental education more generally within the system?
- What are the current critiques, issues, and innovations related to those policies and practices?
- What are the implications of these findings for CCC practices and policies, and for state policy related to developmental education?

To develop the analysis of course-taking patterns and their correspondence with particular outcomes, EdSource contracted with Dr. Peter Riley Bahr, Assistant Professor of Education at the Center for the Study of Higher and Postsecondary Education, University of Michigan, Ann Arbor. Using unitary Management Information System (MIS) data supplied by the CCCCO, Bahr compiled and analyzed the course-taking history of students who enrolled for the first time in Fall 2002 and—at some point prior to Summer 2009—enrolled in a remedial mathematics, writing, or reading course.

The balance of the study describes relevant policies and practices in the community colleges. Researched and written by EdSource staff, it reflects literature review, policy analysis, and information gathered through interviews and other consultation with more than 40 community college stakeholders, including educators, policymakers, and researchers within and outside California.

Crucial questions in California today

Policy discussions in California and nationally focus increasingly on student success in community colleges, and those discussions inevitably come around to questions of academic rigor within the system. But in the open-access community colleges in this state, ratcheting up expectations for ultimate outcomes cannot be separated from thinking about developmental education.

This reality was clear when the California Community Colleges officially standardized the minimum course expectations for the associate degree to require that students successfully complete Intermediate Algebra and Freshman Composition. Although the first class to be directly affected by this statewide requirement just entered the system in September 2009, it has already focused new attention on developmental education. It has also raised many important questions, including those explored in this study.

The quantitative portion of this study, presented in Part Two, looks at remedial course-taking patterns and their relationships with student attainment and completion. This information was requested to inform policymaking related to developmental education.

As Part Three of this report highlights, the relevant policy issues are numerous, including questions of prerequisites and their enforcement on one hand and the need to support effective practice and innovative approaches to developmental education on the other. California also is considering changes in how incoming students are assessed for placement. And the state remains challenged to provide consistent and clarifying information about student outcomes in developmental education, given the myriad approaches undertaken by local colleges.

This study provides benchmark measures of student behavior and outcomes in developmental education as it has been practiced in the state to date, and an assessment of prospects for continued growth and improvement looking forward. Based on the findings and conclusions from both the quantitative and qualitative sections, it also presents implications for state policy as California works to strengthen developmental education at its 112 community colleges.

June 2010

Executive summary

The visibility of developmental education—or basic skills education as it is called most often in California—has increased in recent years. One major catalyst was a comprehensive community college strategic planning process completed in 2004 that listed basic skills as a critical area of focus. Another was an increase in the system's minimum course-taking requirements for the associate degree. These helped pave the way for the state's Basic Skills Initiative (BSI) and greater public reporting of basic skills outcomes through the new *Basic Skills Accountability Report* (CCCCO, 2009). These policy actions underscore the place of developmental education as a cornerstone of the work and purpose of the California Community Colleges.

EdSource undertook this study, under contract with the Chancellor's Office, to further understanding of several issues related to this part of the system's mission.

This study has two parts. The quantitative section describes remedial course-taking patterns in the community colleges and examines the correspondence between those patterns and various student outcomes. The qualitative sections examine research and opinion on related policies and practices both historically and looking forward.

> **Terminology Used in This Study**
>
> - **Developmental** is the broadest and most inclusive term used in this report, and is the predominant term used in the qualitative portions of this study.
> - **Remedial** is used to refer to *courses* and *course sequences.*
> - **Basic skills** is a common term in California that appears in state regulations and the names of major initiatives, and is used consistent with that reality.

The course-taking data follow students from Fall 2002

The present study focuses on the cohort of students who entered community college for the first time in Fall 2002, and who enrolled in credit remedial courses in mathematics, writing, or reading during a seven-year period. The quantitative section includes statistics describing the remedial sequences offered within the system and the students who enrolled in those courses. It also, for writing and mathematics, explores differences between those students based on the academic level at which they started. Finally, a further quantitative analysis looks at possible correspondence between student course-taking patterns and academic outcomes in these two subjects.

The system's complexity and a lack of data set limits on this study

Because there was *tremendous variation* in how students moved through—or did not move through—the remedial writing and mathematics sequences, this study cannot provide a meaningful summary of students' most common remedial course-taking *trajectories.* Instead, it focuses on key course-taking *variables*—e.g., the skill-level of a student's first remedial course; delay in taking that course; passing that course; delay between a first remedial course and a second, more advanced course—all of which are used to characterize underlying patterns.

In addition, because student-level data on placement recommendations are not collected for the state of California as a whole, this study cannot describe students who "need" developmental education and compare them with students who "do not." Rather, it focuses on students in the cohort who *actually enrolled in* a remedial course in writing, reading, and/or mathematics during the seven-year period analyzed.

California community colleges vary widely in how they organize remedial sequences in writing and reading

The number of course “levels” offered below college composition varied among the colleges. In addition, slightly more than half of colleges offered some form of *integrated* (or *combined*) writing and reading instruction within their respective remedial sequences, with a few colleges offering them at every remedial level. This variation made an analysis of student course-taking in remedial reading impossible to do with any precision. (For the purposes of analysis, integrated courses were considered part of a college’s writing sequence.)

The structure of remedial mathematics sequences is more consistent

In general, colleges offered three or four levels of remedial coursework below college mathematics, which were coded with respect to their progression of *content* as follows: Basic Arithmetic (four levels below college math), Pre-Algebra (three levels below), Beginning Algebra (two levels below), and Intermediate Algebra/Geometry (one level below).

The study looks at students who took at least one remedial course

About half of the 122,427 first-time students in the Fall 2002 cohort[1] enrolled in a remedial course during the seven-year period studied. In all, 41% enrolled in a course in a remedial mathematics sequence, 32% took a course in a remedial writing sequence, and 11% took a course in a remedial reading sequence. There was a great deal of overlap among these three groups: overall, slightly more than half of students who took a remedial course did so in more than one sequence. (See the figure on the next page.)

The Course-taking Information in This Study

This study involved the creation of a database that made it possible to identify students based on various characteristics, accurately follow their progress through remedial sequences to college-level courses, and identify their attainment within the system. The study:

- Covers the timeframe from Fall 2002 to Spring 2009.
- Looks at statewide patterns of remedial course-taking within 107 semester-based colleges.
- Is limited to credit courses in mathematics, writing, and reading, and more specifically those that are part of subject-area sequences that lead to college-level coursework.
- Focuses on the subset of all first-time students who entered the system in Fall 2002 and enrolled in those courses.

The study began with careful examination of the remedial sequences offered by the colleges using course catalogs for the years 2002–03 through 2008–09. Using course-taking data for the cohort provided by the California Community Colleges Chancellor’s Office, each relevant course taken by a student was coded to specify its “level” with respect to college-level coursework.

Compared with the full first-time cohort, a larger share of students who took a remedial course:

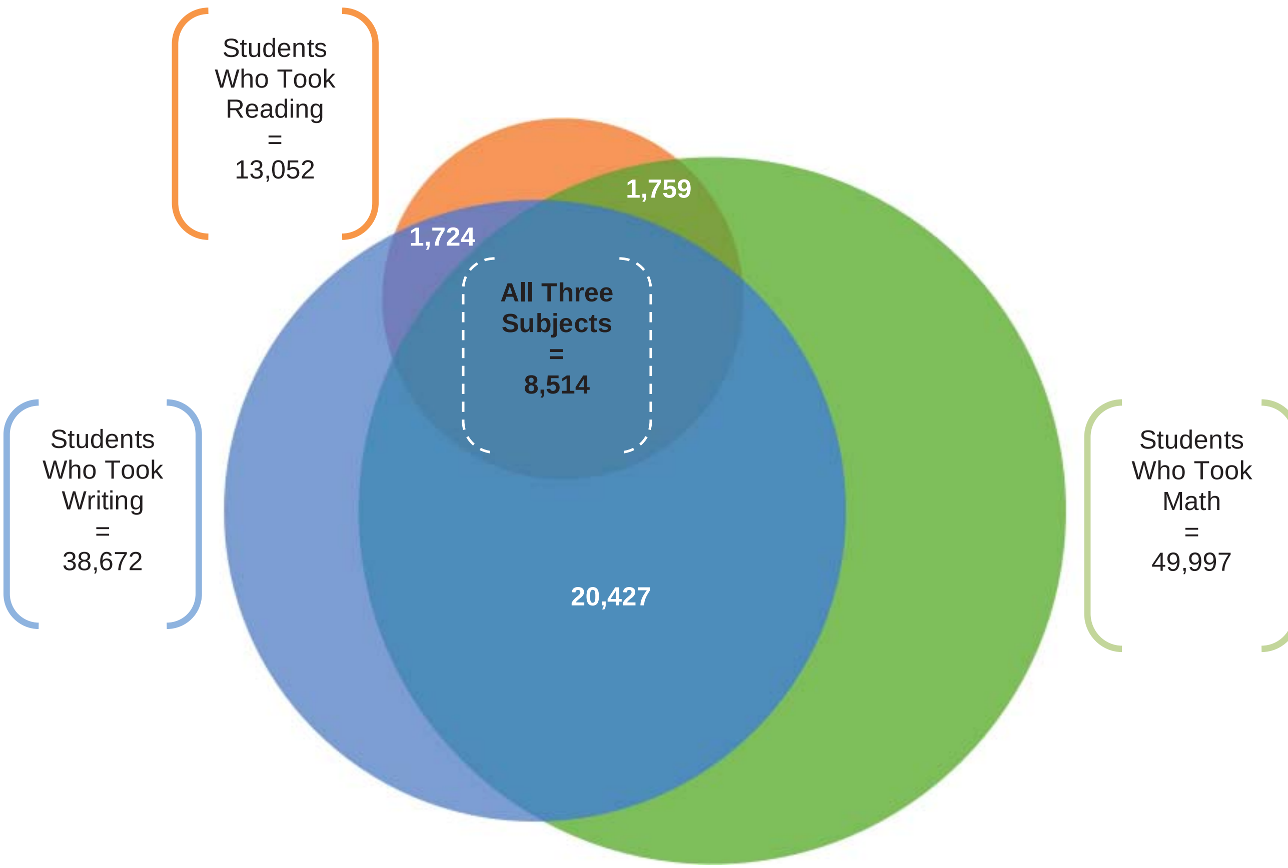
- Were of traditional college age (19 or younger).
- Aspired to transfer.
- Enrolled full time during their first year (12+ units per term), on average.
- Attended community college for a greater number of semesters.

About a third of developmental students in writing and mathematics completed a credential/degree and/or transferred. But large proportions of developmental students did not reach those milestones, including:

[1] See page 15 for a detailed definition of this student cohort.

- Roughly two-thirds of students who enrolled in each of the remedial *mathematics* and *writing* sequences; and
- Nearly three-quarters of students who enrolled in a remedial *reading* sequence.

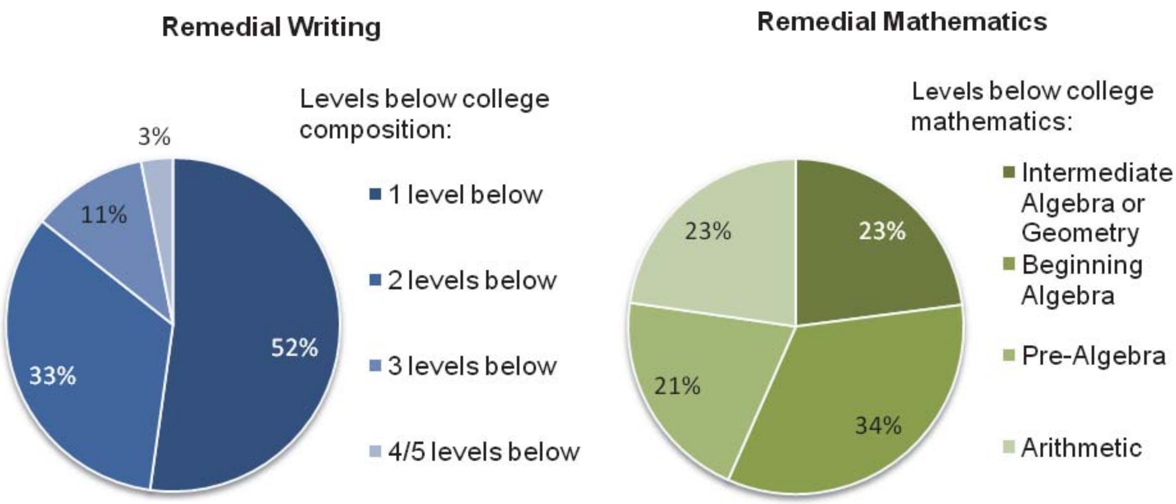
Fall 2002 first-time students who enrolled in one or more remedial courses in writing, reading, and/or mathematics



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges.

EdSource 6/10

The starting levels of students in the sample who took a remedial writing and/or mathematics course



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges.
Note: Percentages may not sum to 100 due to rounding. EdSource 6/10

Students' characteristics and attainment varied along with their starting levels

The characteristics, aspirations, behavior, and outcomes of first-time students in the Fall 2002 cohort who took a course in a remedial mathematics or writing sequence varied—sometimes substantially—depending on the level at which they entered a sequence. The pie charts on this page show the different levels at which students in the Fall 2002 cohort entered the writing and mathematics sequences.

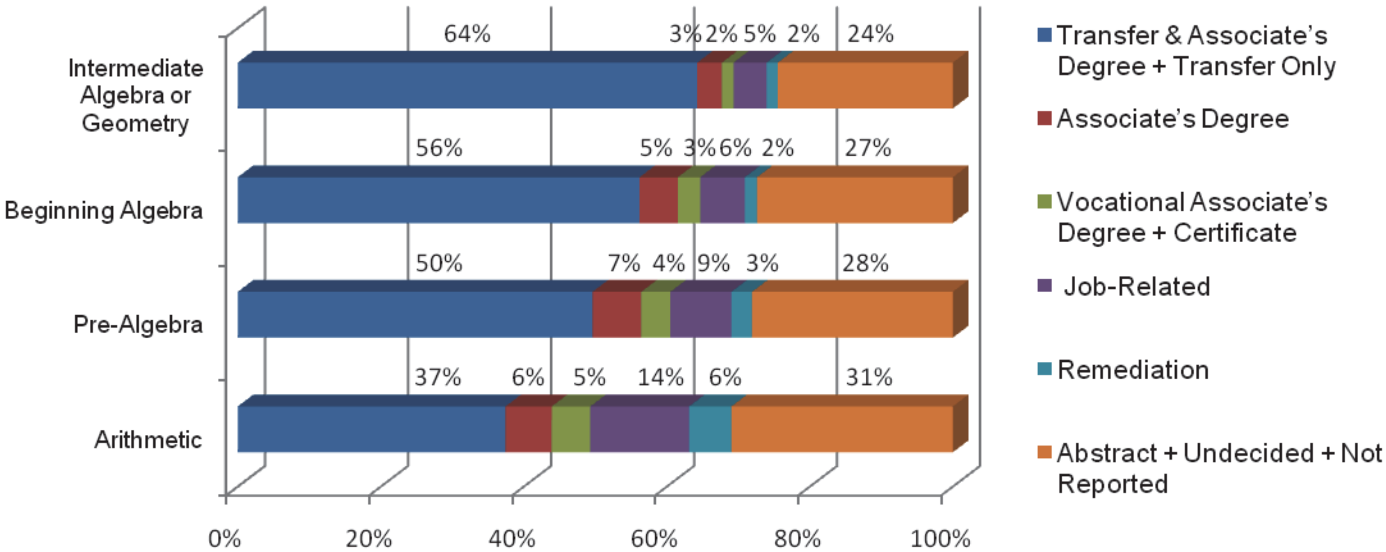
Compared with students who began at lower levels within each remedial sequence, a larger share of the students who began at higher levels of the sequences:

- Were of traditional college age when they entered community college.
- Aspired to more ambitious academic goals.
- Enrolled full time during their first year (12+ units per term), on average.
- Completed college-level coursework beyond the sequence.
- Transferred or completed a degree or certificate, although their rates of doing so were still low. (Even among students who began remedial writing only one level below college composition, 62% neither transferred nor completed a degree or credential.)

Hispanic and black/African American students were overrepresented among those who began at lower levels of the state's writing and mathematics sequences. Asian students were also overrepresented among those who began in lower-level remedial writing courses.

Across all starting levels, most students began taking a remedial writing or mathematics course during their first or second term of enrollment. More than half began immediately in Fall 2002 and another one in five students began in Spring 2003. Some deferred their first remedial course for longer periods of time, including until after Spring 2004.

Incoming aspirations of students in the sample who took a remedial mathematics course, by starting level



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Overall, very few students who began at the lowest levels of remedial coursework ever completed the last course in the remedial sequence or beyond. This prevented many of these students from meeting their long-term college aspirations, although some appear to have had goals other than transfer or a degree. (See the figure on this page for an example.)

The analysis of correlations between course-taking patterns and academic outcomes yielded information about starting levels, delays, and interim benchmarks

Logistic regression was the primary analytical tool used for this portion of the study, which was conducted by Dr. Peter Riley Bahr of the School of Education at the University of Michigan.

Certain aspects of remedial course-taking behavior among first-time students who entered the community colleges in Fall 2002 appear to have had systematic relationships with these students' progress and ultimate achievement in mathematics and writing, controlling for other variables. (It is important to note, however, that we cannot say necessarily that a particular pattern of remedial course-taking "causes," "contributes to," or "leads to" success or failure. We can say only that particular patterns of remedial course-taking are paired in systematic ways with aspects of progress or success.)

Students' starting levels are related to subsequent course-taking in writing and mathematics, but not to delays in taking a first remedial course

- The skill-level of a student's first remedial mathematics or writing course does not appear to be related systematically to whether a student tends to delay this first course.
- With some exceptions, students who began at lower levels of the remedial mathematics or writing sequences were more likely to attempt—and less likely to delay—a second, more advanced course than students who began at the highest levels.

- However, even after accounting for these seemingly advantageous behaviors, the lower a student's starting level in a remedial mathematics or writing sequence, the less likely the student was to complete a college-level course in that subject or a course one level below.

Delaying a first remedial course is related to later course-taking and success, notably in writing

- Students who delayed their first remedial mathematics course were less likely to pass that course, with the exception of students who delayed until their first summer. In writing, delaying a first remedial course was not associated consistently with success in that course.
- In general, students who delayed their first remedial mathematics or writing course for more than one or two semesters were less likely to attempt a second, more advanced course in those subjects, even among students who remained in the system for a long period of time.
- Moderate delays of a student's first remedial writing course (i.e., until the second year) appear to be related negatively to a student's likelihood of completing a college-level writing course or a course one level below. However, only quite lengthy delays of a students' first mathematics course (i.e., until after the second year) appear to have similar consequences.

Passing the first remedial course is related to persistence in—and successful completion of—a writing or mathematics sequence

- Students who passed their first remedial mathematics or writing course were much more likely to attempt a second course, and much less likely to delay this course if they attempted it, than were students who did not pass their first course.
- In addition, there was a very modest positive relationship between passing the first remedial mathematics course and subsequent completion of a course one level below college mathematics, and likewise between passing the first remedial writing course and subsequent completion of a college-level writing course.

Students who delayed a second, more advanced course by more than a semester were less likely to complete the remedial sequence or a college-level course

- Generally speaking, even students who remained in the system for a long period of time were less likely to complete a college-level course or a course one level below if they delayed a second, more advanced course by more than one or two semesters. This was true in both mathematics and writing.

Completion of a college-level math or writing course is strongly related to a student's likelihood of transferring and/or earning various credentials

- Students who completed a college-level course in mathematics or writing were much more likely to transfer or complete an academic associate degree (versus neither completing a credential nor transferring) than students who did not.
- Remedial course-taking patterns matter for these ultimate outcomes *insofar as these patterns are associated with students' attainment in mathematics and writing*. In sum, particular aspects of remedial course-taking patterns appear to be associated with the likelihood of attaining key thresholds of mathematics and writing competency, and attainment of these thresholds is strongly associated with students' likelihood of completing credentials and transferring to a four-year institution.

Current policies and practices, and issues going forward

The descriptive statistics and quantitative findings presented above offer valuable baseline measures related to developmental education that can be used to help evaluate policies and practices implemented recently and going forward. As the qualitative section of this report describes, a number of forces are converging to support changes in the shape of developmental education in this state and nationally.

Higher expectations for college attainment and success raise the stakes for developmental education

In 2006, the Board of Governors (BOG) revised the state's Title 5 regulations to raise the minimum, statewide course-taking requirements for the associate degree. These new rules went into effect for students who entered in Fall 2009.

The higher minimum requirements (Title 5, §55063) establish that students must complete:

- [Transfer-level] Freshman Composition (or an equivalent English course); and
- [One level below transfer] Intermediate Algebra with Elementary Algebra as a prerequisite (or an equivalent mathematics course).

These higher minimum requirements were one catalyst for California's Basic Skill Initiative (BSI). The BSI documents and promotes "best practices" in developmental education, in part to improve students' chances of meeting the new degree requirements.

Another change to Title 5 regulations currently under consideration is raising similar questions. It would allow colleges to validate communication and computation prerequisites for courses outside the English and mathematics departments—e.g., a writing prerequisite for a history course—through a content review by faculty, without statistical validation as is now required. The current rules were one product of a lawsuit brought by MALDEF and settled by the system in 1991.

Supporters see the potential change as necessary to ensure the intended rigor of academic courses, and as a way to encourage earlier remediation among students who have not yet learned basic skills in English or mathematics. But the changes also pose implementation challenges for local colleges, and some worry a change could have a disproportionate impact on particular student groups.

Whatever decisions are made, changes to Title 5 will bring additional responsibility for colleges to provide effective developmental education and improve student success. These discussions inevitably circle back to ongoing efforts—in California and nationally—to rethink how developmental education is provided.

Can developmental innovation improve outcomes and ensure access?

Many stakeholders familiar with the BSI agree it has produced much-needed dialogue about the importance of improving student outcomes in developmental education in the state. And the initiative has drawn the system's attention to "best practices" in developmental education. Faculty development and ongoing reflection on student outcomes are central to this work, and various efforts in California are trying to build the system's capacity.

This new focus on the quality of developmental education and the need for more effective practices comes not merely from within the state, however. This is a period of intense scrutiny of developmental education by researchers, policymakers, philanthropic organizations, and national initiatives. This scrutiny has resulted in broad agreement that changes in practice related to developmental education are needed to:

- Improve students' rates of successful course completion, and
- Compress the amount of the time required for developmental students to become college-ready.

Various approaches to meeting these goals are increasingly cited. For example, research draws attention to the importance of better *integrating developmental instruction with a suite of support services* that ensure students stay engaged, receive assistance, and maintain a sense of forward progress toward their goals. *Contextualization* raises questions about the relationship between developmental courses and occupational or academic content in the rest of the curriculum. And the fact that students who begin at the lowest levels of remedial sequences are unlikely to complete those sequences has prompted some educators to think differently about *the structure and goals of remedial sequences*, through approaches such as acceleration and modularization.

In regard to state policies that support such innovation, California's position is mixed. On the one hand, some have argued that state categorical funding structures and other restrictions, such as the requirement that colleges spend half of funds on direct classroom instruction, constrain administrators' ability to "allocate college funding in ways designed to maximize student success" (Moore, Shulock, et al., 2007, pg. 40). On the other hand, California regulations allow for a variety of flexible course configurations, including open entry/exit courses, distance learning, supplemental assistance, and independent study.

Current fiscal constraints are of particular concern because of the time and resources needed for experimentation and the expenses associated with some models for providing extra supports to students.

Reducing the need for remediation remains a complicated goal to pursue

The state of California would benefit financially and in terms of the educational level of its citizenry if fewer students entered community college in need of developmental education. That ambitious goal is complicated by many factors. For example, at the statewide level, there is not a straightforward policy about what students should know and be able to do at the end of high school, and for which postsecondary paths. As a result, students do not necessarily understand what level of high school preparation could land them in remedial instead of college-level courses.

The diversity of assessment practices among the California Community Colleges also leaves the system's entrance expectations unclear. Pressure continues to increase for colleges to adopt a more uniform approach to the assessment of incoming students. A current proposal originating in the Chancellor's Office—the Online Common Assessment Project, or CCCAssess—would provide a structure for colleges to save money by using common, centrally-delivered assessments, while providing students and counselors more complete information.

The California Community Colleges are also becoming more involved with the state's Early Assessment Program (EAP), developed in 2004 by the California Department of Education, the State Board of Education, and the California State University (CSU). The EAP provides high school students with early feedback during the summer before their senior year about their preparedness for college-level classes in English and math. Many community colleges have agreed to accept some or all EAP results as a basis for exempting students from placement testing in English and/or mathematics, with more considering doing so. And some colleges have identified an EAP coordinator to conduct outreach to local high school students, in coordination with CSU.

Absence of clear and consistent data from the colleges is an obstacle to improvement

"The first step toward improving performance outcomes in developmental education is to get a firm handle on current student and institutional performance," argues Michael Collins, a program director with Jobs for the Future (Collins, 2009, pg. 17). He adds that one key step in doing so is to gather data that clarify the need for developmental education and illuminate how that varies among different groups of students, depending on their age, ethnicity, and full-time versus part-time status. And a new national initiative—the Voluntary Framework for Accountability—is working toward developing measures that could be used by community colleges and easy for the public to understand.

California's *Basic Skills Accountability Report* has helped highlight the need for more data standardization in the state and prompted an institutional response. For example, faculty have been addressing inconsistencies in how colleges have coded the course "levels" of their remedial sequences historically. The result is a series of rubrics that provide a common framework for coding the level of each remedial course within a sequence, more clearly defined in terms of levels *below the transfer level*. The rubrics related to credit courses define four levels below the transfer-level in writing (English), reading, and mathematics, with each level defined according to its general learning outcomes, or exit skills (ASCCC and CCCCO, 2010).

The new coding will enable more meaningful statewide data on student progress through remedial sequences. It could also provide a foundation for better articulating high school courses and noncredit adult basic education courses with credit instruction. Some worry the new coding system could institutionalize remedial course sequence structures that should be revised; others view common coding as a necessary first step for considering changes.

The conclusions and policy implications of this study

Current enrollment pressures, combined with financial constraints, have created something of a perfect storm for the California Community Colleges. That storm is testing their commitment to developmental education and their ability to strengthen the programs and services they provide.

But the community colleges cannot afford to ignore the rising call, both in California and nationally, for greater success rates for their students. As long as open access remains a core operating principle for these public institutions, improving developmental education and increasing student success are goals that go hand in hand.

The findings from this study have implications for college officials and state leaders as they continue to pursue both the access and success goals of the system.

<u>Reducing the need for developmental education is a complex and long-term challenge</u>. California's state leaders ought to consider every strategy available for improving high school students' preparation for community college. Current efforts to clarify academic expectations (such as the Early Assessment Program) and promote the use of common assessments are important first steps.

<u>Delays in remedial course-taking are entwined with other issues and solutions need to be approached thoughtfully</u>. For example, this study suggests that colleges might first focus on encouraging students to enroll early in remedial courses in writing. But deeper and more detailed research into local patterns would be an important precursor to the implementation of such a strategy on a given campus. Campuses might also want to examine their course schedules to determine ways they could encourage students to enroll in a given remedial sequence continuously, without interruption. Stronger support for students' success during their first year could also help students in completing remedial sequences.

Students who enter the community colleges at the lowest levels face daunting odds. Further, black/African American and Hispanic students in the cohort studied were overrepresented at the lowest levels of the mathematics and writing sequences. The same was true for Asian students in writing. This raises questions about strategies for better supporting these students. For example, colleges in five counties educate two-thirds of African American community college students. A state-led focus on these colleges could have great benefit.

Innovations in developmental education need to be implemented and evaluated. What works where, for which students, and under what conditions warrants extensive and careful investigation. But for local educators and the state to learn more effectively from these efforts, common frameworks for measuring and evaluating outcomes are also essential. The system's movement toward more standardized coding of course levels below transfer and toward other common metrics should be encouraged and supported.

The efficacy of the state's investment in developmental education warrants more attention. It is not clear that the colleges have sufficient resources or motivation to bring successful innovations to scale and fully integrate them into existing curricula and services. But when students attend college and never leave the developmental sequence, it is costly both for them and for the state. Helping students get through developmental sequences in less time would help address this issue. Making sure students are aware of their options could also be a good investment for the state and for those students who are currently at the greatest risk of leaving community college empty-handed. For example, California might be better served if more students were encouraged to participate in high quality career technical programs rather than the emphasis being placed so heavily on transfer courses.

Part One

Key policies and decisions that have shaped developmental education in the California Community Colleges

Part One: Key policies and decisions that have shaped developmental education in the California Community Colleges

Developmental education as a core mission of the California Community Colleges

From national think tanks to the California Legislature, those concerned with community colleges have identified “three fundamental areas of community college education—developmental, occupational, and academic transfer” (Pusser and Levin, 2009, pg. 5). But although this triad of functions reflects the reality of what the California Community Colleges do, the commitment to developmental education is neither as firmly entrenched nor as widely accepted as the other two commitments.

Various examinations of the history of the community colleges explain some of the reasons for continued ambivalence about the developmental education role. Pusser and Levin describe that, in 1964, “the principal twin missions of community colleges” articulated by the American Association of Junior Colleges (now the American Association of Community Colleges) were “job training and education for university transfer” (Pusser and Levin, 2009, pg. 17). Elsewhere, Callan notes that this same assumption informed how California viewed its community colleges in 1960: the core value was open access for “all Californians who were capable of benefiting from attendance” (Callan, 2009, pg. 5).

Callan points out that, at the time, there was little formal recognition that graduates from the state’s K–12 education system might arrive at college unprepared for college-level academic work. In the years since, the proportion of community college students identified as needing developmental education has grown steadily, likely for several reasons. The state has seen a dramatic increase in the number and proportion of high school graduates who pursue postsecondary education, in part because of increasingly sophisticated workplace demands and the growing complexity of our society and economy. Demographics also play a role: the state’s population has become more diverse at the same time that inequities in access and success among different student groups have become more visible and less tolerated. Simultaneously, California’s K–12 education system has weakened in terms of the resources provided to schools compared with most other states (e.g., see EdSource, 2010b, Cards 10 and 26).

All of these factors have contributed to substantial growth in the number and proportion of community college students who are assessed as needing to complete one or more remedial courses in writing, reading, and/or mathematics prior to attempting college-level work. Every community college district in California offers such courses, through sequences leading to college-level work in English and mathematics.

Recently, the visibility of developmental education—or basic skills education as it is called most often in California—has increased. One catalyst was a comprehensive community college strategic planning process completed in 2004 that listed basic skills as a critical area of focus. Another was an increase in the system’s minimum course-taking requirements for the associate degree. These paved the way for the state’s Basic Skills Initiative, which has focused on professional development that brings knowledge about “effective practices” to the attention of local colleges, encouraging them to take stock of their developmental education practices and try new approaches. The state is also moving toward greater public reporting of basic skills outcomes through its new *Basic Skills Accountability Report* (CCCCO, 2009).

These state policy actions underscore the place of developmental education as a cornerstone of the work and purpose of the California Community Colleges. Indeed, the role of developmental education in enabling wide access to the colleges is intimately, and often tensely, intertwined with the system's efforts to maintain and raise standards for college-level instruction.

TERMINOLOGY

Developmental, remedial, pre-collegiate, or basic skills?

Any report pertaining to academic preparation for postsecondary study at a California community college must define its terms. Educators, policymakers, and researchers use a host of terms when discussing this topic, including "developmental," "remedial," "pre-collegiate," and "basic skills." As a recent report by The Carnegie Foundation for the Advancement of Teaching observes, "for better or worse, each brings its own history and values" (2008, pg. vii). Consistency with a set of generally accepted uses of these terms is virtually impossible.

As a result, this report can only strive for internal consistency. To that end, it uses each of the following terms for a particular purpose.

- **Developmental** is the broadest and most inclusive term used in this report, and is the predominant term used in the qualitative portions of this study. We use this term to refer to the full suite of *programs* and *services* that colleges provide to students who arrive underprepared to undertake college-level work, and to the *fundamental role* of these programs and services in the contemporary mission of the California Community Colleges. On occasion, the term may also refer to *students* who benefit from these programs and services, hopefully on the way to meeting their goals.
- **Remedial** is used as a technical term, primarily but not exclusively in this report's quantitative portions. We use this term to refer to *courses* and *course sequences* leading to college composition or college mathematics, acknowledging that these courses have traditionally been intended in California to help students master the skills and concepts they need to succeed in college-level work.
- **Basic skills** is an unavoidable term in California that appears in state regulations and the names of major initiatives. In this study, the term refers primarily to:
  - The particular subset of remedial courses, offered in the credit mode (see the box on page 7), that Title 5 regulations (§55000j, §55062) define as located *prior to* degree-applicable coursework within a remedial sequence. (For example, Intermediate Algebra is not a "basic skills" course because it applies toward an associate degree, but it is a "remedial" course as defined above.)
  - The particular exit expectations for what a student should know and be able to do at the end of a remedial course or sequence, as a foundation for subsequent study.

This report generally does not use the term "pre-collegiate" because the California Community Colleges define "college-level" somewhat differently than do the state's public four-year universities. Courses that transfer to a four-year university are typically denoted by the term "transfer-level."

Maintaining the integrity of college-level instruction while providing access to foundational skills: A brief history

The passage of Proposition 13 in 1978 began an important transition for both K–12 education and the California Community Colleges. Local governing boards lost their ability to increase revenues through property taxes and those revenues declined sharply. One effect was that state-provided funds became the primary source of support for the colleges. In the process, the traditional local autonomy of the colleges and the interest of state policymakers in ensuring accountability for and the effectiveness of state support were placed in a new tension. This new relationship helped lay the groundwork for debate about the consistency with which colleges maintain the rigor of degree-applicable and transferable coursework while ensuring an open-access pathway to these courses through developmental education—a conversation that continues today.

For example, a 1983 report by the California Postsecondary Education Commission (CPEC), *Promises to Keep*, called for the system to "establish an academic floor below which [remedial] instruction would not be offered." Students needing instruction below this level would be referred to local adult education programs (CPEC, 1983, pg. 105). The report also criticized the granting of associate degree credit for remedial coursework.

Several years later, in order to encourage timely student progress, the Commission for the Review of the Master Plan for Higher Education recommended that students be allowed to take no more than 30 semester (45 quarter) units of remedial coursework. The commission also recommended that the colleges establish "minimum academic skill levels appropriate for the different types of courses and programs offered" and provide "assessment, counseling, placement, and follow-up" for incoming students (Commission for the Review of the Master Plan for Higher Education, 1986, pg. 6).

Between the mid-1980s and the early 1990s, the California system undertook various efforts to increase consistency among colleges, such as prioritizing the expansion of matriculation services to enable more effective student transitions into the system. The Seymour-Campbell Matriculation Act defined matriculation in 1986 as "a process that brings a college and a student who enrolls for credit into an agreement for the purpose of realizing the student's educational objectives."

Under this process, students bore such responsibilities as expressing an educational intent at the time of enrollment, declaring a specific educational objective thereafter, and making timely progress. Colleges were charged with such responsibilities as orientation services, assessment, and counseling. This included advice on course selection and determination of students' language and computation skills, study and learning skills, aptitudes and interests, educational objectives, and need for special services or financial assistance. The act also established that assessment instruments used during the matriculation process should be chancellor-approved, be sensitive to cultural and language differences, and be used as an advisory tool to assist students in selecting a program of study.

Matriculation services expanded dramatically in the following years. Between the 1987–88 and 1989–90 academic years:

- The number of students receiving orientation services increased from 61,000 to more than 424,000.
- The number receiving counseling/advising services increased from 181,000 to nearly 929,300.
- The number receiving assessment services increased from 96,000 to about 482,000 (Board of Governors, 1991, pg. 2).

In the process, colleges identified many more students in need of remedial instruction. This put stress on the colleges' instructional resources. A majority of colleges "were unable to meet the demand for credit basic skills courses, despite large increases in course offerings," and "many colleges reported difficulties in finding enough qualified instructors" to teach these courses (BOG, 1991, pg. 37).

During this time period, the system's Board of Governors (BOG) also increasingly exercised its authority "in the arenas of educational policies and academic standards." For example, it distinguished more clearly in Title 5 regulations between degree-applicable and basic skills courses (BOG, 1987, pg. 3). It also passed various policies in connection with the implementation of matriculation services. Among other things, these policies:

- Called on colleges to offer, "in the non-degree applicable credit mode" (see the box on the next page), the "full range of pre-collegiate basic skills instruction needed to correct the skills deficiencies of those students who enroll with an intent to complete degree and certificate courses and/or programs," with these courses being "sequenced by levels" (BOG, 1987, pp. 5–6).
- Called on colleges to specify the skills and competencies required at each of these levels and for "entry-level degree- and certificate-applicable courses," based on "systematically derived evidence of a relationship between student assessment measures and students' performance in the course." Students were not to be excluded from a course based on a single test score (BOG, 1987, pp. 9).
- Held that assessment services should play a critical role in placing students properly by considering students' "language skills and computation skills . . . aptitudes, interests and educational goals . . . learning and study skills, and referral to specialized support services," as well as English proficiency and disability (BOG, 1997, pg. 14).
- Held that "no student may take more than 30 semester units (45 quarter units) in the pre-collegiate basic skills curriculum in order to meet the skills requisites for all courses that would be required to complete her/his chosen degree or certificate program or other educational objective" (pg. 11), consistent with the recommendation of the Commission for the Review of the Master Plan for Higher Education. Subsequent legislation—Assembly Bill 1725 (1988)—directed the BOG to adopt Title 5 regulations pertaining to the 30-unit limit, which the BOG did in 1990.

These examples are but a sampling of prior efforts to address questions such as how developmental sequences should be structured and how to encourage timely student progress through them. Today, these questions remain central to the system's efforts to sustain the rigor of college-level courses while maintaining open access to them through developmental education. But today's conversations are also informed by the system's 1991 settlement of an important lawsuit.

The MALDEF lawsuit and settlement

Current discussions about community college reform in California cite 1991 as a pivotal year. In that year, the system settled a lawsuit brought by the Mexican American Legal Defense and Education Fund (MALDEF). A number of key regulations under which the colleges currently do their work, such as regarding the validation of course prerequisites, trace back to this settlement.

In 1988, MALDEF filed a lawsuit—*Romero-Frias, et al. v. Mertes, et al*.—against Fullerton College, the system chancellor, and the Board of Governors. The suit contended that outdated assessments, used in lieu of full matriculation services, had the effect of tracking Latino students into required remedial coursework that prevented full participation in the transfer curriculum, contrary to the Matriculation Act's provision that assessment instruments be used as an advisory tool (see Reyes, 1988; Times Wire Services, 1991; Berger, 1997; Moore, Shulock, et al., 2007; Wiseley, 2009). The limited availability of remedial course sections made it difficult for students to meet these additional course-taking requirements. In the words of one MALDEF attorney at the time, "One student . . . was forced to take remedial English, but because the number of classes offered was so limited, he couldn't attend because of a work schedule conflict and had to drop out" (Reyes, 1988).

The case was settled out of court in 1991. As part of the settlement, then-Chancellor David Mertes sent a letter outlining steps the system would take to resolve MALDEF's concerns (Mertes, 1991). These included intended revisions to Title 5 regulations regarding the validation of prerequisites, assessment using multiple measures, and students' right to challenge a prerequisite. In its response, MALDEF noted its particular concern that no test be used "for any purpose other than advisory counseling unless the test is from the Chancellor's approved list of instruments and the test has been locally normed and validated" (Brown and Romero, 1991).

Key regulations resulting from the settlement, and their still-contested meaning for local practice, are discussed in subsequent sections of this report.

TERMINOLOGY

Credit versus *noncredit* basic skills courses in California

This study focuses primarily on student course-taking within *credit* remedial course sequences leading to college-level academic study. The report discusses noncredit "adult education" courses offered by community colleges only occasionally. But the difference is important for understanding the broad range of developmental education services offered by the California Community Colleges.

Neither credit nor noncredit basic skills courses transfer to the University of California or California State University, and neither applies toward a degree. In general:

- *Credit* basic skills courses are intended to prepare students for further postsecondary study at the college level, leading toward degrees and/or transfer. And as the Legislative Analyst's Office (LAO, 2008) notes, credit course units "are taken into account for financial aid purposes" (pg. 5).
- *Noncredit* basic skills courses provide adults with skills and knowledge for a high school diploma or equivalent, success in the workforce, parenting, and as an entry point to further postsecondary study. The LAO (2008) notes, "unlike credit courses, students taking noncredit basic skills courses do not receive grades and are typically permitted to join or leave a class at any time during the semester" (pg. 5).

  The California Community Colleges share responsibility for adult education with the K–12 system, depending on local practice. But as the California Budget Project (2009) reports, "noncredit instruction is a very small part of what most community colleges do, and a few colleges have no noncredit offerings" (pg. 6).

  In a recent survey of the colleges, only 31% reported offering any noncredit basic skills course levels in reading, only 29% in writing, and only 33% in mathematics. However, 56% of colleges reported offering one or more levels of noncredit English as a Second Language (ESL) coursework (Academic Affairs Division, 2008, pp. 12–13).

The need for developmental education

Today, little doubt exists about the widespread need for developmental instruction in the 112 California Community Colleges. Meeting this need is of growing importance, given the stakes for students in a changing economy where a high school education no longer provides reliable access to a living wage.

Coming to grips with this need in California is also of national importance: the California system served a total of 2.89 million students in 2008–09 alone, dwarfing the systems of other states (California Community Colleges Chancellor's Office Management Information System). One recent National Center for Education Statistics (NCES) report estimates that the California system served "about 23% of the nation's community college students" in fall 2005 (Provasnik and Planty, 2008, pg. 5).

Accurately quantifying the need for developmental education in California is difficult because of data limitations and inconsistency in the assessment processes used by the colleges. Currently, California does not collect statewide, student-level data on assessment recommendations or placement test results. The only current source for statewide information on the recommended placements of community college students is a survey of the California Community Colleges conducted for the state's *Basic Skills Accountability Report* (CCCCO, 2009).

These data suggest that, among credit and noncredit students assessed for Fall 2007, only 16% of those assessed in mathematics were deemed ready for transfer-level math—roughly the equivalent of having met the standards of a high school Algebra II course. Only 28% of those assessed in English (excluding reading) were ready for a transfer-level course in college composition, as were only 38% of those assessed in reading (CCCCO, 2009, Tables C1–C3).

Corresponding data for individual community colleges in California are not reported as part of the *Basic Skills Accountability Report*. The best approximation of the variation in local needs is provided by Hayward (2009): the proportion of students assessed in mathematics as ready for transfer-level coursework ranged from 0% to 32% among a sample of colleges in the state. The range in English (excluding reading) was 2% to 52%, and in reading (using a much smaller sample of colleges) was 8% to 53% (Hayward, 2009, pg. 2).

These data limitations place specific constraints on this study, which are discussed in more detail in Part Two.

Part Two

Course-taking data and outcome analysis

(Continued on next page.)

Part Two: Course-taking data and outcome analysis

The study design

This portion of our study uses student-level data to address two overarching questions:

- How can we describe remedial course-taking patterns within the California Community Colleges? *These results are presented in Section 2A.*
- Which remedial course-taking patterns correspond most closely with various student outcomes of interest, and to what extent does that correspondence vary as a function of student characteristics? *These results are presented in Section 2B.*

Overview: The database and analysis

This study looks at statewide patterns of remedial course-taking within 107 semester-based colleges. The student population of interest is first-time students who entered the system in Fall 2002 and, at some point between Fall 2002 and Spring 2009, enrolled in a remedial writing, reading, and/or mathematics course (as defined later).

The CCCCO provided Dr. Bahr with access to the Chancellor's Office Management Information System (COMIS). The study began with careful examination of the sequences offered by the colleges using course catalogs for the years 2002–03 to 2008–09. The process of constructing the data for the study included matching the course listings from student records with the sequence information. Each relevant course taken by a student in the cohort was coded to specify its "level" below college-level. The coding of writing and reading courses for this study was undertaken by Bahr and EdSource; the coding of mathematics courses was undertaken by Bahr based on prior work (Bahr, 2008, 2010b).

The resulting database made it possible to identify students based on various characteristics, follow their progress through remedial sequences to college-level courses, and determine their attainment within the system. This database was used to address the two overarching questions noted above, in considerable detail.

The seven-year timeframe considered in this study acknowledges that community college students are a diverse group who frequently need more than two or three years to complete a course of study, particularly if they enroll part-time and/or "stop out" at some point in their studies. By definition, students who take a course in a remedial sequence need additional time to reach college-level studies in mathematics and/or English. And allowing for a longer period of time is essential for examining such questions as whether and for how long students may delay their first or second remedial course in a sequence.

Because of changing policy contexts, this study's sample of interest is an imperfect analogue for students who are currently entering remedial sequences in the California Community Colleges. For example, students in the sample began community college prior to the current statewide requirement that students complete both Intermediate Algebra and Freshman Composition for the associate degree, which went into effect for all students entering in Fall 2009. (See discussion on page 61.) And this study cannot clarify whether the statewide Basic Skills Initiative—see discussion beginning on page 61—has produced measurable changes in students' patterns of remedial course-taking more recently.

That said, Sections 2A and 2B provide community college educators and policymakers with benchmark measures of student behavior and outcomes in developmental education as it has been practiced in the California Community Colleges to date. These can serve as a baseline for evaluating policy changes going forward.

Section 2A: This section describes the **sequence structures** through which students took remedial writing, reading, and mathematics courses. Using simple frequency data, it then **describes the characteristics of the students** in the first-time Fall 2002 cohort who enrolled in these courses, and how students who entered the remedial sequences at different levels differed with respect to their characteristics, academic outcomes, and key course-taking variables.

Section 2B: To identify **the course-taking patterns that corresponded most closely with various student characteristics and outcomes**, Dr. Bahr used logistic regression as his primary analytical tool. The results of that work begin on page 46. His analyses address a series of questions about students' course-taking behaviors:

- Who tends to delay the first remedial course?
- Who tends to achieve a passing grade on first attempt in the first remedial course?
- After the first remedial course, who tends to attempt a second, more advanced course?
- Among students who attempt a second (more advanced) course, who tends to delay this second course?
- Who tends to complete successfully a remedial math course that is no more than one level below college algebra, or a remedial writing course that is no more than one level below college composition?
- Who tends to complete successfully a college-level course in math or writing?
- Does variation in remedial course-taking patterns have any bearing on students' long-term outcomes?

A key limitation of the available data related to the need for developmental education

Ideally, this study would provide a clear view of students' diverse developmental needs when they entered the California Community Colleges system, as documented through a consistent matriculation process, regardless of whether students actually took a remedial course. Unfortunately, as noted earlier, California currently does not collect statewide, student-level data on the academic readiness or recommended placements of students when they enter community college. (Further, variations among campuses in the assessment and placement process suggest that such data, if available, would not provide a consistent view of incoming students' developmental needs—see the box on pages 13–14.)

As a result, this study can identify only which students in the first-time Fall 2002 cohort *actually enrolled in* remedial courses within a writing, reading, and/or mathematics sequence at some point during their studies. These data do not represent all students who *needed* such instruction. Not all students take placement tests, and not all students who are assessed follow the placement recommendations they receive. Almost certainly, some students who could have benefited from remediation are not included among the ranks of those students who *actually enrolled in* remedial courses.

For example, faculty at **Evergreen Valley College** recently found that, in general, "the majority of [their] students who take a math assessment test do not enroll in a math course, and many enroll in a course other than the one in which they placed." To the latter point, although Vietnamese students at the college who are assessed in mathematics typically *place* into the course located three levels below the transfer level, these students typically *enroll* in transfer-level mathematics (University of Southern California Center for Urban Education and Evergreen

Valley College, 2009, pp. 12, 15).

As Moore, Shulock, and colleagues (2007) note, this key limitation makes impossible any statewide comparison of students who “need” developmental education with students who “do not,” at least as determined through the colleges’ own assessment processes.

Acknowledging this limitation, however, the following sections show that community college students in the study sample who enrolled in a remedial course constitute an important population that deserves attention and stands apart from other students in important ways.

Assessment practices vary widely among the California Community Colleges

Even if the California community college system did collect statewide, student-level data on placement test results and assessment recommendations, the meaning of these statewide data with respect to students’ incoming needs would still be unclear. The assessment process for student placement is an area where California’s tradition of local determination is both strong and debated.

The California Community Colleges assess students to determine their incoming needs and aptitudes, and to inform course placement and referral to services. The vast majority of assessments in mathematics, writing, and reading are proctored on the state’s more than 100 community college campuses, though most colleges proctor at least some assessments at local high schools (Consultation Council Task Force on Assessment, 2008, pp. 28, 34, 40).

Title 5 regulations establish, for example, that:

- Colleges may not use assessment to exclude a student “from any particular course or educational program, except that districts may establish appropriate prerequisites” (§55521a5).
- No “single assessment instrument, method or procedure”—nor “two or more highly-correlated instruments”—may serve as a sole predictor of student success when placing students. Rather, assessment must consider “multiple measures” (§55521a3). The measures most commonly reported—after “objective tests (e.g., multiple choice)”—in an Academic Senate survey of colleges in 2004 included academic transcripts and personal interviews and information (ASCCC, 2004, pg. 26).
- Colleges must also rule out “disproportionate impact” on different student groups that “is not justified by empirical evidence demonstrating that the assessment . . . is a valid and reliable predictor of [student] performance” (§55502d).

Colleges tend to use a few commercial assessment instruments

The Consultation Council Task Force on Assessment described widespread use of certain computerized, commercial assessments by colleges in 2005–06:

- In **writing**, 80 colleges used a commercially developed test, with 37 colleges using ACCUPLACER and 22 using COMPASS.
- In **reading**, 91 colleges used a commercially-developed test, with 46 using ACCUPLACER and 23 using COMPASS.
- In **mathematics**, 100 colleges used a commercially-developed test, with 42 using the CSU Mathematics Diagnostic Test Project (MDTP), 41 using ACCUPLACER, and 18 using COMPASS (Consultation Council Task Force on Assessment, 2008, pg. 8).

Some colleges have developed their own tests. And in each subject area, a handful of colleges employ a *self*-assessment process in which students take an active role in determining the courses for which they are prepared (e.g., see Barr, 2005; Felder, Finney, and Kirst, 2007).

Other aspects of assessment practice differ more

There is concern that variation in local assessment *processes* leads to different treatment of—and consequences for—the same students depending on where they enroll (e.g., see Moore, Shulock, et al., 2007, pg. 31). Some sources of variation include:

- Policies for exempting students from placement assessment,
- How many students are assessed,
- The transparency of the assessment process, and
- The portability of assessment recommendations among colleges.

Statewide, 11.8% of first-time freshman were exempted from placement assessment for credit coursework in Fall 2007, and 66.1% received placement assessment services (CCCCO, 2009, Tables C6 and C7). Local exemption policies have some common characteristics. For example, the vast majority of colleges report exempting from assessment tests students who already hold a bachelor's or associate degree (Consultation Council Task Force on Assessment, 2008, pp. 60–62). And Title 5 regulations (§55532) provide that certain criteria—e.g., a student is "undecided about his or her educational objectives" or "does not intend to earn a degree or certificate"—may not be used as the sole basis for exempting a student.

But there is also variation with respect to whether colleges exempt students who intend to upgrade their job skills, who plan to advance their careers, or who do not enroll in an English, mathematics, or ESL course (Consultation Council Task Force on Assessment, 2008, pp. 60–62). A previous survey found that the colleges variously use coursework from other colleges, Advanced Placement test scores, and other considerations in exempting students from placement evaluation. At that time, 25 responding colleges reported that they "do not waive placement evaluation" (ASCCC, 2004, pg. 27).

In forthcoming research on the impact of community college assessment and placement practices on U.S.-educated language minority students, George C. Bunch and colleagues (Bunch, 2010) describe other sources of variation among colleges, such as local policies for when students may re-take an assessment. Colleges also varied in how they used multiple measures: these might consist of additional questions embedded in an assessment instrument; in other cases, students might need to specifically request or bring additional information to be considered. Clear information regarding what students have a right to expect is essential for navigating these processes, but the availability of such information (e.g., via college websites)—and the relative straightforwardness or technicality of the information provided—also varied, Bunch and colleagues report.

Finally, colleges do not necessarily accept one another's placement recommendations in writing, reading, or mathematics. This lack of portability of student assessment outcomes—and the "testing burden" it can place on students who enroll in more than one college—was one motivation for the Board of Governors to call, in March 2007, for an evaluation of the possibility of common assessments across the system. The possibility that poor portability of assessments posed challenges for students in the Fall 2002 first-time cohort considered in this study is very real: approximately one-third of those who took a remedial course changed colleges at some point during the seven-year timeframe studied.

The Consultation Council's task force report found that lack of portability is often driven by variations in how colleges structure their *curricula*—a topic explored in this report beginning on page 20. Colleges frequently cited "lack of alignment in curriculum" and concern that "other tests do not meet the needs of our curriculum" as reasons why they might not accept another college's placement recommendations (Consultation Council Task Force on Assessment, 2008, pp. 32, 38, 44).

Data sources and variables considered

In this section, Peter Riley Bahr, Ph.D. (assistant professor, University of Michigan, School of Education), summarizes the data and variables that form the basis of the subsequent descriptive statistics (Section 2A) and regression analyses (Section 2B).

The following provides a brief orientation to the data and variables used in this portion of the study to explore the remedial course-taking patterns of students who entered college for the first time in one of 107 semester-based California Community Colleges in Fall 2002.

Data sources and definitions

This study draws upon data from the Chancellor's Office Management Information System (COMIS), which is the repository of student records for all of California's community colleges. The focal group of students for this segment of the study is the Fall 2002 first-time cohort in all of California's semester-based (as opposed to quarter-based) community colleges.

As implemented here, the definition of a "first-time student" excludes students who were enrolled in an institution of higher education at some point in time prior to Fall 2002, as well as those students who held "special admit" status (enrolled concurrently in high school) during the first semester of attendance (Fall 2002). In addition, students who did not report a valid Social Security number (SSN), and those who applied to one of the semester-based community colleges in Fall 2002 but actually did not enroll in any coursework (neither for-credit nor noncredit) in that semester, are excluded. For those students who were retained in the analytical cohort, this analysis considers their course enrollments, receipt of financial aid, credential completion, transfer to a four-year institution, etc., through Spring 2009 (seven years).

Within this larger cohort of first-time students, the students of particular interest are the so-called "remedial cohorts"—in particular, the remedial math cohort, the remedial writing cohort, and the remedial reading cohort. For the purposes of this analysis, the remedial math cohort is defined as all students whose first nonvocational math course was remedial in nature, *regardless of when in a given student's academic career this first nonvocational math course was taken*. Comparable boundaries were applied to the remedial writing and remedial reading cohorts, respectively.

The determination of the status (remedial, college-level, vocational, etc.) and skill-level of a given math, writing, or reading course was made through a rigorous and painstaking cross-referential analysis of students' actual course enrollments and the course catalogs of the college at which a given course was taken. In the case of math, this coding process resulted in seven categories—college-level math, intermediate algebra or geometry, beginning algebra, pre-algebra, arithmetic, vocational math, and peripheral math courses—of which the first five are of primary interest in this study.

A detailed discussion of these math categories has been provided by Bahr (2010b) and is summarized briefly here:

- College-level math includes all math courses that fulfill the general education math requirement in the California State University (CSU) and/or University of California (UC) systems.
- Intermediate algebra and geometry are parallel courses, and both are considered to be one level below college math.
- Beginning algebra, pre-algebra, and arithmetic are two, three, and four levels below college math, respectively.

- Vocational math courses are not integrated fully in the remedial math sequence, fulfill the general education math requirement in neither the CSU nor UC systems, and typically are specific to a particular vocational program, though some community colleges offer a generic math course that fulfills the math requirement of the associate's degree but otherwise meets the definition of a vocational math course as defined here.
- Peripheral math includes a range of math courses from supplementary labs to courses intended to help students manage math anxiety.

The coding of writing and reading courses proved to be considerably more complex than the coding of math for a variety of reasons that are discussed elsewhere in this report (see pages 20–23). Appendix Two provides a set of definitions of the various writing and reading categories that resulted from our analysis of course-taking and course catalogs. The primary focus of this study with respect to writing and reading coursework is college-level writing and reading courses and the several levels of remedial writing and readings courses below college-level coursework.

Course-taking, attainment, and student variables

Variables that address remedial course-taking patterns

The primary focus of this analysis is students' course-taking behaviors in remedial math and remedial writing.

In that regard, we consider five aspects of course-taking:

1. **The skill-level of a student's first remedial course in math or writing**. As discussed in more detail in the next section, the skill-level of a student's first remedial *math* course is defined with respect to the lowest college-level math course (college algebra). For a given student, this variable may take on any one of four values:
    - Intermediate algebra or geometry (one level below college math),
    - Beginning algebra (two levels),
    - Pre-algebra (three levels), or
    - Arithmetic (four levels).

    Similarly, the skill-level of a student's first remedial *writing* course is defined with respect to the lowest college-level writing course (college composition). This variable may take on any one of five values, of which we combine into a single category the fourth and fifth levels below college writing.

    Although levels below college composition in *reading* are described from the perspective of how writing and reading sequences are *structured* in the California Community Colleges, *student course-taking patterns* in reading are not considered in the regression analyses or descriptive statistics, for reasons discussed in Appendix Three. However, a broad descriptive portrait of how students who took a remedial reading course compare with other students is provided beginning on page 25 (see also page 39).

2. **The number of units attempted (unit load) in a student's first remedial course.** The unit load of a student's first *math* course is treated as a dichotomous variable:
    - Less than three units, versus
    - Three units or more.

    Although we provide descriptive statistics for the course unit load of students' first remedial writing courses, *this variable was not considered in the subsequent regression analyses in the case of writing*. Compared with math, relatively few first remedial writing courses were attempted for fewer than three units. (See the descriptive statistics in Appendix Five.)

3. **The length of delay between a student's semester of initial college enrollment and the semester of his/her first remedial math or writing course.** Both delay of first math and delay of first writing may take on any one of six values for a given student. These six values include:

    - No delay (enrollment in first math or first writing in Fall 2002),
    - A one-semester delay (enrollment in Spring 2003),
    - A two-semester delay (Summer 2003),
    - A three-semester delay (Fall 2003),
    - A four-semester delay (Spring 2004), or
    - A five-semester delay or greater (after Spring 2004).

    Note that the Winter intersessions offered by some community colleges present a significant methodological complication in this study. Although math and writing enrollments in the reduced intersessions are rare (math enrollments are particularly rare), they do occur. In this study, any information about relevant course enrollments in the Winter intersession was selectively combined with that of the following Spring to account for two key facets of course-taking: enrollment in a first remedial course in math/writing and enrollment in a more advanced course in math/writing than the most recent math/writing course taken.

4. **A student's grade in his/her first remedial math or writing course.** Grade in first math and grade in first writing both may take on any one of 10 values, but for the sake of the regression analyses were coded as dichotomous variables. The two conditions of these variables include:

    - A passing grade (A, B, C, Credit, or ungraded), or
    - A nonpassing grade (D, F, No Credit, Withdrawal, Incomplete with no further notation, or no grade recorded).

5. **The length of delay between a student's first math or writing course and his/her second math or writing course, if any.** Delay of second math and delay of second writing both are measured with respect to when a given student attempted his/her first remedial math or writing course, respectively. Each of these variables may take on any one of five values:

    - No delay (the second course was taken the very next semester),
    - A one-semester delay,
    - A two-semester delay,
    - A three-semester delay, or
    - A four-semester delay or greater.

Variables that address attainment

This analysis considers three aspects of student attainment:

- Whether a given student completed successfully a math or writing course that is **no more than one level below** college math or college composition, respectively;

- Whether a student completed successfully at least one math or writing course that is **deemed college-level**;
- Students' **credential and transfer outcomes**, which is treated as a six-category nominal variable, including:
    - Transfer to a four-year institution with a credential,
    - Transfer to a four-year institution without a credential,
    - The completion of an academic associate's degree without subsequent transfer,
    - The completion of a vocational associate's degree without subsequent transfer,
    - The completion of a certificate only, and
    - Neither the completion of a credential nor transfer to a four-year institution.

In cases in which a student did not transfer, but completed both an academic associate's degree and a vocational associate's degree, the student is categorized as having completed an academic associate's degree.

Variables that address global enrollment patterns

In addition to the remedial course-taking variables and the attainment variable, a wide array of other variables are explored in this study. Three of these address students' global enrollment patterns:

- A student's **average course unit load in the first year** was calculated by summing all units attempted by a student in the Fall and Spring semesters of the first year of attendance, and then dividing this sum by the number of regular semesters (Fall and Spring only) in which the student enrolled in any coursework in his/her first year. Note that average course unit load excludes entirely any course enrollments in the Winter intersession or Summer term.
- A student's **rate of course success in the first year** was calculated by dividing the number of courses in which the student achieved a passing grade (A, B, C, Credit, or a noncredit/ungraded enrollment) in his/her first year by the number of courses attempted during the first year.
- A student's total **duration of attendance** in the community college system is a simple count of the number of regular semesters and Summer terms (excluding Winter intersessions) in which the student enrolled in coursework of any kind. Duration of college attendance *does not assume enrollment in consecutive semesters/terms*, and those semesters in which a student did not enroll in coursework were not included in the count.

Variables that address demographic characteristics and goals

Six variables address students' demographic characteristics:

- **Age at college entry**;
- **Race/ethnicity**;
- **Sex**;
- **Citizenship status**;
- **Two indicators of a student's socioeconomic status-of-origin**, including:
    - Whether a student received a fee waiver in the first year of attendance, and

- The percentage of individuals in the student’s self-reported residential zip code who hold a bachelor’s degree or a higher credential.

A single measure of students’ self-reported **academic goals**, information about which was collected at the time of college entry, also is included.

Section 2A: Description of remedial course-taking in writing, reading, and mathematics

Section 2A provides summaries of descriptive data from the course-taking database compiled for this study. The section:

- Describes the **sequence structures** through which students in the first-time Fall 2002 cohort took remedial writing, reading, and mathematics courses;
- Using simple frequency data, describes **the characteristics of the students** in the sample who enrolled in these courses; and
- Using the same data, describes **how students who entered the remedial sequences at different levels differed** with respect to their characteristics, academic outcomes, and key course-taking variables.

The structure of remedial sequences leading to college-level coursework

Before describing the *students* who took a course within a writing, reading, or mathematics sequence leading to college-level coursework, it is essential to describe the *structure* of these sequences, and how these structures vary across the California Community Colleges. This section describes writing and reading sequences first, then mathematics sequences.

The following descriptions are based on careful examination of the sequences of the 107 semester-based community colleges in California that provided remedial courses to first-time students who entered college in Fall 2002. We matched course listings from student enrollment records with course listings from the 2002–03 through 2008–09 course catalogs of the colleges. This process documented the remedial sequences offered by these colleges, as these were experienced by students in the sample.

Writing and reading sequences vary widely among the California Community Colleges

In order to identify sequence structures in writing and reading, we began with the first college-level writing class—typically Freshman Composition, defined here as the course offered by a given college that meets the Intersegmental General Education Transfer Curriculum (IGETC) 1A requirement. We then proceeded backward through the prerequisites and other recommended preparatory coursework (advisories) to the lowest level of remedial coursework offered by each college. (See Appendix Two for more information.) This coding inquiry, undertaken for this study by Bahr and EdSource, revealed wide variation.

Variation in *whether* colleges offer integrated writing and reading instruction

One key area of variation pertained to *whether colleges offered some form of integrated (i.e., combined) writing and reading instruction* within their respective remedial sequences. In all, 53 colleges (49.5%) offered separate remedial sequences for writing and reading. The remaining 54 colleges (50.5%) offered at least one integrated writing and reading course intended to improve students' reading and writing skills simultaneously.

As a result, students' course-taking paths varied depending on the college in which they enrolled. For example, **Bakersfield College** offered no integrated writing and reading courses. Rather, students in the sample participated in remedial writing and reading instruction through separate sequences. In contrast, **Mendocino College** offered only integrated reading and writing courses, so that all students moved through a single remedial sequence. (See Figure 1 on the next page.)

Figure 1: Varieties of remedial writing and reading sequencing—a sample

Community College	Writing courses below college composition	Integrated writing/reading courses below college composition	Reading courses below college composition	Description
Bakersfield College	1 level below 2 levels below 3 levels below		1 level below 2 levels below 3 levels below	Two distinct writing and reading sequences.
Mendocino College		1 level below 2 levels below 3 levels below		An integrated sequence.
West Hills College Lemoore	2 levels below 3 levels below	1 level below	2 levels below 3 levels below	A sequence with separate writing and reading courses at lower levels, but which “merges” one level below college composition.
Cypress College	1 level below	2 levels below 3 levels below	1 level below	A sequence that is integrated at lower levels, but which “forks” one level below college composition.
Merritt College	3 levels below 4 levels below	1 level below 2 levels below 3 levels below 4 levels below	3 levels below 4 levels below	Integrated courses compose the main sequence, in conjunction with individual writing and reading classes.
Los Angeles Southwest College	2 levels below 3 levels below	1 level below 2 levels below 4 levels below	3 levels below	A mostly integrated sequence is “interrupted” three levels below college composition by separate writing and reading courses.

Data: Student course enrollment records provided by CCC Chancellor’s Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002 through 2009 course catalogs of the colleges. EdSource 6/10

Variation in the *use* of integrated writing and reading instruction

The 54 colleges that offered some form of integrated writing and reading instruction also differed in *how they used integrated courses* within their respective remedial sequences. These colleges varied tremendously in this respect. (See Figure 1 on the previous page.)

Only 10 colleges offered integrated writing and reading courses at every remedial level. The approach taken by **Mendocino College**—i.e., a single, integrated writing/reading sequence—was comparatively unusual, however. More typically, these colleges offered curricula akin to **Merritt College** in Oakland, where integrated writing/reading courses compose the main sequence in conjunction with some individual writing and reading classes. (Again, see Figure 1.)

The presence of remedial *courses* that integrate writing and reading on a campus does not necessarily mean that the *faculty* teaching those courses is similarly integrated, however. At **Chabot College** in Hayward, for example, the presence of an integrated remedial sequence taught by the English department reflects an integrated faculty. (See the Acceleration section on pages 78–79 for further discussion.) At **Los Angeles Valley College**, in contrast, available remedial sections that focus on writing and reading together were elaborations of the *writing* sequence taught within the English department; a full reading (or developmental communications) sequence is taught separately within the psychology department.

Figure 2: Variation among colleges with respect to the *lowest level* of remedial writing and reading coursework offered below college composition

Lowest Level of Coursework Below College Composition Offered by Colleges in the Study	Colleges	
	Number	Percent
*Writing (N=107)**		
Only 1 level below	0	0%
2 levels below	18	17%
3 levels below	48	45%
4 levels below	36	34%
5 levels below	5	5%
Reading (N=102)		
Only 1 level below	5	5%
2 levels below	28	27%
3 levels below	41	40%
4 levels below	20	20%
5 levels below	5	5%
6 levels below	3	3%

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

* Integrated writing/reading courses are considered part of the *writing* sequence for the purposes of this chart. See Appendix Three for further discussion.

Note: Percentages may not sum to 100 due to rounding.

Variation in the number of levels of writing and reading below college composition

Colleges also varied with respect to the number of course levels they offered in writing and/or reading below college composition, as experienced by students in the cohorts examined for this study. Most commonly, the *lowest level* of writing or reading colleges offered was located three levels below college composition. (See Figure 2 on the previous page.)

In addition, 37% of colleges that offered remedial reading separately also offered an additional, college-level course in reading (not included in Figure 2), such as READ 10 at **College of the Siskiyous** in Weed. These courses are intended to improve students' *college-level* reading skills, while providing them with an opportunity to earn elective credits that are transferable to CSU and/or UC.

English as a Second Language (ESL) course-taking is outside the scope of this report—but language minority students are included in the cohorts analyzed

This study does not examine patterns in English as a Second Language (ESL) course-taking among students in the California Community Colleges. In addition, this study cannot track the progress of language minority students through the remedial writing, reading, or mathematics sequences because statewide student-level data provided by the Chancellor's Office Management Information System (COMIS) offer no indication of a student's language status.

This does not mean that language minority students are not included among students in the first-time Fall 2002 cohort who enrolled in a remedial writing, reading, and/or mathematics course, however. For example, the relationship between remedial writing/reading sequences and ESL sequences is particularly complex and variable, and whether a student assesses in English or ESL is an event of potentially great consequence. Although there is no limitation on how long a student may take ESL courses, colleges pursue different policies regarding whether ESL coursework is established as "a pre-requisite to academic work in English or a supplement to that work" (Bunch, 2008, pg. 7). For example, students may be required to complete an ESL sequence before entering the remedial English sequence, which can affect dramatically the amount of time these students need to achieve their goals.

Past research also demonstrates that a stigma often is attached to ESL placement (Intersegmental Committee of Academic Senates ESL Task Force, 2006). This stigma is particularly strong for U.S.-educated language minority students (i.e., so-called "Generation 1.5" students), who "exhibit similarities with remedial students from monolingual English-speaking backgrounds," but whose "second-language issues require specialized attention that remedial English teachers are often not trained to provide" (Bunch, 2008, pg. 4; see also Bunch and Panayotova, 2008).

Mathematics sequences are structured more consistently among the California Community Colleges

Compared with writing and reading, the structure of remedial mathematics sequences is more consistent among the colleges.

In general, colleges offered three or four levels of remedial coursework below college mathematics, defined here as fulfilling the CSU General Education B4 breadth requirement, which often corresponds with IGETC 2A. Unlike in writing and reading, however, mathematics levels are coded more clearly with respect to the content of instruction:

- In the case of writing and reading, the curricular variation among colleges with respect to structure and content meant that the most transparent and effective way of coding "levels" of remedial coursework was to document the number of "steps" a student would need to take in a sequence to reach college composition.
- In mathematics, the levels are coded more explicitly with respect to the *progression of content*, with the lowest level pertaining to basic arithmetic and leading subsequently through pre-algebra, beginning algebra, and intermediate algebra/geometry. (See Figure 3.) This coding, undertaken by Bahr based on prior work (Bahr, 2008, 2010b), is more analogous to that undertaken by the Academic Senate for California Community Colleges (ASCCC) in clarifying the conventions for coding levels below transfer using the CB-21 data element (ASCCC and CCCCO, 2010).

Most colleges in which students in the first-time Fall 2002 cohort enrolled offered most of the remedial mathematics courses shown in Figure 3 below. There were some variations, however.

- The course most likely to *not* appear within a community college's remedial mathematics sequence was Pre-Algebra.
- It was not uncommon for a given remedial course level, such as Beginning Algebra, to be offered both as a single-semester course and as a two-semester extended sequence (e.g., Beginning Algebra I followed by Beginning Algebra II).

Figure 3: **The typical remedial mathematics sequence below college math within the California Community Colleges, as experienced by Fall 2002 first-time students**

Intermediate Algebra/Geometry (1 level below college mathematics)
Beginning Algebra (2 levels below college mathematics)
Pre-Algebra (3 levels below college mathematics)
Arithmetic (4 levels below college mathematics)

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Descriptive statistics on students who enrolled in remedial courses

Using simple frequency data, this section provides a general descriptive portrait of students in the sample who enrolled in remedial courses in sequences leading to college-level coursework. Specifically, this portrait focuses on ***first-time students in Fall 2002 who enrolled in at least one remedial course in mathematics, writing, or reading at some time during their attendance*** in the California Community Colleges. This study tracks these students during the course of seven years (2002–03 through 2008–09). (Full descriptive data on them are available in Appendix Five.)

When informative, the following portrait compares these students with the overall population of *all* first-time students who began their studies in Fall 2002—a population that *includes* those first-time students who took remedial courses. (See page 15 for the criteria used to define this full Fall 2002 cohort.)

A few points to keep in mind:

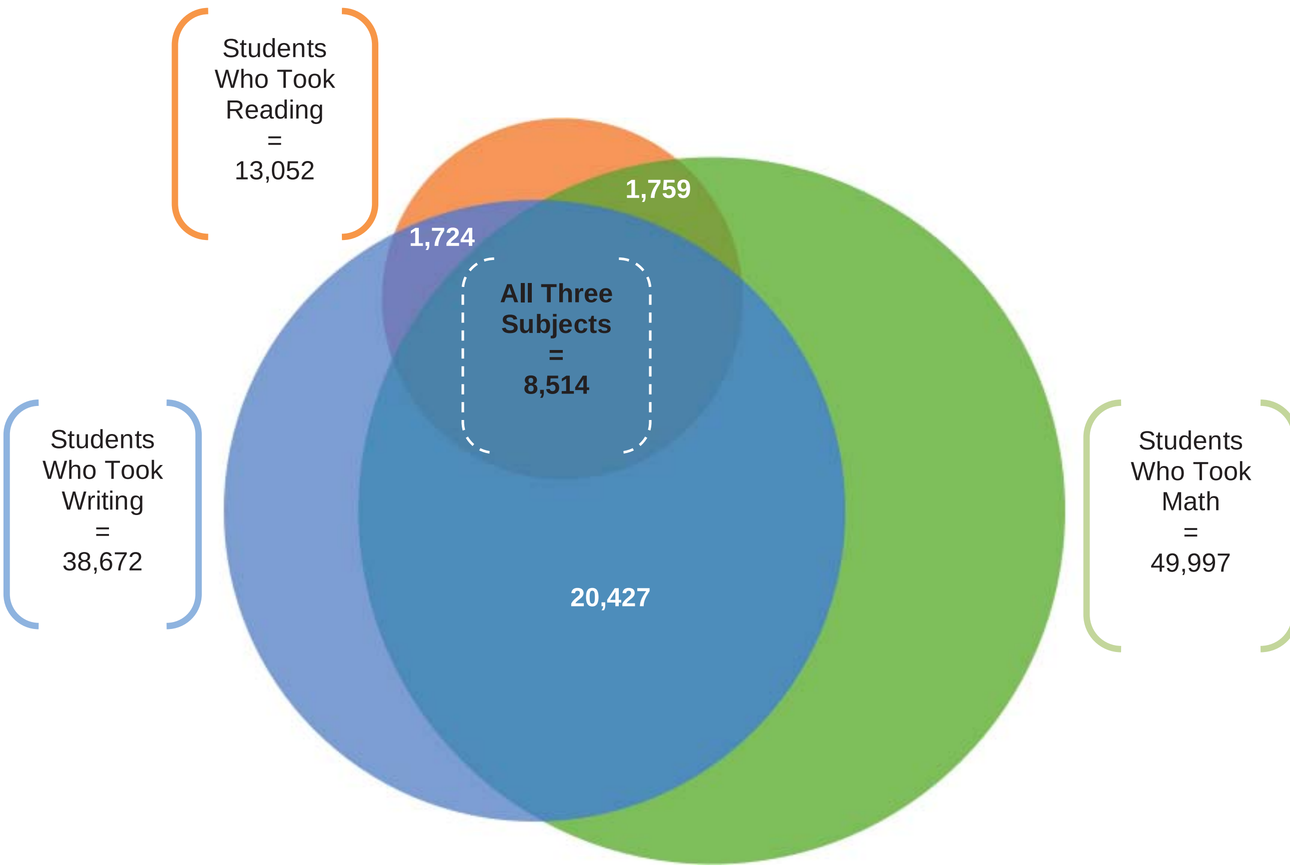
- These descriptive statistics do not control for other variations in student characteristics or behaviors. Rather, these observations simply document what happened with students and their incoming characteristics. More sophisticated analyses are reserved for Section 2B.
- The reader should note that, for the purposes of the remaining descriptive statistics in Section 2A—and also for the regression analyses in Section 2B—integrated writing and reading courses are considered to be part of each college's *writing* sequence. See Appendix Three for further discussion.
- Finally, to reiterate an earlier point, *this study can shed light only on students who actually enrolled in a remedial sequence at some point during their studies. It cannot describe students who may have needed such coursework but did not enroll in it.* Even so, those first-time students who enrolled in a remedial sequence leading to college-level coursework constitute an important population that stands out in interesting ways.

About half of Fall 2002 first-time students enrolled in a remedial course

Among the 122,427 first-time students identified for this study who began their community college studies in Fall 2002, 60,783 students—nearly 50%—enrolled in at least one course in a remedial writing, reading, and/or mathematics sequence at some point during the seven-year window considered. (See Figure 4.)

In all, 49,997 students (41%) enrolled in a course in a mathematics sequence, 38,672 students (32%) took a course in a writing sequence, and 13,052 (11%) took a course in a reading sequence. A great deal of overlap existed among these three groups. For example, 20,427 students (17%) in the Fall 2002 first-time cohort enrolled in at least one course in both the writing *and* mathematics sequences, but not in the reading sequence. Overall, slightly more than half of those who took a remedial course did so in more than one subject.

Figure 4: **Fall 2002 first-time students who enrolled in one or more remedial courses in writing, reading, and/or mathematics**



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Developmental students tended to be of traditional college age

Most first-time students in the Fall 2002 cohort who enrolled in a remedial course—about four in five—were of "traditional college age" (19 years old or younger) when they entered community college. (See Figure 5a.) In comparison, somewhat more than half of the larger cohort was of traditional college age when they entered. Students who enrolled in each of the remedial sequences also were female in greater proportion.

Students who enrolled in a remedial *reading* course stand out in other respects. For example, these students were Hispanic in much greater proportion, compared with students who enrolled in the remedial writing or mathematics sequences, and compared with all first-time students. (See Figure 5b; see also the box on page 39.) Students who enrolled in a remedial reading course also received fee waivers during the 2002–03 academic year in greater proportion.

Figure 5a: **Age (at the time of college entry) of students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**

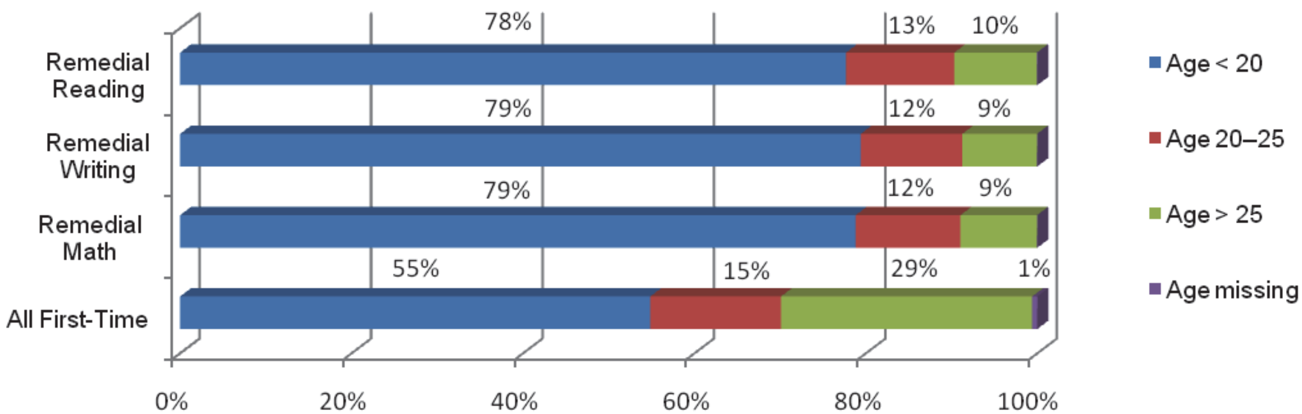
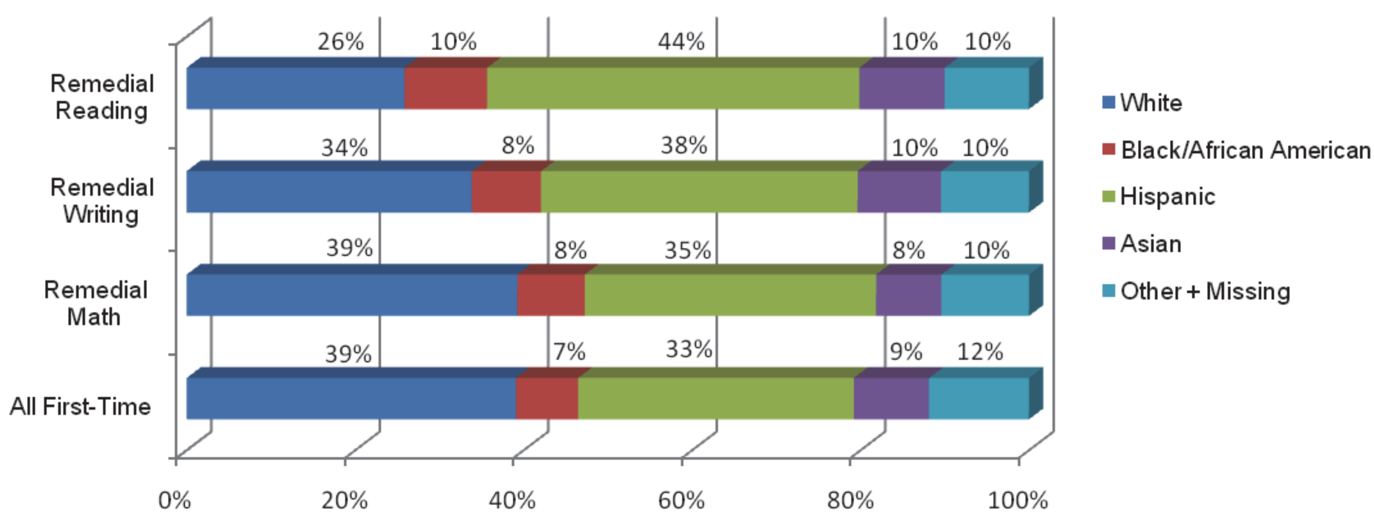


Figure 5b: **Race/ethnicity of students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Developmental students more often aspired to transfer and acted accordingly

Data on students' academic goals often are criticized for inaccuracy and the extent to which students may not have a clear or realistic goal when they enroll. That said, students in the sample who enrolled in a remedial course appear to have entered community college with high aspirations and made efforts to achieve them. More than half (across all three sequences) aspired to transfer, to transfer in combination with completing an associate degree, or to complete a terminal academic associate's degree. This is in contrast to 40% of all first-time students who expressed these ambitions. (See Figure 6a.)

In addition, large percentages of students across the remedial sequences (43%–46%) enrolled in an average of 12 or more units per semester (i.e., full-time) during the first year. In comparison, only 30% of all first-time students enrolled full-time. (See Figure 6b.)

Figure 6a: **Academic goals of students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**

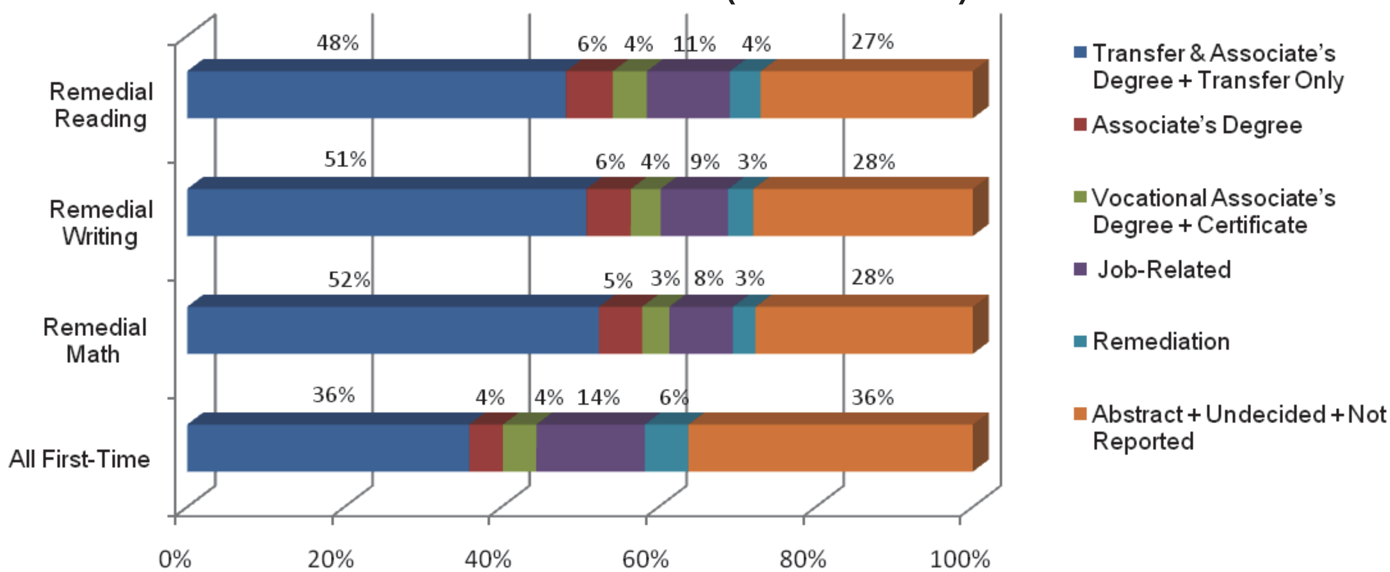
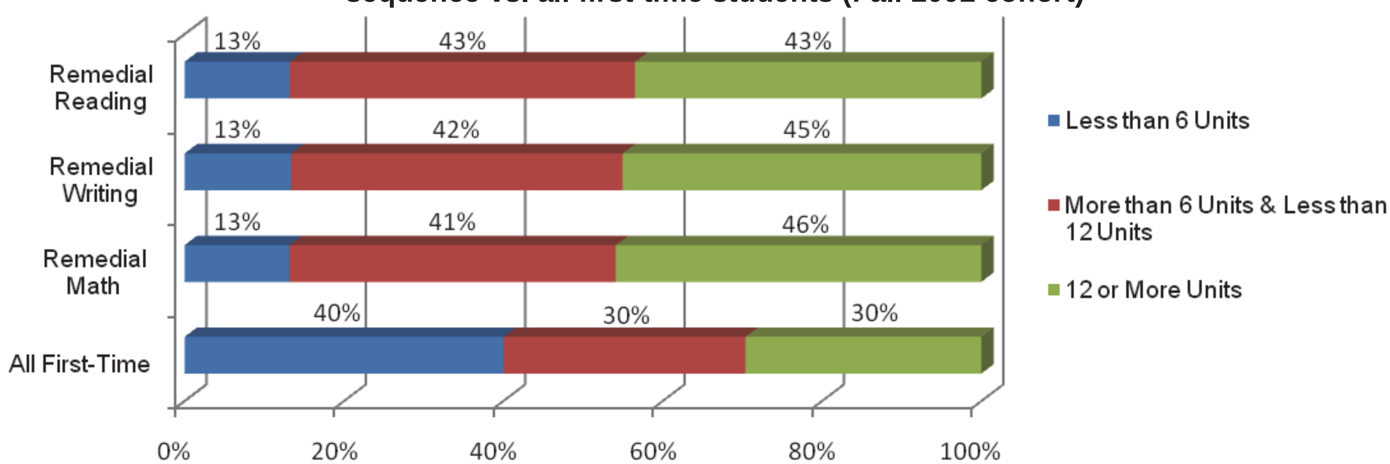


Figure 6b: **Average first-year unit loads of students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**



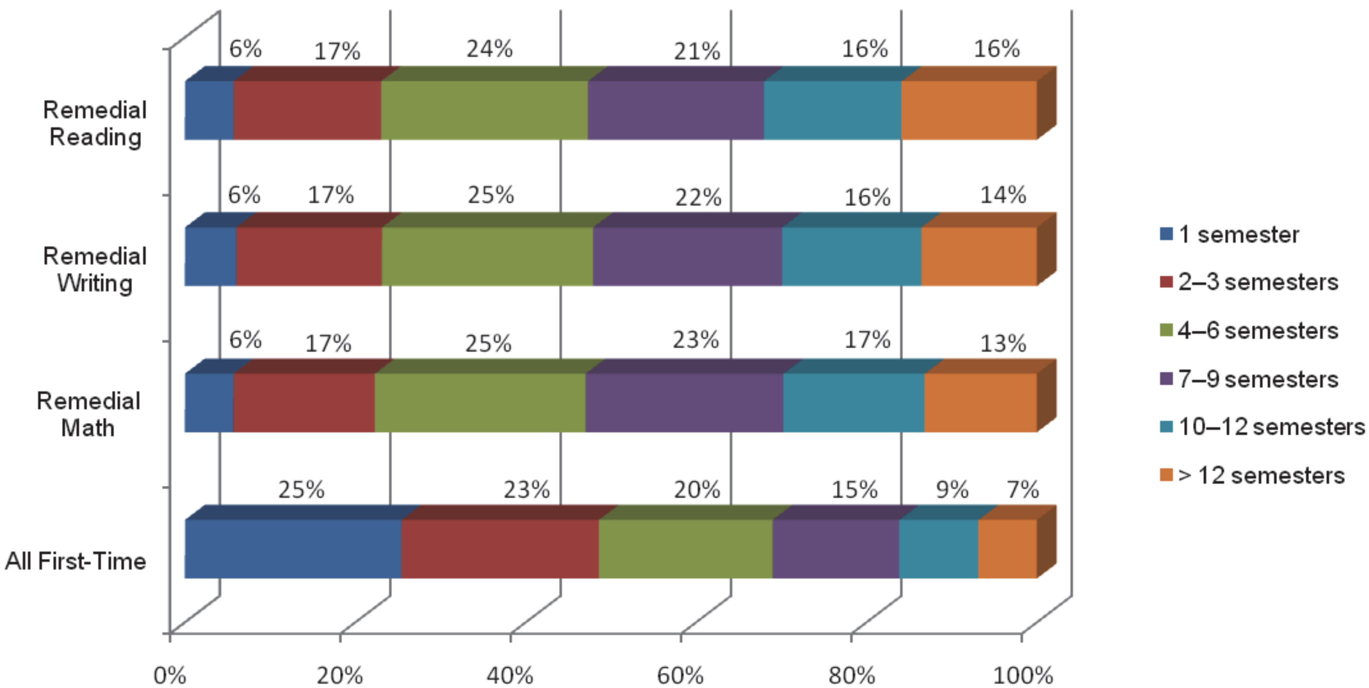
Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

The population of first-time students who enrolled in a remedial course excludes many "drop-in" students (e.g., see Bahr, 2010a) who enrolled in community college for only the Fall 2002 semester. Only 6% of students who enrolled in a remedial course in each of the three sequences did this, compared with 25% of all first-time students. (See Figure 6c.)

This descriptive finding is difficult to interpret, however, because students' duration of attendance is related to whether they enter a remedial sequence. Simply put, enrolling for additional semesters provides additional *opportunities* to begin a remedial sequence, and departing the system early may preclude beginning a sequence. These "drop-ins" likely include both students who intended to take only a few classes and students who did not meet their goals.

Figure 6c: **Number of semesters enrolled among students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**

(Note: Semesters include Summer terms and need not be consecutive.)



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

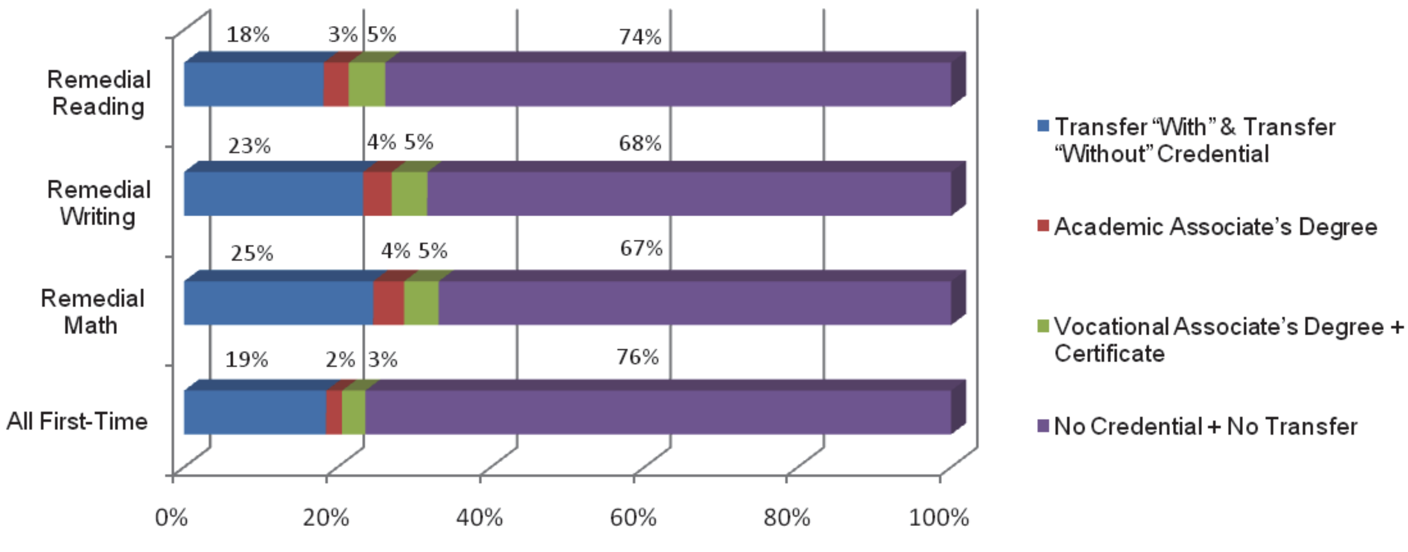
Greater proportions of developmental writing and mathematics students reached a completion benchmark—but most did not

Across all three sequences, greater percentages of students who enrolled in a remedial course earned 60 or more transferable credits by the end of seven years than among the overall first-time cohort. And in particular, students who enrolled in a remedial mathematics or writing course, respectively, transferred (with or without a credential) or completed a degree or certificate in greater proportion. (See Figure 7.)

Large proportions of *all groups* neither transferred nor completed a degree or credential, however:

- Roughly *two-thirds* of students who enrolled in each of the remedial *mathematics* and *writing* sequences, respectively, neither transferred nor completed a degree/credential.
- Nearly *three-quarters* of students who enrolled in the remedial *reading* sequence neither transferred nor completed a degree/credential.

Figure 7: **Ultimate academic outcomes of students who enrolled in a remedial sequence vs. all first-time students (Fall 2002 cohort)**



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Variation among students based on their starting levels

The prior section provided a broad descriptive portrait of the students in the first-time Fall 2002 cohort who took a remedial course at some point during the seven-year period considered. But these students' characteristics, aspirations, and outcomes varied—sometimes substantially—depending on the level at which a student entered a sequence. This section uses simple frequency data to describe these differences among students who took a remedial writing or mathematics course.

This section includes:

- Summary tables of key descriptive statistics related to these differences within the writing and mathematics sequences, respectively. (See Appendix Five for complete descriptive statistics for the Fall 2002 first-time cohort.)
- Discussion of notable descriptive observations based on students' starting levels.

Unfortunately, this section cannot provide a summary of the most common remedial course-taking *trajectories* that first-time students in the Fall 2002 cohort undertook on their way to college-level study. In addition to the variation in how colleges organize remedial sequences described earlier, there was ***tremendous variation*** in how students actually moved through—or did not move through—these sequences. Appendix Four provides a snapshot of this dizzying variety of student trajectories. (To summarize this behavior in a form that can be understood and analyzed, we use the economical set of remedial course-taking *variables* outlined beginning on page 16.)

In addition, because not all colleges offer a separate or complete remedial reading sequence, the following descriptive statistics do *not* attempt to describe differences among students as a function of beginning *reading* level. In addition, the subsequent quantitative analyses—presented in Section 2B—cannot track student behavior and progress through remedial reading sequences. See Appendix Three for further explanation. As before, integrated writing and reading courses are considered to be part of each college's *writing* sequence.

Also as before, these descriptive statistics do not control for other variations in student characteristics or behaviors. These observations simply document what happened with students and their incoming characteristics—in this case, as these vary among students who began at different levels of the remedial mathematics and writing sequences. Again, more sophisticated analyses are reserved for Section 2B.

Student characteristics and outcomes in the *remedial writing sequence*: It depends on where you start*

The 38,672 students in the Fall 2002 first-time cohort who took a remedial writing course entered the writing sequence at different levels below Freshman Composition (FC)…

1,195 students (3%) began 4+ levels below Freshman Composition (FC).	4,355 students (11%) began 3 levels below Freshman Composition (FC).	12,932 students (33%) began 2 levels below Freshman Composition (FC).	20,190 students (52%) began 1 level below Freshman Composition (FC).

Across the different starting levels identified above, students varied with respect to…

Age at college entry

- 61% of those who began 4+ levels below FC were 19 years old or younger, while 18% were 20–25 years old and 21% were older than 25.
- 83% of those who began 1 level below FC were 19 years old or younger, while 10% were 20–25 years old and 7% were older than 25.

Race/ethnicity

- Black/African American, Hispanic, and Asian students were overrepresented among those who began at lower levels of remedial writing.
- White students were overrepresented among those who began at the highest level of remedial writing (1 level below FC).

Socioeconomic status

- 55% of those who began 4+ levels below FC received a fee waiver in 2002–03.
- 36% of those who began 1 level below FC received a fee waiver in 2002–03.

Academic goals

- 32% of those who started 4+ levels below FC aspired to transfer (with or without a degree), and 15% enrolled for the purpose of remediation. 17% of those who started 3 levels below FC aspired to a vocational degree, a certificate, or other job-related goals.
- 55% of those who began 1 level below FC aspired to transfer (with or without a degree); 10% aspired to a vocational degree, a certificate, or other job-related goals.

First-year unit load

- 33% of those who began 4+ levels below FC enrolled full-time (12+ units per term) on average during their first year; 24% enrolled in fewer than 6 units per term.
- 49% of students who began 1 level below FC enrolled full-time (12+ units per term) on average during their first year; only 11% enrolled in fewer than 6 units per term.

Highest writing course completed

- Only 21% of those who began 3 levels below FC, and 17% of those who began 4+ levels below FC, completed FC or higher. Half as many completed a writing course one level below FC.
- 50% of those who began 1 level below FC completed FC or higher; another 26% completed their starting-level course.

Academic outcome

- 80% of those who began 3 levels below FC, and 83% of those who began 4+ levels below FC, neither transferred nor completed a degree/credential within seven years.
- 38% of students who began 1 level below FC transferred or completed a degree/credential within seven years; 62% did not.

* See Appendices Five and Six for supporting descriptive data.

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Student characteristics and outcomes in the *remedial mathematics sequence:* It depends on where you start*

The 49,997 **students** in the Fall 2002 first-time cohort **who took a remedial mathematics course** entered the mathematics sequence at **different levels below college mathematics**…

11,363 students (23%) began in **Arithmetic**, **4 levels below** college mathematics.	10,325 students (21%) began in **Pre-Algebra**, **3 levels below** college mathematics.	16,843 students (34%) began in **Beginning Algebra**, **2 levels below** college mathematics.	11,466 students (23%) began in **Intermediate Algebra/Geometry**, **1 level below** college mathematics.

Across the different starting levels identified above, students varied with respect to…

Age at college entry

- 64% of those who began in Arithmetic were 19 years old or younger, while 18% were 20–25 years old and 18% were older than 25.
- 92% of those who began in Intermediate Algebra/Geometry were 19 years old or younger; only 6% were 20–25 years old and 2% were older than 25.

Race/ethnicity

- Black/African American and Hispanic students were overrepresented among those who began in Arithmetic.
- Asian and white students were overrepresented among those who began in Intermediate Algebra/Geometry.

Gender

- 62% of those who began in Arithmetic were female.
- Male and female students began in Intermediate Algebra/Geometry in similar numbers.

Socioeconomic status

- 51% of those who began in Arithmetic received a fee waiver in 2002–03.
- 29% of those who began in Intermediate Algebra/Geometry received a fee waiver in 2002–03.

Academic goals

- 37% of those who began in Arithmetic aspired to transfer (with or without a degree); 19% aspired to a vocational degree, a certificate, or other job-related goals.
- 64% of those who began in Intermediate Algebra/Geometry aspired to transfer (with or without a degree); only 6% aspired to a vocational degree, a certificate, or other job-related goals.

First-year unit load

- 31% of those who began in Arithmetic enrolled full-time (12+ units per term) on average during their first year; 22% enrolled in fewer than 6 units per term.
- 61% of those who began in Intermediate Algebra/Geometry enrolled full-time (12+ units per term) on average during their first year; only 6% enrolled in fewer than 6 units per term.

Highest math course completed

- Only 24% of those who began in Pre-Algebra and 13% of those who began in Arithmetic completed Intermediate Algebra/Geometry or a college mathematics course.
- 51% of those who began in Intermediate Algebra/Geometry completed a college mathematics course; another 22% completed their starting-level course.

Academic outcome

- 74% of those who began in Pre-Algebra and 82% of those who began in Arithmetic neither transferred nor completed a degree/credential within seven years.
- 51% of students who began in Intermediate Algebra/Geometry transferred or completed a degree/credential within seven years; 49% did not.

* See Appendices Five and Six for supporting descriptive data.

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Notable descriptive observations related to students' starting levels

In addition to the overall differences just described in student characteristics and academic outcomes among students beginning at different levels of the remedial writing and mathematics sequences, additional patterns deserve special mention. In some cases, these additional descriptive observations are of particular salience for policy. In other cases, they prompt interesting questions for further research.

Most students began taking remedial courses during their first or second term of enrollment

One question of particular policy salience in California—see discussion beginning on page 63—is the extent to which new students delay taking remedial courses, and the effect this may have on student success. The basic frequency data below describe *when* students who took a remedial course began doing so.

For the most part, students in the Fall 2002 first-time cohort who enrolled in a remedial course in a writing or mathematics sequence began doing so during their first year of enrollment, most commonly during their first term. (See Figure 8 on the next page.) Across starting levels, more than half of these students began taking remedial courses immediately in Fall 2002 and roughly another one in five students began the following Spring 2003.

That said, roughly 10%–12% of students at each level of the writing and mathematics sequences, respectively, deferred their first remedial course in the sequence until their second regular academic year (Fall 2003 or Spring 2004). In addition, between 9%–16% of students at each level of the respective writing and mathematics sequences deferred their first remedial course until *after* their second regular academic year (beyond Spring 2004).

(Note: More sophisticated regression analyses of any correspondence between delaying a first remedial course and other student outcomes or characteristics are reserved for Section 2B.)

***Figure 8:* Across starting levels, most students who took a remedial course in writing or mathematics began doing so during their first year of enrollment**

Term of first remedial writing course		The **38,672 students** in the Fall 2002 first-time cohort **who took a remedial writing course** entered the writing sequence at **different levels below Freshman Composition**…			
		1,195 students (3%) began **4+ levels below** Freshman Composition.	4,355 students (11%) began **3 levels below** Freshman Composition.	12,932 students (33%) began **2 levels below** Freshman Composition.	20,190 students (52%) began **1 level below** Freshman Composition.
Year 1	Fall 2002	**55%**	**52%**	**58%**	**60%**
	Spring 2003	**17%**	**21%**	**19%**	**18%**
	Summer 2003	1%	2%	1%	1%
Year 2	Fall 2003	8%	7%	6%	6%
	Spring 2004	4%	5%	4%	4%
Later		15%	12%	12%	10%

Term of first remedial math course		The **49,997 students** in the Fall 2002 first-time cohort **who took a remedial mathematics course** entered the mathematics sequence at **different levels below college mathematics**…			
		11,363 students (23%) began in **Arithmetic, 4 levels below** college mathematics.	10,325 students (21%) began in **Pre-Algebra, 3 levels below** college mathematics.	16,843 students (34%) began in **Beginning Algebra, 2 levels below** college mathematics.	11,466 students (23%) began in **Intermediate Algebra/Geometry, 1 level below** college mathematics.
Year 1	Fall 2002	**51%**	**52%**	**57%**	**59%**
	Spring 2003	**19%**	**20%**	**18%**	**19%**
	Summer 2003	1%	2%	1%	1%
Year 2	Fall 2003	7%	7%	7%	7%
	Spring 2004	5%	5%	5%	4%
Later		16%	15%	12%	9%

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10
Note: Percentages may not sum to 100 due to rounding.

Most students passed their first remedial writing or mathematics course

In general, most students passed their first remedial course in writing or mathematics, across different starting levels in the sequences. Of those who did not pass, close to half withdrew from the course. Withdrawals were more common in the mathematics sequence. (See Figures 9a and 9b.)

Across starting levels, most students who took a first remedial course in writing or mathematics also attempted a second, more advanced course in those subjects. However, fewer than half of students who entered the remedial mathematics sequence at the Arithmetic level did so. (See Figures 9a and 9b.)

Figure 9a: **Most students passed their first course in the remedial *writing* sequence, and most attempted a more advanced course**

Remedial course-taking behavior	The **38,672 students** in the Fall 2002 first-time cohort **who enrolled in a remedial writing course** entered the writing sequence at **different levels below Freshman Composition**…			
	1,195 students (3%) began 4+ **levels below** Freshman Composition.	4,355 students (11%) began 3 **levels below** Freshman Composition.	12,932 students (33%) began 2 **levels below** Freshman Composition.	20,190 students (52%) began 1 **level below** Freshman Composition.
Passed first course	**58%**	**58%**	**60%**	**63%**
Failed first course	24%	25%	23%	20%
Withdrew from first course	18%	17%	17%	17%
Attempted a higher-level course	54%	57%	63%	62%

Figure 9b: **This was also true in the remedial mathematics sequence, except that slightly less than half of students who began in Arithmetic attempted a more advanced course**

Remedial course-taking behavior	The **49,997 students** in the Fall 2002 first-time cohort **who enrolled in a remedial mathematics course** entered the mathematics sequence at **different levels below college mathematics**…			
	11,363 students (23%) began in **Arithmetic**, 4 **levels below** college mathematics.	10,325 students (21%) began in **Pre-Algebra**, 3 **levels below** college mathematics.	16,843 students (34%) began in **Beginning Algebra**, 2 **levels below** college mathematics.	11,466 students (23%) began in **Intermediate Algebra/Geometry**, 1 **level below** college mathematics.
Passed first course	**52%**	**54%**	**50%**	**52%**
Failed first course	28%	25%	26%	25%
Withdrew from first course	20%	21%	24%	24%
Attempted a higher-level course	48%	58%	54%	62%

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10
Note: **Passed** = A, B, C, Credit, Ungraded / **Failed** = D, F, No Credit, Missing. Percentages may not sum to 100 due to rounding.

Data on the racial/ethnic distribution of students across remedial levels raise important questions about differences in college readiness

To the extent that policymakers and community college educators are especially interested in fostering increased academic success among Hispanic/Latino, African American, and other historically lower-achieving populations, the racial/ethnic distribution of students across different levels of California's remedial writing and mathematics sequences is of high interest. This also has important implications for how policymakers think about the success of K–12 schools in preparing students of different racial and ethnic groups for college.

As previously noted, Hispanic and black/African American students were overrepresented among first-time students in the Fall 2002 cohort who began at the lowest levels of the state's writing and mathematics sequences. Asian students were also overrepresented among those who began in lower-level remedial writing courses.

Figures 10a and 10b (on the next page) provide a different look. They show the distribution of students across remedial levels *within* each of the four largest racial/ethnic groups: black/African American, Asian, Hispanic, and white.

- Students in all four ethnic groups tended, on average, to have a longer road ahead to complete the remedial sequence in *mathematics* than in writing, assuming this was their goal.
- Black/African American students were the most likely among the four groups to begin remedial coursework at the lowest levels of a sequence. This was true in both writing and mathematics.
- *In the remedial writing sequence:* The largest proportion of students within each racial/ethnic group began one level below Freshman Composition, with white students being by far the most likely to do so.
- *In the remedial mathematics sequence:* Large numbers of black/African American, Hispanic, and white students began at the Arithmetic level. Black/African American and Hispanic students were the most likely to do so, however.

Figure 10a: **The distribution of students across remedial writing levels *within four racial/ethnic groups***

Race/ethnicity of students enrolling in remedial writing	Number (proportion) of students in group who began 4+ levels below Freshman Composition	Number (proportion) of students in group who began 3 levels below Freshman Composition	Number (proportion) of students in group who began 2 levels below Freshman Composition	Number (proportion) of students in group who began 1 level below Freshman Composition
Black/African American (N=3,176)	213 (7%)	580 (18%)	1,121 (35%)	1,262 (40%)
Asian (N=3,830)	170 (4%)	556 (15%)	1,335 (35%)	1,769 (46%)
Hispanic (N=14,537)	548 (4%)	1,966 (14%)	5,422 (37%)	6,601 (45%)
White (N=13,090)	156 (1%)	901 (7%)	3,711 (28%)	8,322 (64%)

Figure 10b: **The distribution of students across remedial mathematics levels *within four racial/ethnic groups***

Race/ethnicity of students enrolling in remedial mathematics	Number (proportion) of students in group who began in Arithmetic	Number (proportion) of students in group who began in Pre-Algebra	Number (proportion) of students in group who began in Beginning Algebra	Number (proportion) of students in group who began in Intermediate Algebra/Geometry
Black/African American (N=3,996)	1,568 (39%)	873 (22%)	1,042 (26%)	513 (13%)
Asian (N=3,865)	592 (15%)	661 (17%)	1,327 (34%)	1,285 (33%)
Hispanic (N=17,301)	5,178 (30%)	4,032 (23%)	5,275 (30%)	2,816 (16%)
White (N=19,629)	2,987 (15%)	3,794 (19%)	7,351 (37%)	5,497 (28%)

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10
Note: Percentages may not sum to 100 due to rounding.

Hispanic students are notably overrepresented among students who took a remedial reading course

Although this report does not analyze differences among students who took a remedial *reading* course based on their starting levels, enrollments in remedial reading among Hispanic students in the Fall 2002 first-time cohort deserve special mention.

Altogether 44% of students who enrolled in a remedial reading course at some point during the seven-year time period were Hispanic. In contrast, Hispanic students comprised only 33% of the overall first-time cohort, 35% of students who took a remedial mathematics course, and 38% of students who took a remedial writing course.

This overrepresentation raises important questions that cannot be answered here. For example, to what extent do these enrollments include language minority students who might have different instructional needs than native language speakers? It is impossible to draw firm answers from the available data and, in any event, this likely varies by college.

Consider one local example drawn from the qualitative research for this report. Nearly half of credit basic skills students at **Merced College**, located in the San Joaquin Valley, in 2007–08 were Hispanic, according to the 2009 *Basic Skills Accountability Report*. Another 22% percent were white, 10% were black/African American, and 10% were Asian (CCCCO, 2009, college-level Table A3).

The college offered 89 sections of credit basic skills reading in that year, compared with six sections of credit basic skills ESL (college-level Tables B3, B4). Younger students (no more than 24 years old) contributed 301.9 FTES in credit basic skills reading courses, but only 3.7 FTES in credit basic skills ESL. Although Merced College offered 39 sections of *noncredit* ESL, students who were 25 years of age or older comprised the vast majority (roughly 85%) of FTES in these courses (college-level Tables B7, B8).

According to one dean at the college, students taking credit basic skills courses who might also be considered ESL students—frequently “Generation 1.5” students—enroll predominantly in developmental English. He notes that knowing exactly how many students might be potential ESL students is difficult because most do not identify themselves as such through assessment.

Some students who entered the remedial writing and mathematics sequences at the lowest levels may have had goals other than transfer

As noted earlier, very few students among the Fall 2002 first-time cohort who began at the lowest levels of remedial writing and/or mathematics ever completed the last course in the remedial sequence or the first college-level course beyond it. This likely prevented many students from meeting their long-term college aspirations.

Some students who began taking remedial courses at the lowest levels appear to have had goals other than transfer or an academic degree, however. Roughly one in five students who entered the mathematics sequence at the Arithmetic level declared an intent to pursue either a vocational associate degree (3%), a certificate (3%), or “other job-related” goal (14%). And 15% of students who entered the writing sequence four or more levels below Freshman Composition declared remediation as their purpose for enrolling.

In addition, many students who began at these lowest levels were older when they entered community college. Nearly two in five students who began in Arithmetic, or began four or more levels below Freshman Composition, were older than traditional college age when they first enrolled in a community college. About one in five was older than 25 years of age.

Finally, many students who began at these lowest levels took a low-unit first course. Altogether 24% of students who began in Arithmetic and 25% of students who began four or more levels below Freshman Composition took a course that provided fewer than three units. Such low-unit courses were uncommon at higher levels of both sequences.

It seems likely that, for some students who entered the remedial mathematics and writing sequences at these lowest levels, not completing the last course in the sequence or the first college-level course beyond it did not constitute a “failure.” The 14% of Arithmetic-starters who declared an “other job-related” goal, for example, may have achieved their goals *without* completing a college mathematics course or achieving a credential or transfer. Their achievements are not documented in the outcomes as analyzed.

Most students who began only one level below Freshman Composition achieved neither transfer nor a credential

One important question for further research is why such a large proportion of students who began only one level below Freshman Composition neither transferred nor completed a degree or credential within the seven-year time period studied. Despite the relatively high rate at which these students passed their first writing course (see previous Figure 9a), *62% neither transferred nor completed a degree/credential*.

Given this, it is notable that most of these students also entered the remedial mathematics sequence—at widely varied starting levels. (See Figure 11a.) Only 32% of students who started one level below Freshman Composition successfully completed college-level math, and only another 10% completed Intermediate Algebra/Geometry. (See Figure 11b.)

This may not fully explain the low rate at which these students transferred or completed some kind of credential, however. These descriptive data cannot illuminate, for example, whether the quality of remedial writing instruction was adequate to prepare students for broader success in college-level coursework.

Figure 11a: **First-time students who entered remedial *writing* one level below Freshman Composition also entered *mathematics* at a variety of levels…**

Students who entered the remedial writing sequence one level below Freshman Composition (N=20,190)	
FIRST mathematics course *attempted*	Percent of students
College-level math	12%
Intermediate Algebra/Geometry	18%
Beginning Algebra	27%
Pre-Algebra	15%
Arithmetic	13%
Vocational math outside the sequence *only*, or did not *attempt* a math course	15%

Figure 11b: **…Ultimately, fewer than half completed Intermediate Algebra/Geometry or higher**

Students who entered the remedial writing sequence one level below Freshman Composition (N=20,190)	
HIGHEST mathematics course *completed*	Percent of students
College-level math	32%
Intermediate Algebra/Geometry	10%
Beginning Algebra	13%
Pre-Algebra	5%
Arithmetic	4%
Vocational math course outside the sequence, or did not *pass* a math course	36%

Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Section 2B: Quantitative analysis of remedial course-taking patterns and student outcomes

In this section, Peter Riley Bahr, Ph.D. (assistant professor, University of Michigan, School of Education), discusses the structure and findings of his regression analyses. ***Regression tables referenced in this section are contained in Appendix Seven****; see also Appendix Eight for charts summarizing the findings.*

Analytical methods

I use logistic regression (Long, 1997; Powers and Xie, 2000) as the primary analytical tool in this section of the report. Logistic regression is appropriate when the outcome of interest is dichotomous (having only two conditions). For example, I analyze whether a student delayed his or her first remedial math or writing course, whether he or she passed that first math/writing course on the first attempt, etc.

In the execution of these regressions, I employ a number of categorical independent variables. The interpretation of the results of a regression analysis when the independent variable of interest is categorical depends upon comparisons to an excluded category of that variable, called a "referent." To illustrate, in the regression analysis of passing or not passing first math on the first attempt, I include a measure of the amount of time that passed between first enrollment in college and the attempt of this first remedial math course (i.e., length of delay of first math). The excluded category is "no delay," meaning that the student enrolled in his/her first math course in the first semester of college attendance. The "effect" of each successive degree of delay (a one-semester delay, a two-semester delay, etc.) is measured with respect to the relationship between no delay and the likelihood of passing the first math course on first attempt. We may find, for example, that students who delayed their first remedial math course by one semester were less likely to pass that first math course on the first attempt than those who did not delay.

Finally, one rather unusual aspect of the regression analyses should be mentioned briefly here, though it will receive further elaboration in subsequent sections of this report. In particular, as I analyzed each outcome of interest (e.g., delay of first math/writing, passing first math/writing on the first attempt, attempting a second math/writing course), I divided the analytical cohort into segments based on how long students remained in the community college system. For example, in the analysis of the attempt of a second math/writing course, I analyzed separately students who remained in the system for two to three semesters, four to six semesters, seven to nine semesters, 10 to 12 semesters, and more than 12 semesters. The purpose of this approach was to disentangle the "effects" of various facets of remedial course-taking patterns on a given outcome of interest from the "effect" of persistence (duration of attendance) on the outcome. As I discuss in detail later, both course-taking patterns and outcomes are tied inextricably to duration of attendance.

The reader will note that I did not mention students who remained in the system for only one semester. By virtue of the definition of the remedial math/writing cohort (those students whose first nonvocational math/writing course was remedial in nature), it is not possible for a student who is included in a remedial cohort to both depart from the system after only one semester of attendance and to delay his/her first course in a given subject. Yet, delay of first math/writing is central to the analyses executed here. Thus, in all regression models I exclude (at a minimum) those students who departed from the community college system after only one semester. In addition to this constraint, I also exclude from the regression analyses those students who were missing data on the course success ratio, age, and/or sex.

Partial relationships

One point that the reader should keep in mind concerning the interpretation of the results of the regression analyses is the meaning of “partial relationships.” The value of regression analysis lies in its capacity to aid exploration of relationships between two variables (say, for example, variable A and variable B) while accounting for, or “subtracting out,” any relationship between variable A and a given variable C and, likewise, any relationship between variable B and variable C.

Consider, for example, the oft-noted relationship between race/ethnicity and academic attainment in its myriad forms. It is well established that black/African American students experience a disadvantage, relative to white students (the referent in this example), on a number of measures of academic attainment. However, we know that this relationship between race/ethnicity (variable A) and attainment (variable B) is not a consequence of race itself but, instead, is a consequence of the correlation between race/ethnicity and other predictors of attainment (Bahr, 2010c). One of these predictors is students’ socioeconomic status-of-origin. Compared with white students, black/African American students originate disproportionately from backgrounds of lower socioeconomic status. In turn, students who originate from backgrounds of lower socioeconomic status tend, on average, to reach lower levels of attainment than do students who originate from backgrounds of higher socioeconomic status. Therefore, if we wish to understand the relationship between race/ethnicity (variable A) and attainment (variable B), we must account for differences in socioeconomic status (variable C) because variable C is correlated with both variable A and variable B. The so-called “residual” relationship between variable A and variable B that we observe after controlling statistically for variable C is a partial relationship.

Authors who seek to describe these partial relationships frequently use phrases such as “net of other variables” or “all else being equal” or even “ceteris paribus” (a Latin phrase that may be translated “with other things the same”) to describe the relationship between variable A and variable B after accounting for differences in variable C and other potentially confounding variables (D, E, F, etc.) that are included in the regression model. Here, I often forgo this language in the interest of improved “readability” and ask the reader to remember that all observed relationships that I describe with respect to the regression models are partial relationships—conditional on the other variables included in a given regression model.

Statistical significance

Another point of clarification should be raised here, namely a clarification concerning the meaning of statistical significance. Strictly speaking, the phrase “statistical significance” used in reference to a regression coefficient is a statement about the likely value of the partial relationship between two variables (the predictor variable and the outcome variable) in the population from which the analytical sample was drawn. To say that a coefficient is “statistically significant” typically indicates that the likely size of this relationship in the population from which the sample was drawn is greater than or less than zero; or, said another way, that a relationship between these two variables is likely to exist in the population. One also might say that the relationship found in the sample, and observed in the regression model, is unlikely to be due to chance alone.

The analyses presented in this report focus on segments of a population, not samples from that population. Consequently, although the interpretation of statistical significance in this study is debatable, it certainly lacks the weight accorded in an inferential study. In harmony with this lesser weight, I take a simplified approach to handling statistical significance. In all regression tables, coefficients that met the widely accepted threshold of statistical significance ($p \leq 0.05$) or exceeded it ($p \leq 0.01$; $p \leq 0.001$) are denoted with a single asterisk (*). In other words, in contrast to the common practice of marking differing thresholds of statistical significance with differing numbers of asterisks, I do not distinguish between differing *p*-values so long as $p \leq 0.05$.

Coefficients that did not meet this threshold are unmarked.

Cautionary considerations regarding data and methodology

A number of issues regarding the data and methodology for this study deserve special cautionary attention and consideration. One of these issues in particular, discussed at length earlier in this report, is the absence of a shared system of assessment practices and tests in California's community colleges. (See discussion on pages 12–14.)

Why is this variation consequential for this study? As explained earlier (see pages 12–13), the main problem that this inter-college variability presents for this study is that it is not possible to define the segment of any given cohort of first-time students who *require* remedial assistance with math, writing, or reading. The only means of identifying these students is by their *participation* in remedial coursework (i.e., course-taking behavior). In effect, students self-select into the analytical cohorts of primary interest in this study—the remedial math cohort, the remedial writing cohort, and the remedial reading cohort—by enrolling in a first course in math, writing, or reading that is remedial in nature.

How does this affect the interpretation of analyses? This question perhaps is best answered with an example. Consider, for instance, the dichotomous "outcome" of whether or not a student delayed his/her first remedial math course by at least one semester, which is one aspect of remedial course-taking patterns that is of interest in this study. For the purposes of this example, those students in the Fall 2002 first-time student cohort who enrolled in remedial math in their first semester of attendance (Fall 2002) will be considered "timely" enrollees, while those who waited to enroll in their first remedial math course until Spring 2003 or later will be considered "delayed" enrollees.

Consider that, because one cannot identify in advance who *should* be taking remedial math coursework, only those students who remain in the system for at least two semesters may be categorized as "delayed" enrollees, while "timely" enrollees may include both those who attended for only one semester and those who remained in the system for longer periods of time. Hence, the outcome of *delay of first remedial math* is intertwined inextricably with students' duration of attendance. First-time students who remain in the community college system for longer periods of time have more opportunity to enroll in a first math course that is remedial in nature, with the result that they are included in the analytical cohort for remedial math. Those students who depart from the system early without taking a remedial math course, despite needing it, are excluded entirely from the analytical cohort for remedial math. In this case, the very definition of *delaying* first math hinges on student retention (or persistence).[2]

In fact, we see in these data that, of those students who were included in the remedial math segment of the Fall 2002 first-time cohort, fully 25% enrolled in their first remedial math course at least one calendar year after beginning college. On the other hand, of all of the Fall 2002 first-time students, nearly one-half (49%) remained in the community college system for less than four semesters (not necessarily consecutive semesters). How many students would have been, and probably should have been, counted in the remedial math cohort but dropped out before displaying the identifying behavior, namely enrollment in a remedial math course? One cannot know because assessment tests and practices vary across the community colleges.

In terms of the effect of this problem on the interpretation of the results of this analysis, the question one must ask is whether students who remain in the community college system for shorter periods of time may be systematically different in important ways from students who

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[2] This problem, by the way, is one of several reasons why this study does not employ event history analysis (e.g., Bahr, 2009) as the primary analytical tool in this phase of the analysis.

remain in the system for longer periods of time. The answer to this question is unequivocally affirmative, but a discussion of these differences is outside the scope of this report and, in any case, is detailed elsewhere (Bahr, 2010a).

A second methodological problem revolves around the effort to disentangle and measure the relationship between certain course-taking patterns in a given subject and ultimate attainment in that subject. Again, I elaborate this problem through an example. In this example, I treat *delay of first remedial math* as a predictor (or correlate) of students' ultimate attainment in math, and I allow for five potential categories of this variable based on when a student enrolled in his/her first remedial math course: Fall 2002 (no delay), Spring 2003 (delay of one semester), Summer 2003 (two-semester delay), Fall 2003 (three-semester delay), Spring 2004 (four-semester delay), or sometime after Spring 2004 (five-semester or greater delay). Ultimate attainment in math will be measured by whether a given remedial math student eventually completed successfully a college-level math course (e.g., college algebra). The question is, in what way is the length of delay of first math associated with students' ultimate attainment in math?

This example illustrates three problematic issues. First, we face the same problem of self-selection detailed earlier: some of the students who departed from the system after a relatively short amount of time may have enrolled in a first math course that was remedial in nature (and, therefore, have been included in the remedial math cohort) if they had remained for a longer period of time. As a closely related matter, but perhaps more problematic, among those students who were included in the remedial math cohort, only those students who remained in the system for *X* amount of time may have delayed their first remedial math course by *X* amount. In other words, analytically speaking, we face both self-selection into the cohort (problem #1) and self-selection into particular values of the variable *delay* (problem #2), both in part a function of duration of attendance. Again, the question one must ask is whether students who remain in the system for longer periods of time are systematically different from students who remain for shorter periods of time.

Third, we face a confounding relationship between delay, duration of attendance, and ultimate attainment in that the structure of the remedial hierarchy generally dictates a minimum amount of time required to complete the necessary coursework and advance to college-level competency. Case in point, consider *Student A* who begins in Fall 2002 with arithmetic, and who must complete that arithmetic course and three other courses (pre-algebra, beginning algebra, and intermediate algebra) before advancing to a college-level math course. *Student A* must remain in the system for a minimum of five semesters to complete the remedial math sequence and then complete a college-level math course. In contrast, consider *Student B* who also begins with arithmetic, but who delays this first math course for one year, until Fall 2003. If both *Student A* and *Student B* remain in the system for six consecutive semesters (i.e., Fall 2002, Spring 2003, Summer 2003, and so on), only *Student A* will be able to complete a college-level math course. Structurally speaking, it is not possible for *Student B* to complete a college-level math course. There simply is not enough time remaining in the six consecutive semesters of college attendance for *Student B* to advance through the necessary math coursework.

Analytically speaking, why does this matter? The problem here is that any analysis of the relationship between delay of first math, duration of college attendance, and ultimate attainment in math for these two students will appear to suggest that delay is associated negatively with attainment. Strictly speaking, delay *is* associated negatively with attainment in this case, but only insofar as the structure of the remedial math sequence prescribes a relationship between where a student begins in the remedial math sequence and how long a period of time is required to reach a college-level math course (Bahr, 2010b). The question one must ask is whether the same relationship between delay and attainment would hold if both students remained in the system for nine consecutive semesters, rather than six. If not, then any measured relationship between delay and attainment is a function of the structure of remedial math and not a unique “effect” of delay *per se*.

To the extent that the data allow, in the analyses presented here I seek to disentangle these sorts of relationships (e.g., to disentangle the relationship between delay and attainment from the relationship between persistence and attainment) and to estimate the magnitude of the relationships between the variables that are of interest in this study. For example, if a relationship between delay and attainment exists that is independent of persistence, is this relationship of consequential size?

I seek to accomplish these objectives by presenting a series of statistical models for any given outcome, each of which applies a different set of constraints to the analytical sample. The constraints, which vary from model to model, always involve confining the analytical segment of a given remedial cohort to students who remained in the community college system for a particular length of time (e.g., 2–3 semesters, 4–6 semesters, 7–9 semesters, 10–12 semesters, more than 12 semesters). This allows one to compare and contrast the observed relationship between, for example, delay of first math and ultimate attainment in math for students who remained in the system for varying amounts of time. Patterns and trends that emerge across a set of models are deemed to be informative about the nature of the relationship between a given predictor and the outcome of interest. To reiterate, the focus here is on emergent patterns across models and not individual coefficients in any one model.

However, given the complications that have been described, even these careful analyses and guarded conclusions should be approached with caution and a critical point of view. Although a given coefficient may be large and statistically significant, it does not follow necessarily that it is meaningful. Before any conclusions are reached, one must consider carefully who (which students) are included in a given model, and how the constraints of the data and the various constraints that are placed on the model may influence the observed relationships.

Results

In this section, I discuss the results of the regression analyses of various aspects of course-taking behavior in remedial mathematics and remedial writing. This section is organized around a series of questions about each aspect of course-taking behavior.

1. Who tends to delay the first remedial course?
2. Who tends to achieve a passing grade on the first attempt in the first remedial course?
3. After the first remedial course, who tends to attempt a second (more advanced) course?
4. Among students who attempt a second (more advanced) course, who tends to delay this second course?
5. Who tends to complete successfully a remedial math course that is no more than one level below college algebra, or a remedial writing course that is no more than one level below college composition?
6. Who tends to complete successfully a college-level course in math or writing?
7. Does variation in remedial course-taking patterns have any bearing on students’ long-term outcomes?

For each question, a set of six (or, in some cases, five) logistic regression models is presented, first for remedial math and then for remedial writing. Within a given set, each regression model explores the same outcome (e.g., delay of first math, achieving a passing grade in first math) but focuses on a different segment of the relevant population. As each question is answered, the outcome from the previous set of regression models is included as an independent variable (a predictor) in, or a constraint on, subsequent sets of regression models. For example, the “outcome” of delaying first math (question #1) is used as a predictor of the likelihood of passing first math (question #2), and so on.

Who tends to delay the first remedial course?

Among the first aspects of remedial course-taking behavior that may be observed in these data is *when* a student enrolls in his/her first remedial course in a given subject. Students may enroll in this first course in their first semester of attendance or in the second, third, or some later semester. I describe the latter as a *delay* of first math or first writing, and I analyze this behavior as a simple dichotomous variable. In other words, either the student enrolled in a first remedial course in a given subject in the first semester of attendance (*delay* = 0) or the student delayed his/her first course until a later semester (*delay* = 1).

In Table 1, I present the results of a series of logistic regressions of delay of first math on selected variables: the skill-level of that first math course, student’s average course unit load in his/her first year, student’s course success ratio in his/her first year, student’s age at college entry, student’s race/ethnicity, student’s sex, student’s self-reported citizenship, student’s self-reported academic goal, whether the student received a fee waiver in his/her first year, and the percentage of individuals in the student’s self-reported residential zip code who hold a bachelor’s degree or a higher credential. Model 1-1 limits the analytical cohort to those students who remained in the system for at least two semesters but no more than three semesters (not necessarily consecutive semesters). Model 1-2, 1-3, 1-4, and 1-5 limit the analytical cohort to those students who remained in the system for four to six semesters, seven to nine semesters, 10 to 12 semesters, or more than 12 semesters, respectively. Model 1-6 includes all students who remained in the system for at least two semesters but also includes duration of community college attendance as an additional independent variable.

Note that use of the skill-level of a student’s first math course (or first writing course) as a predictor in this set of models assumes that this variable is a property of the student, not a property of the course. Without this assumption, it would not make sense to include the skill-level of the first course in a model that predicts the likelihood of delaying the first course. This assumption has value here because it allows us to explore whether students who began the remedial sequence at different levels were more or less likely to delay their first course in a given subject.

In the first five models in Table 1, only one highly consistent pattern emerges. After controlling for other variables, students who enrolled in a lower average course unit load in their first year tended also to be more likely to be counted among the students who delayed their first math, and all the more so as one considers groups of students who remained in the system for progressively longer periods of time. One *might* interpret this observation as indicating a strategic delay of first math by students who enrolled part-time in their first year. That is, students who attended part-time (especially those who attended *very* part-time) may have been well aware that they would be attending college for a lengthy period of time and, consequently, may have actively delayed their first math course.

However, the more likely explanation is tied to the definition of the remedial math cohort: those students whose first nonvocational math course was remedial in nature. Part-time students likely have a lower chance of enrolling in a first remedial math class in any given interval of time than do full-time students simply because part-time students take fewer classes. On the other hand, the longer a part-time student remains in the system, perhaps the more likely he/she is to enroll in a first remedial math course. In fact, one may expect that, for all students (both part-time and full-time), the likelihood of enrolling in a first remedial course increases as duration of attendance increases. Yet, it is likely that the slope of this increasing likelihood is smaller in magnitude for part-time students than it is for full-time students due to the lower unit load of part-time students, resulting in a widening gap between part-time and full-time students as duration of attendance increases. A widening gap, in fact, is observed in this case: as we examine segments of the remedial math cohort who remained for longer periods of time, the differences in the likelihood of delaying a first math course across the several levels of average course unit load grow larger. So, in all likelihood, the appearance of strategic decision-making in the delay of first math actually is a consequence of the manner in which the remedial math cohort is identified: remedial math students are identified by their enrollment in a first math course that is remedial in nature, and part-time students have a lower chance of enrolling in a math course in any given semester than do full-time students simply because they enroll in fewer units of coursework.

Interestingly, one trend is not evident, though it might have been anticipated. Generally speaking, there does not appear to be a sizeable or consistent difference in the likelihood of delay of first math across different starting points in the remedial math hierarchy, after accounting for other variables. Students who began the remedial math sequence at differing levels appear to be about equally likely to have delayed their first math course.

With remedial writing (Table 2), we find a similar relationship between average course unit load in the first year and delay of first remedial writing, and a similar absence of a consistent pattern of relationships between where students began in the remedial writing hierarchy and delay of first writing. In addition, it appears that, net of other variables, older students were somewhat more likely to have delayed their first remedial writing course than were younger students, which is not a relationship that we observe with the timing of students' first remedial math course. Likewise, black/African American students, male students, and foreign students appear to have been more likely to delay first writing than were white students, female students, and students who are U.S. citizens, respectively. None of these relationships is observed consistently for delay of first math.

The question, of course, is whether delaying first math or first writing has any consequences for students academically speaking. To answer this question, I turn next to students' performance in first math and first writing.

Who tends to achieve a passing grade on the first attempt in the first remedial course?

In Table 3, I present the results of the logistic regression of whether or not a student passed his/her first remedial math course on selected independent variables. The outcome is coded *1* for a passing grade and *0* for a nonpassing grade (including withdrawal). The regression models presented in Table 3 impose the same restrictions as those imposed in Tables 1 and 2. Likewise, the same independent variables are included, but two additional independent variables have been added in Table 3: degree of delay of first remedial math and the unit load of the first remedial math course.

Several patterns are observed in Table 3. First, net of other variables, students who began the remedial math sequence at the lower levels generally were more likely to pass their first math course than were students who began at higher levels. The difference is especially noteworthy for the two lowest levels: pre-algebra (three levels below college math) and arithmetic (four levels below college math).

Second, delays of first math generally appear to be associated with a lower likelihood of passing the course, once other variables are controlled. However, the magnitude of the "effect" of delay on achieving a passing grade is not as simple to determine as it might appear. Case in point, in model 3-1, the consequences of delaying first math on the likelihood of achieving a passing grade appear to be quite severe for students who experienced lengthy delays. However, one must keep in mind that this model includes only those students who remained in the system for two to three semesters. The only way such students could delay their first math course for a lengthy period of time is to drop out of college and then return at a later date (i.e., sporadic or inconsistent college attendance). So, the "effect" of a lengthy delay is confounded by another predictor of lower performance, namely stop-outs.

A less problematic "effect" of delay on performance in first math may be observed in models 3-3, 3-4, and 3-5, which address students who remained in the system for progressively longer periods of time. Here, we find that the effect of delay on performance in first math is modestly negative but still meaningful. Students who delayed their first math course were somewhat less likely to pass their first math course.

The one exception is students who enrolled in first math in the first summer following enrollment in college. These students do not appear to have suffered the same disadvantage. In fact, controlling for other variables, these students were as likely to pass their first math course as students who enrolled in first math in the first semester of college attendance. Given that summers are very unpopular times to enroll in math (Bahr, 2009), this absence of an association is likely due to the fact that only highly motivated students would have chosen to enroll in a first math course during the summer.

Not surprisingly, a student's average rate of course success is strongly and positively associated with performance in first math. In addition, older students and female students tended to be more likely to pass their first math course than were younger students and male students, respectively. Black/African American students were consistently less likely to pass first math than were white students. Finally, there appears to be a modest negative relationship between very low course unit loads (less than six units) in the first year of attendance and the likelihood of passing first math.

Turning to writing (Table 4), one does not observe a consistent relationship between the skill-level of first writing and success in the course, nor a consistent relationship between delay of first writing and success, nor the consistent advantage for older students, nor the consistent disadvantage for black/African American students, all of which were found with math. Female students, though, still tended to be consistently more likely to pass first writing than did males, just as with math. Likewise, a student's rate of course success in the first year again is strongly associated with performance in first writing.

Finally, like math, average course unit load is associated positively with performance in first writing and, in fact, appears to have a more consistent pattern. Increases in course unit load in the first year of attendance are associated with progressive increases in the likelihood of achieving a passing grade in first writing, all else being equal. Given the various statistical controls included in these models, including delay of first writing and duration of attendance (an implicit control), one might speculate that greater course unit loads in the first year increased students' exposure to academic reading and writing, resulting in better performance in the first remedial writing course even when this course was delayed. In future research, it may be useful to examine more closely the relationships between delay of first writing, course unit load, and performance in first writing to determine if a performance advantage in first writing accumulates over time and/or over courses taken.

After the first remedial course, who tends to enroll in a second (more advanced) course?

An arguably poorly translated, but often quoted, tenet of the Chinese philosopher Lao Tzu reads, "The journey of a thousand miles begins with one step." I have considered the first step of the remedial math and writing sequences in the previous two sections. Here, I consider the second step—the attempt of a more advanced math or writing course—which surely is as important as the first step.

In Table 5, I present, as before, a series of logistic regression models of whether or not a student attempted a second, more advanced math course. The phrase "more advanced" refers to a math course that is of a higher skill-level than the student's first remedial math course and may include a college-level math course. The outcome is coded *1* if the student attempted a more advanced course and *0* otherwise. The same constraints again are applied, and the same independent variables are included, but now I add to the independent variables whether or not a student passed his/her first remedial math course.

As in previous sets of models, several general patterns emerge. First, just as students who began the remedial math sequence at the lower end of the skill continuum tended to be more likely to pass their first math course than were students who began in Intermediate Algebra/Geometry, students who began at lower levels also tended to be more likely to attempt a more advanced math course, net of other variables.

In this regard, context is important. For the students considered in this study, the minimum statewide course requirement in mathematics for the Associate's degree was Elementary Algebra, though some students were required by their local colleges to complete at least Intermediate Algebra. As discussed on page 61, Intermediate Algebra became a statewide minimum expectation in California only with students who began in Fall 2009.

Here, we find that students at the bottom two levels of remedial math (Arithmetic and Pre-Algebra) tended to be more likely than students at the top of the remedial math ladder to attempt a second math course, which seems reasonable because Arithmetic and Pre-Algebra generally are not terminal points in mathematics. However, we also find no consistent difference in the likelihood of attempting a second math course between students who began one level below college math (Intermediate Algebra or Geometry) and students who began two levels below college math (Beginning Algebra). It is unclear the extent to which local variation in the minimum course-taking requirement in math for the Associate's degree explains this observation.

Second, net of other variables, students whose first math course was at least three units tended to be more likely to attempt a more advanced math course. This finding is particularly interesting because, although math courses of lower skill are more likely to be offered for fewer units, here I control statistically for the skill-level of the first course, as well as whether a student achieved a passing grade in his/her first math course. Therefore, the positive relationship between the unit load of the first math course and the likelihood of attempting a more advanced math course is independent of the skill-level of, and grade achieved in, the first course. This finding counters the intuitively reasonable assumption that easing students into math with low-unit courses will increase the likelihood that they will enroll in more advanced math courses, and it counters the assumption all the more when one considers that the unit load of the first math course is not consistently associated with an increased likelihood of achieving a passing grade (see Table 3).

It is interesting to note, however, that this positive relationship declines in magnitude as we examine segments of the population who remained in the system for longer periods of time. Said another way, the cost of a low-unit first math course on the likelihood of attempting a second math course declines as duration of attendance increases. This finding hints at the possibility of a confounding relationship. In particular, it seems reasonable that the low-unit (often modular) math courses lengthen the time required to move up to the next, higher-level math course. As has been suggested in this report, anything that lengthens the time required to remediate successfully creates a structural obstacle for students, one solution to which is to remain in the system for a longer period of time. Here, we see what may be interpreted as evidence of this problem occurring "in process" as students move up (or not) from first math to a second, more advanced math course, in part as a function of remaining in the system (or not) long enough to enroll in this more advanced course.

The relationship between delay of first math and the attempt of a more advanced math course is, again, somewhat confusing at first glance. To disentangle this relationship, one may look to Models 5-3, 5-4, and 5-5, which address students who remained in the system for longer periods of time. In these models, it appears that minor delays of first math have, at most, a modest negative relationship with the likelihood of attempting a more advanced math course. However, even among students who remained in the system for a very long period of time, students who delayed their first remedial math course until their second year after initial enrollment appear to have paid a price in terms of the likelihood of attempting a second math course. Therefore, it appears that delays of first math of more than a semester or two likely hamper students' progress into a second, more advanced math course.

The single strongest relationship evident in Table 5 concerns whether or not a student passed his/her first math course. Those who passed their first math course were consistently more likely to attempt a second math course than those who did not pass, once other variables were controlled. Yet, interestingly, the difference between those who passed and those who did not pass declines as duration of attendance increases. This suggests the possibility that the cost of initial failure of first math—the "discouraging effect" of poor performance in first math that was documented by Bahr (2010c)—may be reduced if students are retained for longer periods of time.

Of the remaining patterns of note, average course unit load in the first year is positively associated with the likelihood of attempting a more advanced math course. Additionally, the oldest group of students (more than 25 years of age) generally were less likely to attempt a second math course than were the youngest (less than 20 years of age).

The set of regression models that address the attempt of a more advanced writing course, which are presented in Table 6, differ from the models for math only in that the indicator of the unit load of first writing is excluded. (See pages 16–17 for explanation.) Despite this exclusion, the findings are fairly similar.

- Students who began two and three levels below college writing (as opposed to three and four levels below college math) were more likely to attempt a more advanced writing course than were students at the top of the remedial writing hierarchy.
- Moderate delays of first writing were moderately costly in terms of the likelihood of attempting a more advanced writing course, but lengthy delays were very costly even for students who remained in the system for long periods of time.
- Passing one's first writing course is the single strongest predictor of attempting a more advanced writing course, but this relationship shrinks as students remain in the system for progressively longer periods of time.
- Average course unit load in the first year is positively related to the likelihood of attempting a more advanced writing course.
- The oldest students were less likely to attempt a more advanced writing course than were the youngest students.
- Lastly, unlike math, it appears that female students were more likely to attempt a second writing course than were male students.

Among students who attempt a second (more advanced) course, who tends to delay this second course?

Just as I considered how the delay (or not) of a first remedial math/writing course varies across a set of student behaviors and characteristics, so I also consider how the delay of a second (more advanced) remedial math/writing course varies among those students who attempted such a course. As before, though, considerable caution must be exercised in the interpretation of these results because delay (or not) of a second remedial course in math/writing involves a multilayered self-selection process, one aspect of which is the assumption that students remained in the system long enough to attempt a more advanced course.

In Table 7, I present a series of logistic regressions of delay of second math on selected variables. This outcome is coded *0* if a student enrolled in a more advanced math course in the semester immediately following his/her first math course. It is coded *1* if the student delayed the more advanced math course by one or more semesters. Note that, because this outcome presumes that students enrolled in a second (more advanced) math course, I exclude from these models all students who did not enroll in a second math course. In addition, I exclude all students who remained in the system for fewer than four semesters because it is not possible for a student who remained in the system for less than four semesters and who delayed his/her first math course by even one semester to then delay his/her second math course. These two constraints are more severe than the constraints applied in previous models.

Two particularly strong predictors of delay of second math are evident in Table 7, as well as several predictors of lesser strength. First, among students who attempted a second math course, those who delayed their first math course until the Spring 2003 or Spring 2004 were especially likely to delay their second math course, net of other variables. This makes sense in light of the nature of the semester system. As noted earlier, the summer is an unpopular time to take math courses. Consequently, students who wait until the Spring term to enroll in a first math course create for themselves a nearly automatic delay of their next math course, unless they are inclined to enroll in a second math course during the Summer term.

Second, controlling for the other variables included in the model, students who did not pass their first math course were especially likely to delay their second math course. This, too, makes sense because students who did not pass (who failed or withdrew from their first math course) typically must repeat this course in a later semester.

Third, all else being equal, the skill-level of a student’s first math course generally was inversely associated with the likelihood of delaying a more advanced math course if such a course was attempted. That is, students who began the math sequence at the lower end of the math hierarchy, and who attempted a more advanced math course, appear to have been less likely to have delayed their second math course.

Finally, a student’s average course unit load in the first year of attendance was inversely associated with the likelihood of delaying a second math course: lower course unit loads in the first year were associated with a greater likelihood of delaying a second math course. Interestingly, unlike the relationship between course unit load and delay of *first* math, the relationship between course unit load and delay of *second* math does not grow stronger as one considers groups of students who remained in the system for longer periods of time. Instead, the strength of the relationship declines. Therefore, the explanation that was offered for the relationship between course unit load and delay of *first* math does not appear to apply to delay of *second* math. One possible explanation is that, among part-time students, those who remained in the system for longer periods of time were more likely to transition to full-time or near-full-time status than were those who remained in the system for shorter periods of time. If true, this would be expected to reduce the observed “effect” of first-year, part-time status on delay of second math, as is observed here.

In the analysis of delay of a second writing course (Table 8), we find essentially the same relationships as observed for remedial math. The only exception is that students who began at the very bottom of the remedial writing hierarchy (four or five levels below college writing) do not appear to have experienced a consistently lower likelihood of delaying second writing, relative to students who began at the top of the remedial writing hierarchy. However, although the coefficients for students at the bottom of the remedial writing sequence in Models 8-1 and 8-2 are not statistically significant, they are of comparable size and the same direction as the coefficients associated with students who began two and three levels below college writing, suggesting that the same pattern of prompt enrollment in second writing may apply to students who began at the lowest rung of the remedial writing hierarchy.

Who tends to complete successfully a remedial math course that is no more than one level below college algebra, or a remedial writing course that is no more than one level below college composition?

Having considered the delay of a first remedial course, performance in the first remedial course, the attempt of a second (more advanced) remedial course, and the delay of the second remedial course, I now turn to the first of the measures of attainment: whether a student completed successfully a remedial math/writing course that is one level below college-level coursework or a higher-level course. This outcome variable is coded *1* for students who completed a math/writing course that is no more than one level below college math/writing, and *0* otherwise. Note that my use of the phrase "or a higher-level course" indicates that students who did not pass (or skipped) the remedial course that is one level below college competency, but who passed a college-level course in the subject, are designated here as having completed a course that is no more than one level below college competency (i.e., a value of *1* on this outcome variable).

For these sets of models (Tables 9 and 10), I apply all of the same constraints employed in the preceding analysis of delay of second math/writing (i.e., attempted a second math/writing course, remained in the system for at least four semesters), except that I also exclude those students who began their remedial math/writing coursework at one level below college-level coursework. These students needed only to pass their first math/writing course in order to have achieved the outcome of interest in these models.

Among the patterns evident in Table 9, students who began the remedial math sequence at the lower end were substantially less likely than were students who began at the upper end to complete a math course that is one level below college math or higher, after controlling for other variables. Although consistent with prior research (Bahr, 2010b), this patterns seems incongruent with the patterns evident in earlier models. In particular, students who began at the lower end of the sequence were more likely to pass their first math course (Table 3), more likely to attempt a second math course (Table 5), and less likely to delay their second math course (Table 7) than were students who began the upper end of the sequence.

Although only substantial delays of *first* math (more than four semesters) appear to have had negative consequences for students' likelihood of completing a math course that is one level below college math or higher, both moderate and longer delays of *second* math appear to have been consequential even for those students who remained in the system for long periods of time. Consider, for example, students who remained in the system for more than 12 semesters (Model 9-4). Net of other variables, those who postponed *first* math by five or more semesters (i.e., attempted first math sometime after Spring 2004) suffered a small decline in the likelihood of completing a math course that is one level below college math or higher. However, in the same model, students experienced a somewhat more sizeable decline in the likelihood of completing a math course that is one level below college math or higher if they delayed their *second* math course for three semesters or longer. Thus, only very lengthy delays of *first* math appear to be detrimental to students' attainment of this outcome, but moderate delays of *second* math appear to be detrimental.

Some additional patterns are observed in Table 9. First, but not terribly interesting, students who experienced lower rates of course success in their first year were less likely than were students who experienced higher rates of course success to complete a math course that is one level below college math or higher. Second, students who were older than 25 years of age were also less likely to do so than were students of traditional college age. Third, and much more interesting, students who passed their first math were modestly more likely to complete a math course that is one level below college math or higher than were students who did not pass their first math course. Although the latter finding may seem to be a “common sense” observation, in fact it is rather surprising. One must remember that the models include only those students who attempted a second math course, and the models control for a number of important covariates. Yet, we find here evidence of a residual effect—a “ripple” or “echo” of sorts—of performance in first math on subsequent attainment in math.

Concerning remedial writing (Table 10), many of the same patterns are evident as were observed for remedial math. A few exceptions should be noted, however. One of these exceptions is the relationship between delay of first writing and subsequent successful completion of a writing course that is one level below college writing or higher. In Model 10, we observe evidence that even modest delays of first writing (delays into the second year following initial enrollment) may be consequential for students’ attainment, even among students who remain in the system for long periods of time, and even after accounting for delay of second writing and other variables. This differs from math in that delay of first math appears to be important only when the delay is quite lengthy. Second, the residual effect of passing (or not) first writing is less consistent than that of math. Finally, black/African American students appear to suffer a fairly consistent disadvantage, relative to white students, in the likelihood of completing a writing course that is no more than one level below college composition.

Who tends to complete successfully a college-level course in math or writing?

An outcome of arguably greater importance is the successful completion of a college-level course in math or writing. I analyze the successful completion of a college-level math course in Table 11 and the successful completion of a college-level writing course in Table 12. These sets of regression models are comparable to those presented in Tables 9 and 10, except that students who began the remedial sequence at one level below college math/writing are included in the analyses presented in Tables 11 and 12. These students were excluded in the analyses presented in Tables 9 and 10.

The relationships observed in Tables 11 and 12 are reasonably similar to those presented in Tables 9 and 10, if not somewhat more clear and unambiguous. For both math and writing:

- The lower a student’s first course in the remedial sequence, the less likely was he/she to complete a college-level math/writing course, all else being equal.
- Only *lengthy* delays of *first* math appear to be consequential for the successful completion of a college-level math course, but even moderate delays of *first* writing appear to be associated negatively with the likelihood of completing a college-level writing course.
- A delay of second math/writing of more than one semester is associated with a lower likelihood of college-level math and writing attainment, even among students who remain in the system for long periods of time.
- Lower rates of course success in the first year are associated negatively with college-level math and writing attainment.
- Passing the first writing course appears to be associated with a greater likelihood of completing a college-level writing course, net of variables. The same relationship is *not* consistently evident with math.
- Black/African American students were less likely to complete a college-level math or writing course than were white students—the stubborn racial gap in successful remediation documented in prior work (Bahr, 2010c).
- Students who were older than 25 years of age were less likely to complete a college-level

math or writing course than were students of traditional college age.

Does variation in remedial course-taking patterns have any bearing on students' long-term outcomes?

The bottom line for many stakeholders in the community college system is degree attainment and, as a component of the process of degree attainment, transfer to a four-year institution. Thus, I ask here whether variation in remedial course-taking patterns in math and writing has any relationship to students' long-term credential and transfer outcomes, *over and above any relationship between remedial course-taking patterns and attainment in math and writing*. To answer this question, I used multinomial logistic regression (Long, 1997; Powers and Xie, 2000) to analyze variation in credential completion and transfer across all of the variables considered in previous models, plus a three-category indicator of the highest-skill math/writing course completed successfully by a given student. This indicator is coded *0* if the student completed a college-level math/writing course, *1* if the student completed a math/writing course that is one level below college math/writing but not a higher-level math/writing course, and *2* for all other outcomes.

Note that one can think of multinomial logistic regression as a series of logistic regression models, all run simultaneously, and each of which compares a different outcome with a single "excluded" outcome. The excluded outcome here is the least desirable, namely neither the completion of a credential of any kind nor transfer to a four-year institution.

As with previous models, I excluded some groups of students. Students who were included in the analysis were those who remained in the system for at least 10 semesters and who attempted a second math/writing course. These students are by no means representative of the larger remedial math/writing cohorts, but this tight set of inclusion/exclusion criteria was important to reduce the confounding associations between delay of first/second math and writing, duration of attendance, etc.

The results of this analysis are presented in Tables 13 and 14. Although there are a number of interesting findings in these tables, I focus on those that concern the relationships between remedial course-taking patterns and long-term credential and transfer outcomes; and, as before, my attention is on systematic configurations of relationships.

In that regard, there are few such systematic configurations of relationships between remedial course-taking patterns and long-term outcomes, once attainment in math/writing and other variables are taken into account. For math (Table 13), one finds what appears to be a consistent positive association between delaying first math and a greater likelihood of transferring *without* a credential versus neither completing a credential nor transferring. Conversely, one observes a somewhat less consistent negative relationship between delay of second math and a lower likelihood of transferring *without* a credential versus neither completing a credential nor transferring. One also notes that students who began at the lower end of the remedial math hierarchy experienced a greater likelihood than did students who began at the upper end of transferring *with* a credential versus neither completing a credential nor transferring, which has been observed in prior work (Bahr, 2010d). Finally, one may note a counterintuitive relationship between passing first math and both transfer outcomes. Students who passed their first remedial math course on the first attempt experienced a lower likelihood of transferring (versus neither completing a credential nor transferring) than did students who did not pass, once other variables (including math attainment) are controlled.

Systematic configurations of relationships are even less evident in the analysis of remedial writing. In fact, none of the relationships noted for math are replicated for writing. The only finding that may hint at such a systematic configuration is a disadvantage in the likelihood of both transfer outcomes (versus neither completing a credential nor transferring) for students who experienced particularly long delays (greater than three semesters) of their second writing course.

In sum, the analyses presented in Tables 13 and 14 suggest that, to the extent that the remedial course-taking patterns examined here have a relationship to students' long-term outcomes, such relationships are indirect, operating through the mediating variables of students' math/writing attainment.

This finding does not mean that variations in remedial course-taking behavior do not matter for students' ultimate outcomes. One may observe in these models that students who completed a college-level course in math or writing were much more likely to transfer or complete an academic Associate's degree (versus neither completing a credential nor transferring) than were students who did not attain this level of math/writing competency. In turn, the previous analyses indicate, for example, that students who delayed their first or second remedial course and/or did not pass their first remedial course tended to be less likely to complete college-level courses in math and/or writing. So, remedial course-taking patterns matter for students' outcomes, but only insofar as these patterns are associated with students' attainment in math and writing. In sum, particular aspects of remedial course-taking patterns appear to be associated with the likelihood of attaining key thresholds of math and writing competency, and attainment of math and writing competency is strongly associated with students' likelihood of completing credentials and transferring to a four-year institution.

Summary of findings

Certain aspects of course-taking appear to have systematic relationships with students' progress and ultimate achievement in math and writing. Here, I summarize the findings concerning the systematic relationships that were observed in these analyses. The reader is reminded, though, that we cannot say necessarily that a particular pattern of remedial course-taking "causes" or "contributes to" success or failure, or even (more cautiously) "leads to" success or failure. We can say only that particular patterns of remedial course-taking and certain aspects of progress or success are paired in systematic ways.

Findings: Level of first remedial math/writing course

- The initial skill-level of a student's first math/writing course does not appear to be related systematically to whether or not a student tends to delay this first course. However, students who began in the lower portion of the remedial math sequence (three or four levels below college math) tended to be more likely to pass their first course, though the same advantage does not hold for students who began in the lower portion of the remedial writing sequence.
- Moreover, students who began in the lower portions of the math/writing sequence (three or four levels below college math; two or three levels below college writing, but not four or five levels below college writing) were more likely to attempt a second (more advanced) math/writing course than were students who began at the top of the remedial math/writing hierarchy. Among students who attempted a second math/writing course, those who began two, three, and four levels below college-level were less likely to delay their second course than were students who began at the top.
- Yet, even after accounting for these seemingly advantageous behaviors, the further down the remedial math/writing hierarchy that students begin, the less likely they are to complete successfully a math/writing course that is one level below college math/writing or to complete a college-level math/writing course.

Findings: Unit load of first remedial math course

- Students whose first math course is of a lower unit load (less than three units) do not appear to be advantaged systematically with respect to the likelihood of passing this first math course. However, they appear to be less likely to attempt a second math course and more likely to delay the second math course if they attempt it.

Findings: Delay of first remedial math/writing course

There are obvious structural consequences of delaying first math/writing for students. Delays of any kind increase the risk that students will depart from the system prior to achieving their goals with respect to math and writing skills. However, these structural consequences were not my primary focus in this segment of this study. Instead, I focused on whether there are other associations between delay and progress/outcomes in math and writing, aside from the decidedly negative structural consequences.

- With the exception of students who delay first math until their first summer, delays of first math tend to be associated with a lower likelihood of passing the course. The same is not true of writing.
- Delays of first math/writing of more than one or two semesters are associated with a lower likelihood of attempting a second (more advanced) course, even among students who remain in the system for a long period of time. Delays of first math/writing also create a nearly automatic delay of second math/writing (among those who attempt a second course) if the first math/writing course is postponed until the Spring semester.
- However, delay of first math appears to have long-term consequences for students' achievement of math competency (whether college math or one level below college math) only if the delay is quite lengthy.
- On the other hand, even moderate delays of first writing appear to have lasting consequences on students' achievement of writing competency.

Findings: Success in first remedial math/writing course

- Students who passed their first remedial math/writing course were much more likely to attempt a second course, and much less likely to delay this course if they attempted it, than were students who did not pass. Put another way, failing or withdrawing from one's first remedial math or writing course has consequences, both in terms of dropping out of the sequence (not attempting a second math course) and, for those who continue in the sequence, in terms of delaying the next (higher) course.
- In addition, a very modest positive relationship was noted between passing first math and the subsequent completion of a math course that is one level below college competency and, likewise, between passing first writing and the subsequent completion of a college-level writing course.

Findings: Delay of second math/writing course

- Holding constant all of the other variables considered in this analysis, delaying second math/writing appears to have negative consequences for students' attainment of math/writing skill (both college-level competency and one level below college competency). Generally speaking, even students who remained in the system for a long period of time suffered a lower likelihood of achieving either of the levels of math/writing competency considered here if the delay was longer than one or two semesters.

Part Three

Current policies and practices, and issues going forward

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The current policy status of developmental education in California in relation to college-level expectations

The descriptive statistics and quantitative findings presented in previous pages offer the state and the California Community Colleges a valuable set of baseline measures for evaluating efforts to balance high standards for college-level courses with wide access to those courses.

For the past several decades, providing developmental education to students who need it has been crucial to achieving that balance. Since the Fall 2002 cohort began their studies, efforts to address the rigor of community college's academic expectations have included:

- Higher minimum academic expectations for the associate degree, and
- Ongoing efforts to revise state regulations pertaining to the validation of communication and computation (i.e., basic skills) prerequisites for transfer-level courses outside the English and mathematics departments.

These efforts, expressed through recent or potential changes to Title 5 regulations, necessarily focus a bright light on the issue of improving student outcomes in developmental education.

Higher requirements for the associate degree help stir renewed focus on developmental education

Prior to Title 5 regulations that went into effect in Fall 2009, the minimum statewide requirements for the associate degree specified that a student must at least complete a course one level below Freshman Composition (in English) and Elementary Algebra (in mathematics). Some colleges had higher local requirements, resulting in variation across the system. Among more than 50 colleges responding to a survey by the statewide Academic Senate (ASCCC) published in Spring 2003, 25 colleges required Freshman Composition and 10 colleges required Intermediate Algebra (ASCCC, 2003, pg. 32).

The ASCCC recommended increasing the statewide minimum requirements and, in September 2006, the Board of Governors (BOG) revised Title 5. The higher requirements went into effect for students who entered in Fall 2009.

The new rules (Title 5, §55063) establish that students must complete both of the following with a satisfactory grade as part of their studies for the associate degree:

- [Transfer-level] Freshman Composition or another English course at the same level and with the same rigor, approved locally.
- [One level below transfer] Intermediate Algebra or another mathematics course at the same level, with the same rigor and with Elementary Algebra as a prerequisite, approved locally.

These changes raised concerns about access among instructional officers and student services officers in the state, however. They argued the higher standards would put a college degree out of reach for many underprepared students unless colleges improved their capacity to provide effective developmental instruction. To resolve this concern, the ASCCC and the statewide organizations of Chief Instructional Officers and Chief Student Services Officers proposed what would become the Basic Skills Initiative (BSI).

The BSI aims to cultivate effective practices and support practitioners

During the past several years, the BSI has focused on "best practices" in developmental education, in an effort to make greater student success an institutional responsibility for colleges. Since September 2007, the BSI has been supported by categorical state funds—initially in the amount of $33.1 million each year, but reduced to $20 million in the 2009–10 state budget approved in July 2009, due to the state's fiscal crisis.

The BSI is intended to draw on and enrich the expertise of practitioners. The initiative has produced several literature reviews of effective practices, most notably *Basic Skills as a Foundation for Student Success in California Community Colleges* (Center for Student Success, 2007). This document is popularly called the "Poppy Copy" because of the color of its cover. A revised version was recently published as *Student Success in Community Colleges: A Practical Guide to Developmental Education* (Boroch, Hope, et al., 2010).

In its second edition in July 2007, the Poppy Copy defined "basic skills" as:

> "those foundation skills in reading, writing, mathematics, and English as a Second Language, as well as learning skills and study skills which are necessary for students to succeed in college-level work" (Center for Student Success, 2007, pg. 13).

In many respects, the literature review offered an extended critique of the "one instructor in one classroom for a standard class time" model of developmental education (Center for Student Success, 2007, pg. 140). Instead, it focused on:

- **Organizational and administrative practices**, such as integrating academic and student support services and ensuring that students complete basic skills instruction early.
- **Program components**, such as making orientation, assessment, and placement for new students mandatory; integrating counseling with academics; and conducting regular program evaluations whose results are used for continuous improvement.
- **Staff development practices**, such as making faculty development in teaching and learning for basic skills instruction a priority connected to a college's mission; and supporting relationships among colleagues so faculty can find intrinsic reward in basic skills teaching.
- **Instructional practices**, such as employing "a variety of instructional methods" including active learning, learning communities where cohorts of students take multiple courses together, and/or contextual learning opportunities that make basic skills relevant for valuable occupational or academic activities.

To broaden the implementation of such practices, the Poppy Copy introduced a template for colleges to use in collecting baseline performance data and assessing where, how, and how broadly they employ (or might employ) these effective practices. Colleges did this in exchange for a share of basic skills categorical funds, with the results informing ongoing action and expenditure plans. These plans detailed the actions and long-term goals each college intended to undertake to improve its institutional capacity for developmental education.

College action plans provide a window into the current practice of developmental education

The action plans submitted by colleges provide a window into the current practice of developmental education around the state. According to an Academic Senate analysis, certain "effective practice" strategies were highlighted most frequently in the plans that colleges submitted for 2007–08 (Fulks, Alancraig, et al., 2008, Chapter 18, pg. 9):

- Strategy A 3.2: "Based upon the institutional structure, a dedicated administrator or lead faculty is/are clearly identified and accorded responsibility for college-wide coordination of basic skills programs." Colleges that have established a coordinator position appear to vary widely in the percentage of time an individual is able to devote to this role, from 100% reassignment to no reassigned time and no stipend (Fulks, Alancraig, et al., 2008, Chapter 18, pg. 6).

- Strategy B 3.1: "A proactive counseling/advising structure that includes intensive monitoring and advising serves students placed into developmental education courses."
- Strategy B 3.2: "Counseling and instruction are integrated into the developmental education program."
- Strategy C 2.1: "Developmental education faculty are involved in the design, planning, and implementation of staff development activities related to developmental education."
- Strategy D 2.1: "Developmental courses/programs implement effective curricula and practices for English (e.g., reading/writing integration, writing across the curriculum, and use of writing labs)."

According to Finton and Fulks (2008), however, the 10% of colleges with the highest basic skills success rates in the state regularly cited only one of these strategies: A 3.2. There was little overlap between the plans of these colleges and those with the *lowest* basic skills success rates. Further analyses concluded that colleges in the state began the BSI self-assessment process from many different starting points. The most successful colleges appeared to have "more plans to research, evaluate and generate data, perhaps informing resource allocation and structural decision-making more completely," while the least successful colleges appeared "to be in the developmental stage for many of the identified effective practices" (Finton and Fulks, 2008, pg. 14).

One critique of colleges' action plans, and the literature review on which they are based, is that they have focused little specific attention on equity in basic skills outcomes among different student groups. For example, Dowd and colleagues have argued that these documents tend to disconnect effective practice from "students' communities, cultures or lived experiences," with faculty development "not rooted in communities outside the college" (Dowd, Lord, et al., 2009, pg. 33). A new literature review drafted by the Academic Senate, *Practices that Promote Equity in Basic Skills in California Community Colleges* (ASCCC, 2010), focuses on these topics.

Can revised policies for communication and computation prerequisites encourage earlier remediation?

A potential change to Title 5 regulations is again raising questions about the relationship between developmental and college-level courses: namely, possible revision of state regulations governing how communication and computation (i.e., basic skills) prerequisites are validated and established.

How to encourage timely remediation remains a question for the colleges

Among students in this study's Fall 2002 first-time cohort who took a remedial course, the majority began doing so during their first year of enrollment; half or more began during their first term. But in the regression analyses of this cohort, students who delayed their first remedial writing course were less likely to attempt a second, more advanced course. The same was true in mathematics among students who delayed their first remedial mathematics course until Fall 2003 or later. And even moderate delays of a student's first remedial writing course appeared to have long-term consequences for whether the student would complete the last writing course in the remedial sequence.

Ensuring that more students complete any needed developmental instruction early and quickly is a longstanding topic of concern for the California Community Colleges. The state has a financial stake in moving students through the system more quickly; indeed, timely student progress was one rationale for the 1986 proposal by the Commission for the Review of the Master Plan for Higher Education to limit remedial course-taking in the credit mode to 30 semester units, for example. Today, the Poppy Copy highlights institutional policies that "facilitate student completion of necessary developmental coursework as early as possible in the educational sequence" as one key practice for fostering student success (Center for Student Success, 2007, pp. 17–19).

Stakeholders inside and outside the system have suggested various strategies to encourage students to begin remediation early, if needed. One is advising. A 2004 report by the Academic Senate, for example, highlighted the importance of matriculation—and orientation in particular—for encouraging students to enroll in any needed remedial courses "right from the start" of their community college studies (ASCCC, 2004, pg. 18).

State funds for matriculation services have been cut severely since 2007–08, however. State categorical funds for matriculation services were cut by nearly 52%, from $101.8 million to $49.2 million, between 2008–09 and 2009–10.[3] Lawmakers also identified these funds for "flexibility" through 2012–13, giving community college district boards discretion to use these funds for alternative purposes. (For more information, see EdSource, 2010a.)

Even before these cuts, however, leveraging earlier remediation through matriculation services posed challenges. For example, only 48% of first-time freshmen enrolling in credit coursework in Fall 2007 received orientation services (CCCCO, 2009, pg. 13). The Consultation Council Task Force on Assessment had such statistics in mind when it argued that "simply requiring all directed students be subject to required matriculation services would make a big difference in providing the guidance students need" (Consultation Council Task Force on Assessment, 2008, pg. 5). But this requires resources in a time of increasing fiscal constraint.

A 2008 report by the Legislative Analyst's Office (LAO) suggested another approach to encouraging earlier remediation. The report recommended that the Legislature:

> "amend statute to require underprepared students (who are not exempted by districts) to take appropriate remedial classes based on their assessment results . . . beginning in their first semester . . . and every semester thereafter until they advance to college-level proficiency" (LAO, 2008, pg. 15).

The LAO also proposed stiff consequences for any nonexempt student who avoided assessment: these students "would be placed in beginning-level remedial math and English courses" (LAO, 2008, pg. 16).

A Strategic Plan Assessment Action Planning Group (APG) requested by then-Chancellor Diane Woodruff in mid-2008 debated and ultimately set aside the LAO's idea. One concern was that the LAO's proposal would create a legislative mandate that could not be funded. The APG's May 2009 End-of-Year Report documented several additional concerns (see Strategic Plan Assessment APG, 2009, pp. 2–3):

- Not all "underprepared" students are the same. Some need extensive help, while others need only "refresher" instruction to be successful in college-level work.
- "[D]oing more of the same is not enough." Given that traditional approaches to sequencing and instruction have not provided sufficient likelihood of student success, the

[3] This comparison considers the 2008–09 state budget as revised in February 2009 and the 2009–10 budget passed in July 2009.

LAO's proposal could not succeed without new approaches to developmental education.

- There was concern that consignment of underprepared students to predominantly remedial courses would disengage many students from college.
- There was also "considerable resistance" to preventing underprepared students from accessing college-level coursework outside the English and mathematics departments. This resistance stemmed from two concerns: that colleges could not provide enough remedial course sections and instructors to meet the demand that would result from the proposal; and that faculty in other disciplines could face declining enrollments in their courses, resulting in declines in enrollment-based funding.

One proposal for encouraging earlier remediation has recently gained momentum: revision of the Title 5 regulations pertaining to the validation of communication and computation (i.e., basic skills) prerequisites outside the English and mathematics departments. Although such prerequisites would not require a student to complete remediation at a particular time, some in the system hope that more effective use of prerequisites could influence student course-taking by specifying clearer requirements for some college-level courses.

The validation of communication and computation prerequisites

The current Title 5 regulations that govern the validation of such prerequisites were adopted in response to the Chancellor's Office's settlement with the Mexican American Legal Defense and Education Fund (MALDEF). The changes were sufficiently complex that the system produced several supporting documents in subsequent years to guide local districts and colleges in meeting their obligations (Board of Governors, 1993; ASCCC, 1997; CCCCO, 1997).

The current regulations (§55003) were one attempt by the system to balance academic standards for college-level coursework with the widest appropriate access to the curriculum. The regulations say that a prerequisite should be established when a student would be *highly unlikely* to pass a course without certain prior knowledge and skills. Once established, colleges must provide reasonable access to a needed prerequisite so students can make timely progress toward their educational goals. Students must also be advised of their right to challenge a prerequisite, with one of the legitimate grounds for a challenge being that a college does not provide sufficient access to needed coursework.

Local boards also must establish policies to ensure that courses with established prerequisites are "taught in accordance with the course outline of record, particularly those aspects of the course outline that are the basis for justifying the establishment of the prerequisite or corequisite" (§55003). This means that faculty should teach these courses in such a way that a student *actually is* highly unlikely to pass if they have not met an established prerequisite.

Generally, the process for establishing a prerequisite involves a content review, through which faculty "identify the necessary and appropriate body of knowledge or skills students need to possess prior to enrolling in a course" (§55000c). However, the process for establishing a communication or computation prerequisite outside the English or mathematics disciplines, respectively, is more complex. A college must prove statistically through "sound research practices" that a student would be highly unlikely to pass a particular course without a proposed communication or computation prerequisite (§55003e).[4]

The regulations also set a high standard for closing off student access to a discipline or curriculum based on a communication or computation prerequisite. Such prerequisites "may not

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[4] Exceptions to this requirement include cases in which "baccalaureate institutions will not grant credit for a course unless it has the particular communication or computation skill prerequisite" (§55003e1).

be established across the entire curriculum unless established on a course-by-course basis" (§55003g).

In lieu of prerequisites, faculty may also establish advisories for recommended preparation. Advisories require a content review of the target course to "list skills that it would be a good idea for students to have but which are not necessary to pass the class" (ASCCC, 1997, pg. 1).

Why some are in favor of revising Title 5 on the validation of communication and computation prerequisites

Currently, computation and communication prerequisites for transfer-level courses outside the mathematics and English departments are relatively uncommon. Few colleges employed them extensively at the beginning of the Basic Skills Initiative, though mathematics prerequisites were the most commonly used, followed by writing prerequisites. (See Figure 12 on the next page.)

Shulock and Moore argue that misunderstanding of the MALDEF settlement, which did not disallow prerequisites or mandatory placements, leads many in the California system to "assume they are unable to require most anything of students" (Shulock and Moore, 2007, pg. 13). They see prerequisites and mandatory placements as a corrective to the system's tendency to err in favor of maximizing students' curricular access rather than providing direction leading to success.

In addition, some describe the statistical validation requirement as "onerous." Colleges may not have sufficient research capacity to conduct the necessary validation studies, they argue (Moore, Shulock, et al., 2007; Lieu, 2010). Even with that capacity, the required evidence may be difficult to document because faculty, having made adjustments over time to the needs of underprepared students, may no longer teach the target course in a way that requires a proposed prerequisite in practice (Moore, Shulock, et al., 2007; Mahon, 2009; Lieu, 2010).[5]

Fulks and colleagues argue that prerequisites can provide "scaffolding" for student success and clearer course-taking pathways, and enable faculty to better meet the objectives and standards of the courses they teach. Fulks cites data showing increased success in Psychology B1A and Sociology B1 among **Bakersfield College** students who had completed a reading prerequisite, and in Economics 1 among **De Anza College** students who had completed different levels of mathematics. The latter data show, for example, that students who had completed Intermediate Algebra or higher were much more likely to pass Economics 1 in Fall 2008 (Fulks and others, 2008, Chapter 16, pg. 13–14).

The statewide Academic Senate is leading an effort to revise the Title 5 regulations governing validation of communication and computation prerequisites to require content review based on faculty expertise *but not statistical validation*. Resolution 9.02, passed in Spring 2009, called for regulatory revisions, with colleges to "conduct research on the effect(s) of the prerequisites" and provide procedures by which students can challenge prerequisites. Resolution 9.05, passed in Fall 2009, focused on ensuring the rigor and consistency of faculty content review systemwide.

The Assessment Action Planning Group (APG) also expressed support for a "project to develop statewide pre-requisites for a limited set of general education courses using content review" (Strategic Plan Assessment APG, 2009, pg. 5). Whereas the Academic Senate's resolutions focused primarily on enabling local flexibility, the APG's recommendation sought to prevent any declining enrollments that might occur if individual colleges implement new prerequisites but their neighboring colleges do not.

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[5] Grubb and Associates (1999) have called this one form of "hidden or submerged remediation," which is problematic to the extent that courses intended to focus on college-level work effectively become remedial courses detached from their intended goals. Berger (1997) describes the frustration and poor articulation of curricula that can result, such as when faculty struggle to assign meaningful grades to underprepared students who work hard and make progress but cannot meet the standards outlined for a course.

Figure 12: **Few colleges employed communication or computation prerequisites extensively at the beginning of the Basic Skills Initiative, though mathematics prerequisites were the most commonly used**

	Percent of **colleges** *offering each response, by subject*			
Colleges' responses regarding the number of transfer-level courses (in history, psychology, economics, etc.) specifying each of the following kinds of **prerequisites** (2006–07, 64 colleges responding)	**Writing** Courses as Prerequisites	**Reading** Courses as Prerequisites	**Mathematics** Courses as Prerequisites	**English as a Second Language** Courses as Prerequisites
None/NA	**33%**	**58%**	20%	**64%**
Few	**33%**	25%	**34%**	17%
Some	23%	13%	**33%**	16%
Many	11%	5%	13%	3%

Data: Academic Affairs Division, CCCCO, *Report on the System's Current Programs in English as a Second Language (ESL) and Basic Skills*, Graphs 41–44. EdSource, 6/10

Note: Percentages may not sum to 100 due to rounding.

Complications, concerns, and counterarguments

Many of the practical concerns about the Legislative Analyst's proposal to mandate immediate remediation also apply to the discussion of prerequisite regulations. To the extent that such prerequisites became more common, critics worry that "doing more of the same" in developmental education could result in many students failing to meet prerequisites, constraining access to higher-level coursework. The possibility that disciplinary faculty outside the English and mathematics departments could face reduced enrollments, and thus reduced funding, also remains a complication for local implementation. And colleges would need to provide enough developmental course sections and instructors to enable students to meet additional prerequisites.

Some also see value in the statistical validation of communication and computation prerequisites as opposed to content review alone. The report of the Assessment APG noted that some research studies demonstrate "the value of prerequisites" while others reveal "student success in spite of not fulfilling a prerequisite" (Strategic Plan Assessment APG, 2009, pp. 4). For example, empirical evidence for a proposed writing prerequisite might show that readiness for a particular history course demands a less rigorous prerequisite than was assumed. Such a finding could be a starting point for further inquiry into curricular alignment (e.g., into the effectiveness of developmental instruction, or whether the history course is being taught at the level of rigor intended).

Finally, some express strong concern about the possible impact of new prerequisites on access to the transfer-level curriculum among different racial and ethnic groups. The report of the Assessment APG cited concern that "an increase in prerequisites" could have "a disproportionate effect on specific groups and block their access to college courses and programs" (Strategic Plan Assessment APG, 2009, pg. 4). As the description of the Fall 2002 cohort of first-time students presented earlier showed, African American and Latino students were overrepresented at lower levels of the state's mathematics and writing sequences. To the extent these students have "further to go" in a sequence and are less likely to complete a sequence, they could be shut out of a growing number of content courses.

Approaches to prerequisites vary across colleges

Whether or not Title 5 is revised, local community college educators appear to take different approaches to the use of prerequisites in balancing academic standards with student access. The research for this study provides a narrow but illuminating look at this diversity.

As noted earlier, this study's examination of student progress through remedial writing and reading sequences involved identifying the *structure* of these sequences at different colleges. This provided an opportunity to examine the extent to which English faculty in different colleges had established formal prerequisites and/or advisories for the 4,285 transfer-level English courses (other than Freshman Composition) in which students from the Fall 2002 first-time cohort enrolled during their studies.[6] This allowed exploration of questions such as:

- To what extent did colleges formally require completion of *Freshman Composition* as a condition for access to other transfer-level English courses?
- To what extent did colleges formally require—for students referred to remediation through assessment—completion of a particular course within the remedial sequence, *below* Freshman Composition, as a condition for access to other transfer-level English courses? (This provides additional avenues into transfer-level coursework in the discipline.)
- To what extent did colleges establish advisories, or specify no direction at all, for transfer-level English courses instead of prerequisites?

The results of this inquiry are shown in Figure 13 on the next page. Among all the transfer-level English courses *other than Freshman Composition* taken by students in this study:

- An estimated[7] 78% of these courses specified a formal *prerequisite*. Although the majority of these were Freshman Composition prerequisites, a fair number specified completion of a course within the remedial sequence.
- An estimated 14% of these courses specified an *advisory or recommendation*, with an advisory that students complete the course one level below Freshman Composition being most common.
- An estimated 8% of these courses specified no prerequisite or advisory on prior preparation.

Analysis of college-level policies sheds further light. All 107 colleges in the study had established a Freshman Composition prerequisite for at least one transfer-level English course. But students' formal options for accessing the transfer-level English curriculum as a whole varied by college. For example:

- 20 colleges had established a Freshman Composition prerequisite for *all other transfer-level English courses* taken by students in this study. At least formally, these colleges provided the "narrowest" gateway into the transfer-level English curriculum, with all paths leading through Freshman Composition.
- At the other end of the spectrum, we estimate that Yuba College had the "widest"

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[6] Because this study's analysis of mathematics course-taking is built on prior documentation of remedial mathematics sequences across California by Bahr (2008, 2010b), similar documentation of prerequisites and advisories within math departments was not performed for mathematics.

[7] The percentages and proportions presented in this section should be considered *fair estimates—not* precise figures—because of variation in how some courses reported in COMIS are named from year to year.

gateway in the study, having established Freshman Composition prerequisites for fewer than one in five of the other transfer-level English courses taken by students in this study. A few transfer-level courses required completion of the remedial course two levels below Freshman Composition. The vast majority of transfer-level English courses taken at Yuba College by students in this study specified no prerequisite or advisory, meaning that—at least formally—the college provided students a wide variety of both charted and uncharted paths into the transfer-level English curriculum.

- Most colleges fell somewhere in the middle. For example, we estimate that Orange Coast College had established prerequisites for most (about six in 10) of the transfer-level English courses (non-Freshman Composition) taken by students in this study, and advisories for the rest. Most prerequisites specified Freshman Composition.

Prerequisites and advisories that are formally specified in colleges' course catalogs (or the lack thereof) are a limited source of information that might not accurately reflect actual practice, however. The extent to which formal prerequisites are enforced, or the extent to which advisories affect student course-taking behavior, could vary substantially from what catalogs describe. Research by Perin (2006) suggests that the *enforcement* of prerequisites also varies among colleges, including in California, for example.

Figure 13: How colleges used prerequisites and advisories to direct students on the preparation needed for transfer-level English courses _other than Freshman Composition_

Varieties of Direction on Prior Preparation Provided in Course Catalogs (Prerequisites and Advisories)	Estimated* Percentage of Transfer-Level English *Courses* (non-Freshman Composition) Employing Each Direction, Systemwide	Number of *Colleges* Employing Each Direction for Transfer-Level English Courses (non-Freshman Composition)
Prerequisites:	**78%**	**107**
Freshman Composition	57%	107#
1 level below Freshman Composition	18%	51
2 levels below Freshman Composition	2%	19
Advisories or Recommendations:	**14%**	**46**
Freshman Composition	6%	22
1 level below Freshman Composition	7%	27
2 levels below Freshman Composition	1%	9
None	**8%**	**48**

* These are *estimated* percentages because of variation in how some courses reported in COMIS are named from year to year. These percentages should be considered fair estimates, not precise figures. Percentages may not sum to total due to rounding.
# 20 colleges established Freshman Composition as a prerequisite for **all** other transfer-level English courses.
Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Potential new regulations raise the stakes for developmental education

Proposed revisions to Title 5 removing the statistical validation requirement for communication and computation prerequisites—drafted by a task force convened by (but not limited to) the Academic Senate—were presented to the Board of Governors (BOG) for a first reading in May 2010. However, the proposal raised questions about how to ensure that colleges' obligations to watch out for and address disproportionate impact on different student groups in light of the 1991 MALDEF settlement are clearly articulated, and about the role of institutional research in grounding faculty judgments in documented local needs. At this writing, these issues are unresolved. The prerequisite task force plans to present further information to the BOG in July, with the potential for new revisions to be approved by the end of 2010.

If a new proposal is approved, it will take time—perhaps not until Fall 2013—for any new prerequisites to appear in colleges' course catalogs. Local district boards electing to permit the new approach will need to adopt new district policies on prerequisite validation, and local curriculum committees will then need to decide how to proceed. Two of their greatest concerns will be ensuring the rigor of faculty content review processes and avoiding disruptive shifts in student enrollments among departments. The statewide Academic Senate is drafting a new document in place of its 1997 *Good Practice for the Implementation of Prerequisites* to help local faculty move forward and meet their obligations under Title 5. The Senate also plans to provide professional development to help ensure a consistent standard of content review across the system.

Regional or statewide coordination of prerequisites to prevent students from "shopping" for courses among multiple colleges remains an open and challenging question. Prerequisite validation based on content review requires faculty to align the demands of the target course with the learning outcomes of the proposed prerequisite course, as these are articulated in the respective course outlines of record. These outlines vary among colleges with respect to their specificity, however, thus making coordination of prerequisites across a region or statewide more difficult in practice.

Finally, the views of the statewide Student Senate for California Community Colleges (SSCCC) on the role of prerequisites are instructive (Fulks, 2009). When surveyed in the spring of 2009, these student leaders generally viewed accurate, mandatory placements and use of prerequisites favorably, to the extent these increase student success and support a more coherent distribution of skill levels within students' classes. However, students argued that the system should not raise expectations without providing the matriculation and counseling services that students need to understand their placements and their prospects. In addition, the students cautioned:

> "Basic skills courses are not seen as relevant to our choices of study; no one goes to school to study 'Basic Skills' or conduct remedial coursework. Taking non-transferable prerequisites is perceived as a waste of time and money; it could delay our completion of transfer or of a certificate or degree program.
>
> "Our colleges' supply of such courses hasn't met student need and demand. Mandatory placement is going to prove difficult not only to us, but to instructors and our colleges, should availability of the classes not change" (quoted in Fulks, 2009, pg. 25).

Whatever decisions are ultimately made, it is clear that changes to Title 5 will bring new responsibility to provide needed developmental courses and improve student success, just as when the system increased its minimum statewide requirements for the associate degree. These discussions inevitably circle back to ongoing efforts—in California and nationally—to rethink how developmental education is provided.

Different approaches to the practice of developmental education

Many stakeholders familiar with California's Basic Skills Initiative (BSI) agree that it has produced much-needed dialogue about the importance of improving student outcomes in developmental education. It has pushed colleges to address the fact that substantial proportions of their students access some form of developmental education while enrolled, and to provide resources that colleges can direct toward professional development for faculty. These efforts will become all the more important if revised Title 5 regulations enable local colleges to establish additional communication and computation prerequisites.

This new focus on the quality of developmental education and the need for more effective practices comes not merely from within the state, however. This is a period of intense scrutiny of the practice of developmental education by researchers, policymakers, philanthropic organizations, and other national stakeholders. This scrutiny is raising far-reaching questions about how developmental education might best meet diverse student needs.

This scrutiny is prompting innovation in California and elsewhere. This section documents examples and raises important questions about the integration of support services with developmental instruction, the connection of developmental instruction with occupational or academic contexts in which foundational skills are used, and the structure of the remedial sequence itself. First, this section addresses the role of faculty in college-level innovation.

The role of faculty inquiry and development in local innovation

Faculty familiarity with a rich menu of research-based options for effective practice in developmental education, such as those documented in the Poppy Copy, is only a first step on the road to improving student outcomes on a campus. Next is the "how to" step (Dowd, Lord, et al., 2009, pg. 34), which requires making judgments about which practices provide the most meaningful response to local problems, and piloting and evaluating the outcomes of new approaches over time.

As the BSI makes clear, faculty inquiry and development are central to the improvement of local outcomes. This is especially important because faculty who teach basic skills courses in the California Community College often do not have training specific to this task. A survey of the colleges by the Chancellor's Office (Academic Affairs Division, 2008) examined the extent to which faculty who taught credit basic skills courses at the beginning of the BSI were "hired with or later received specific training in developmental education." There was a great deal of variation among colleges in this regard. Although more than half of colleges reported that most of their faculty who taught reading and ESL had such training, among faculty teaching writing and mathematics such training was clearly less common. (See Figure 14 on the next page.)

Faculty development is complicated by the fact that so many developmental courses are taught by part-time faculty, who may be more difficult to integrate into a college's development and inquiry efforts. Course sections taught by full-time faculty appear to have been most common in reading, at least in the experience of many colleges, according to the same survey. But many colleges reported that no more than half of their credit basic skills sections in writing, reading, and/or mathematics were taught by full-time faculty. (See Figure 15 on the next page.) The inclusion of part-time faculty in professional development for developmental education connected with their colleges has been one concern for BSI leaders. For example, the initiative's Summer Teaching Institute in 2008 funded the attendance of campus teams comprised mostly of part-time faculty.

A growing number of initiatives around the state propose that making effective developmental education practices central to the work of individual colleges—that is, taking the "how to" step—requires a culture of evidence-based inquiry. Faculty and administrators need to know more about current programs. What is working? What is not? Based on what evidence? What alternatives might be undertaken?

The institutional research function within the California Community Colleges provides capacity for this work. However, the work of institutional researchers to date has been oriented primarily toward accountability reporting and strategic planning, rather than improvement of student learning through faculty inquiry and experimentation, according to the Research and Planning (RP) Group (2009). Its recent survey of colleges found that, in general, college administrators view research and data as being more widely integrated into the work of their colleges than do faculty. According to the authors of the study, these findings suggest that the role of institutional researchers in enabling faculty to use data to inform their practice in concrete ways remains to be fully developed on campuses.

Figure 14: Specific training in developmental education for faculty teaching credit basic skills courses in writing and mathematics was relatively uncommon at most colleges at the beginning of the Basic Skills Initiative

	*Percent of **colleges** offering each response, by subject*			
Colleges' responses regarding the percent of faculty teaching *credit basic skills/ESL courses* who were hired with, or later received, specific training in developmental education (2006–07, 64 colleges responding)	Writing	Reading	Mathematics	English as a Second Language
0%–25% of credit basic skills faculty had training	**39%**	28%	**50%**	22%
26%–50% of credit basic skills faculty had training	22%	16%	23%	8%
51%–75% of credit basic skills faculty had training	22%	16%	14%	19%
76%–100% of credit basic skills faculty had training	17%	**41%**	13%	**52%**

Data: Academic Affairs Division, CCCCO, *Report on the System's Current Programs in English as a Second Language (ESL) and Basic Skills*, Graphs 25–28. EdSource, 6/10

Note: Percentages may not sum to 100 due to rounding.

Figure 15: Colleges were most likely to report in _reading_ that more than half of basic skills course sections were taught by full-time faculty at the beginning of the Basic Skills Initiative

	*Percent of **colleges** offering each response, by subject*			
Colleges' responses regarding the percent of credit basic skills/ESL course sections taught by full-time faculty (2006–07, 64 colleges responding)	Writing	Reading	Mathematics	English as a Second Language
0%–25% of credit sections taught by full-time faculty	11%	6%	14%	20%
26%–50% of credit sections taught by full-time faculty	38%	25%	33%	28%
51%–75% of credit sections taught by full-time faculty	**47%**	**55%**	**45%**	**42%**
76%–100% of credit sections taught by full-time faculty	5%	14%	8%	9%

Data: Academic Affairs Division, CCCCO, *Report on the System's Current Programs in English as a Second Language (ESL) and Basic Skills*, Graphs 33–36. EdSource, 6/10

Note: Percentages may not sum to 100 due to rounding.

Consistent with the goals of the BSI, recent efforts are providing community college faculty with frameworks through which to conduct inquiry and reflect on their practice. These include, but are not limited to:

- A three-year project by the Carnegie Foundation for the Advancement of Teaching and the William and Flora Hewlett Foundation—**Strengthening Pre-collegiate Education in Community Colleges (SPECC)**—that provided grants to 11 community colleges in California. Each college received funding during three years to support faculty inquiry groups (see The Carnegie Foundation for the Advancement of Teaching, 2008). These groups developed and evaluated new approaches to teaching and learning in basic skills courses on their campuses using evidence and data, including the use of assessment to inform the direction of faculty experimentation (e.g., see Bond, 2009). One outcome of SPECC was online case studies through which faculty documented their research questions, the approaches to developmental teaching and learning they undertook in response, and what they learned. Various practices at the core of SPECC, including online documentation of faculty inquiry, continue in projects such as the **Faculty Inquiry Network (FIN)**.
- Efforts by the **University of Southern California Center for Urban Education (CUE)** to work with California community colleges through its Equity Model. The goal is to facilitate faculty inquiry toward more equitable college access and success. Campus inquiry teams disaggregate student data by race and ethnicity, develop benchmarks for improvement, and identify potential leverage points for improving student outcomes. The model supported the **Evergreen Valley College** example referenced early in this report. In that case, faculty discovered that "the majority of students who take a math assessment test do not enroll in a math course, and may enroll in a course other than the one in which they placed." These findings resulted in new goals for enrolling students in the courses into which they had placed, and further inquiry into the role of matriculation (USC CUE and Evergreen Valley College, 2009, pg. 15).
- A new RP Group-led effort—**Bridging Research, Information & Culture (BRIC)**—that, in 2010–11, will assist 15 colleges in strengthening their capacity for evidence-based inquiry projects. The project also intends to make institutional research more efficient, in order to free up time to support campus inquiry. Three colleges—**Las Positas College**, **Los Angeles Southwest College**, and **Porterville College**—began piloting the project in Spring 2010.

Building the system's capacity for faculty inquiry through creation of a "permanent statewide professional learning network" is also the goal of the current phase of the BSI, led by faculty from the **Los Angeles Community College District** (Basic Skills Initiative, 2009, pg. 5). (Faculty from the **Foothill-De Anza Community College District** led two prior phases of the BSI, which included the Summer Teaching Institute noted above.)

Under the current phase, 34 colleges have joined four regional pilot networks: Bay Area, Los Angeles, Sacramento/Central Valley, and San Diego/Imperial Valley. Efforts to date have included a Leadership Institute held in June 2009, which provided for discussion of how to set shorter- and longer-term outcome goals and the development of regional inquiry projects focused on "encouraging the campus at large to take ownership for professional learning" (Basic Skills Initiative, 2009, pg. 22). An online portal enables the regional networks to share information, document their work to date, and stay informed of regional workshops and events.

One long-term goal of the current phase is establishment of a permanent center to serve as a repository for faculty expertise and a hub for the continued growth and support of the network and faculty inquiry. Planning is being undertaken with grant support from several foundations.

Making support for student success explicit and pervasive

Like much of the national research and policy literature, the Poppy Copy drew attention to the importance of better integrating developmental instruction with a suite of support services that ensure students stay engaged, receive assistance, and maintain a sense of forward progress toward their goals. The Poppy Copy calls on colleges to ensure a “comprehensive system of support services exists [that] is characterized by a high degree of integration among academic and student support services,” and states that counseling support should be “substantial, accessible, and integrated into academic courses/programs” (Center for Student Success, 2007, pp. 4–5). The importance of support is heightened all the more by this study’s finding that students who did not pass their first remedial math or writing course on the first attempt were less likely to attempt a second, more advanced course in those subjects, holding constant other variables.

Integrating these many services poses challenges. Shulock, Moore, and colleagues have argued, for example, that state categorical funding structures often create “administrative silos [that] serve as barriers to collaboration between academic affairs and student affairs in addressing the whole student” (Shulock, Moore, et al., 2008, pg. 13), motivated in part by mistrust that local decision makers can or will use funds in meaningful ways to achieve institutional priorities (Shulock and Moore, 2007, pg. 25). They argue that, as a result of these restrictions and others—such as the requirement that colleges spend half of funds on direct classroom instruction—administrators have inadequate “flexibility to allocate college funding in ways designed to maximize student success” (Moore, Shulock, et al., 2007, pg. 40).

Perhaps in testament to such challenges, an analysis of colleges’ 2007–08 basic skills action plans by the Academic Senate showed that 43% cited integration of counseling and instruction as an area for investment and action (Fulks, Alancraig, et al., 2008, Chapter 18, pp. 9–10). And lab requirements for credit basic skills courses in reading, writing, mathematics, and ESL—whether students met these in centralized learning centers or decentralized subject-area labs coordinated with other support services—were the exception rather than the rule in California at the beginning of the BSI, especially in mathematics and ESL (Academic Affairs Division, 2008, pp. 14–16).

The recent work of the Student Support Partnership Integrating Resources and Education (SSPIRE) initiative provides one window into both new and longstanding efforts to integrate support services with developmental instruction. Nine colleges received grants during three years to implement new approaches through a partnership between the James Irvine Foundation and MDRC.

The SSPIRE colleges each undertook efforts to better integrate support services—e.g., counseling and financial aid—into the structure of students’ educational experiences, with ongoing reflection on data throughout the initiative. The nine colleges each undertook one of four primary approaches (see Weissman, Cerna, et al., 2009):

- *Learning communities:* **American River College**, **College of Alameda**, **De Anza College**, **Mt. San Antonio College**, and **Santa Ana College** either created new learning communities or built on existing ones. These communities linked multiple academic courses and revised curricula to include counseling and support staff, or linked academic courses to a “support course” taught by a counselor. Depending on whether learning communities were new or established, the number of students served by these programs at a given college ranged from 50 to closer to 1,000 students per year (Weissman, Cerna, et al., 2009, pp. 18–21).
- *Case management:* **Taft College** and **Victor Valley College** each undertook a case management approach, with advisors handling a small caseload. Case managers ensured that students received financial aid support, academic advising, and career counseling, for

example. However, SSPIRE leaders note that this approach is difficult to bring to a great level of scale "without substantially adding staff and cost" (Weissman, Cerna, 2009, pg. 92).

- *Study center:* **Merced College**, driven in part by results from its participation in the Community College Survey of Student Engagement (CCSSE), established a study center on campus where students can access academic assistance. Coordinators and faculty actively recruit developmental students to use the center, particularly "students who are at risk of failure or dropping out" (Weissman, Cerna, et al., 2009, pg. 47).
- *Summer bridge program:* **Pasadena City College** established a summer bridge program through which developmental mathematics students review math concepts and skills and receive counseling support (Weissman, Cerna, et al., 2009, pg. 60–61).

These grant-funded efforts in California to buttress instruction with stronger student support provide models that other colleges might consider. But they often also raise questions about how colleges can prioritize and sustain programs on behalf of more students. **Chaffey College's** Student Success Centers provide an example of academic support services at scale. The centers were a result of the college's Basic Skills Transformation Project, which responded to declining basic skills outcomes in the late 1990s. Undertaken with Partnership for Excellence funds formerly provided by the state during multiple years, the project included adopting new assessments, revising courses, integrating the college's former basic skills department into the disciplines, and replacing its former basic skills lab with the Student Success Centers.

Faculty lead the Student Success Centers and coordinate them with classroom instruction. The centers are often, but not always, discipline-specific. They include a Math Success Center, a Writing Success Center, a Language Success Center, and others. The centers provide supplemental instruction and directed learning activities (which combine independent exercises with follow-up tutoring) connected with academic or career technical courses, as well as drop-in assistance. (See Chaffey College, www1.chaffey.edu/success/index2.shtml.) The centers also coordinate with other services. For example, the college's Extended Opportunity Programs and Services (EOPS) conduct academic support within the success centers. (EOPS includes academic tutoring, financial support, and other services for students who are educationally or socioeconomically disadvantaged.)

Institutional research conducted by the college has found that students who use the centers are "more likely to successfully complete a course than students who were enrolled in the same section and did not access a success center," and that utilization of the centers has the "largest impact on the success rates of first-time college students" (Chaffey College Office of Institutional Research, 2009b, pg. 8). Other research that followed students during three years found that students who "enrolled in at least one course with a [success center] requirement" in their first term (Fall 2006) were more likely than students who did not take such a course to:

- Enroll in a course with a success center requirement in the following two semesters;
- Use a success center in connection with a course *not* requiring that students do so in their first and next two semesters;
- Persist to the following Fall semester; and
- Earn a certificate, degree, or transfer by the end of Spring 2009 (Chaffey College Office of Institutional Research, 2009a, pp. 1–2).

Contextualization—The role of student interest and identity

Contextualized teaching and learning involves connecting developmental learning with its *application* and *relevance* in academic or occupational contexts. The idea is that students should encounter foundational skills within the context of a practice that is meaningful on its own terms, with a clearer view of why these skills are important and who students might become by using them. To this end, instructors "[model] the skills necessary to complete a task [and also help] students articulate the thinking that accompanies the completion of the task" (Center for Student Success, 2009, pg. 8).

This contextualized approach contains an implicit critique of how writing, reading, and mathematics are frequently taught within remedial sequences. Grubb and Associates (1999) argue, for example, that remedial sequences and instruction frequently break student literacy and numeracy into small, discrete skills to be remediated separately and *prior to* learning the content or practice of a field. For example, a writing sequence may start at the lowest level with sentences, followed by paragraphs, then short essays, then eventually longer essays. Grubb calls this "skills and drills" or "part-to-whole" instruction (Grubb and Associates, 1999, pp. 28, 30). From a curricular perspective, some also say this style of organization recreates a K–12 experience that students are presumed to have missed or failed to understand previously (e.g., Epper and Baker, 2009, pg. 5).

The Integrated Basic Education and Skills Training (I-BEST) Program, a statewide program undertaken by the **Washington State Board for Community and Technical Colleges (SBCTC)**, is perhaps the most widely cited program nationally that integrates developmental instruction with career-technical learning. The program was designed in response to research showing that Adult Basic Education (ABE) and adult ESL students (25 years or older) who "took at least one year's worth of college-credit courses and earned a credential had an average annual earnings advantage," but that few met this "tipping point" (Prince and Jenkins, 2005, pg. 1).

Through I-BEST, adult literacy and career-technical instructors collaborate to provide ABE students with instruction in such areas as computer applications, early childhood education, and nursing. As described by a recent evaluation by Community College Research Center (CCRC), "[s]tudents receive college credit for the workforce portion of the program (though not for the basic skills instruction)" (Jenkins, Zeidenberg, and Kienzl, 2009, pg. 5). The state currently cites more than 140 I-BEST programs across all 34 colleges in the Washington system (Washington SBCTC, 2009) and makes clear the priority of these courses by funding them at a higher per-FTE rate than traditional ABE courses.[8]

The CCRC evaluation shows that I-BEST enrollees appear more likely than other ABE students to pursue credit-bearing coursework and earn awards such as certificates. However, it also notes that I-BEST may be less suited to adult students with the lowest incoming skills. To this point, the Washington State Board (Washington SBCTC, 2005) found during early piloting of I-BEST ESL programs that students with the lowest levels of English proficiency were generally not selected for I-BEST because the programs require reading and interpreting "simple charts" and "graphs and labels," as well as "easily understanding learned phrases and new phrases containing familiar vocabulary" (Washington SBCTC, 2005, pg. 5).

A recent literature review of contextualized approaches by the Center for Student Success documents a small number of California programs with an occupational focus (see Center for Student Success, 2009, pg. 20). One of these—a noncredit program focused on providing students

[8] Unlike in California, where responsibility for adult basic education rests with community colleges *or* the K–12 sector depending on local agreement (e.g., California Budget Project, 2009), all community colleges in Washington State provide such instruction.

with pathways into the utilities and construction trades—is part of a wider network of state-supported Career Advancement Academies, assisted by the Career Ladders Project. These academies are commonly organized in the form of learning communities that position basic skills instruction within a career-technical pathway of regional importance. Three Career Advancement Academy programs currently operate in the East Bay, Central Valley, and Los Angeles, respectively. Each involves partnerships between one or more community college districts, multiple colleges, adult schools, and other local agencies (e.g., chambers of commerce and workforce investment boards). (For more information, see the Career Ladders Project, www.careerladdersproject.org/projects/career.php.)

Because responsibility for adult basic and secondary education in California is split between the K–12 and community college sectors (e.g., California Budget Project, 2009), not all community colleges in the state offer noncredit developmental instruction. Course offerings that explicitly integrate *credit* developmental instruction into an occupational context appear to be relatively uncommon in California. Wiseley (2009) surveyed chief instructional officers, administrators of occupational education programs, and Perkins project directors about any such credit courses offered in 2006–07, such as integrated or "linked" courses, and verified these by examining course outlines and materials. Among 35 colleges that responded, "only 11 courses of sufficient length and content" could be verified (Wiseley, 2009, pg. 69). These included 10 integrated or "hybrid" mathematics courses, and one linked writing course (Wiseley, 2009, pg. 68).

Contextualized developmental instruction need not have a specifically occupational focus, however. Again, the Center for Student Success (2009) provides some examples, such as the Academy for College Excellence (ACE, formerly the Digital Bridge Academy) at **Cabrillo College**. The program is intended to enable at-risk students to succeed in college-level studies. Student cohorts enroll full-time in learning communities, beginning with a two-week Foundation Course. In this course, students—large proportions of whom entered community college without a high school diploma or graduated from continuation high schools—"reevaluate their past educational experiences and think critically about what they want from their community college education" (Navarro, 2008, pg. 6).

Student cohorts then take six linked academic courses. Teams conduct primary research projects as they might do in college-level courses, such as projects on social justice–related topics of interest to them, which in turn provide context for literacy and mathematics learning (such as through analyzing data). The process of conducting research and presenting findings publicly, and explicit reflection on the relation of behavior (e.g., attending class) to academic success (see Navarro, 2008, pg. 7), are intended to help students see themselves as academically knowledgeable individuals who can act to meet their goals.

The ACE program recently received $3.6 million in grant funding from the Bill & Melinda Gates Foundation and the William and Flora Hewlett Foundation. According to the press release, "[t]he grants will fund the program's expansion to three additional California community colleges and one out-of-state community college" (Academy for College Excellence, 2010). The ACE program is discussed further in this next section.

Different approaches to the remedial sequence

Students' chances of completing any kind of credential or transfer decrease as their "starting level" in a remedial sequence moves lower. Considered longitudinally, remedial sequences provide students with "many opportunities to exit" (Bailey, Jeong, and Cho, 2008, pg. 10). This has prompted some educators to think differently about the structure and goals of their remedial sequences.

Acceleration

Acceleration is one approach to thinking differently about remedial sequencing. The approach can take a number of different forms.

The English sequence at **Chabot College** in Hayward is one California example. Developed more than a decade ago, the sequence resulted from a reorganization of English instruction at the college, including the integration of writing and reading within the sequence. In its current form, students who assess as not ready for English 1A (called "Critical Thinking and Composition") may choose from two paths, both of which integrate writing and reading:

- A two-semester "Reading, Reasoning and Writing" sequence (English 101A and 101B), with each course offering 3 hours of lecture and 2 hours of individualized instruction.
- A one-semester, accelerated version of "Reading, Reasoning and Writing" (English 102).

Both paths are shorter than many English sequences encountered by community college students in California, but the English 102 path potentially enables students to enter English 1A as early as their second term. Both paths also share the common premise that students should practice, with support, the literacy tasks expected in transfer-level courses (an assumption shared by the Cabrillo College ACE program). Students read book-length works that serve as spurs to discussion and writing, for example.

Analyses of student progress conducted with the college's institutional research office (Hern, Arnold, and Samra, 2009) show that:

- Students with a range of incoming ACCUPLACER scores take each pathway, with most students appearing to be more likely to pass English 102 than English 101A.
- Students *who subsequently enroll in transfer-level English 1A* are equally as likely to pass the course regardless of whether they entered via the one-semester or two-semester path. In other words, the paths appear to provide equally effective preparation, on average.
- *However*, students taking the one-semester path are *nearly twice as likely to actually enroll* in English 1A. This lower attrition rate means that, in practice, developmental English students at Chabot are nearly twice as likely to make it through English 1A if they take the one-semester path rather than the two-semester path.

Another approach to acceleration is to allow students who assess just below the college level to enroll directly in college-level courses with additional instructional support. For example, Bailey argues that "the distinction between developmental and nondevelopmental students is arbitrary—the dichotomous categorization does not match the underlying continuity" (Bailey, 2009, pg. 23). Although some students clearly enter community college unprepared to succeed "even in augmented college-level courses" (pg. 26), the fact that a student scores slightly above or slightly below the college-level cut score on an assessment need not justify an entirely different entry point into the curriculum, especially if a different entry point makes attrition more likely.

The **Community College of Baltimore County** (CCBC) in Maryland has undertaken this approach though its Accelerated Learning Project (ALP). Prior to the project, students assessed at one level below the college level were directed to Basic Writing II (ENGL 052). But faculty discovered that two-thirds of students who began at this level never passed College Composition (ENGL 101), just one level higher, with most never even enrolling in the course (see CCBC, faculty.ccbcmd.edu/~padams/ALP/Site Folder/theproblem.html).

Students assessing at this level can now enroll directly in ENGL 101, in conjunction with a new version of ENGL 052 in support. The main course is configured such that eight students assessed at the ENGL 052 level join 12 students assessed at the ENGL 101 level in a common section of College Composition. These eight students and the instructor then stay together for the support course, immediately following, to address questions, work on essays, and draft "short papers that reinforce what has been discussed in the 101 class or prepare for what will be discussed in the 101 class" (see CCBC, faculty.ccbcmd.edu/~padams/ALP/Site Folder/alpdescription.html).

Results to date suggest that participating students are roughly twice as likely to pass College Composition as they would have been under the former approach, while doing so more rapidly. CCRC will evaluate the program's academic effects as part of the national Achieving the Dream Initiative.

Modularization

Modularization is a different approach to the remedial sequence that challenges the assumption that full, semester-length courses should be the default unit of remediation. Students do not necessarily arrive at community college with skill needs that fit neatly into pre-defined "levels." A student may need additional preparation with respect to some skills and concepts but not others. Modularization means breaking courses or entire sequences into "modules" that students pursue at their own pace, in order to focus their time on skills and concepts for which they need more preparation and exit the remedial sequence more quickly.

The Tennessee Developmental Studies Redesign Initiative, undertaken by the **Tennessee Board of Regents** and the **Education Commission of the States**, provides examples of modularization. **Jackson State Community College** (JSCC), for instance, has reorganized its formerly three-level mathematics sequence—Basic Math, Elementary Algebra, and Intermediate Algebra—into a single suite of nine modules. Which modules JSCC students must master depends both on their preparation and the program of study they intend to pursue. Students fulfill an "individualized learning contract" by mastering "only the concept deficiencies determined by a pre-test and those that are relevant to their career goals." One implication is that students might exit developmental mathematics through different routes, not necessarily by completing an Intermediate Algebra course (see JSCC, www.thencat.org/States/TN/Abstracts/JSCC Algebra_Abstract.htm).

Changes to sequence structure raise policy considerations

The examples above make clear that traditional remedial sequences are not the only way to structure developmental education. But changes to these structures, or in how students access them, require careful consideration of how new approaches fit into existing local and state policies.

For example, students enrolled in the first several cohorts of the **Cabrillo College** Academy for College Excellence (formerly the Digital Bridge Academy), took English 100 (Elements of Writing). This is the degree-applicable course located one level below transfer-level English 1A (College Composition). These students entered the program with a range of assessment recommendations, however, including recommendations below English 100. This meant some students would "'skip' a course in the developmental sequence," bypassing an established prerequisite (Badway, 2005, pg. 27).

Administrative concern arose at the college that placing a student into “a course that is more advanced than that indicated by the assessment/placement process” ran afoul of state regulations (Jenkins, Zeidenberg, et al., pg. 2). As noted early in this report, colleges may not use the assessment process to exclude a student “from any particular course or educational program, except that districts may establish appropriate prerequisites” (§55521a5). A 1997 document developed through consultation to help colleges understand how to act in accordance with these regulations—*Prerequisites, Corequisites, Advisories, and Limitation on Enrollment* (CCCCO, 1997)—makes clear the practical implications:

> “CAN A STAFF OR FACULTY MEMBER ‘WAIVE’ AN ENROLLMENT REQUIREMENT FOR A STUDENT WHO WISHES TO ENROLL IN A COURSE THAT HAS AN ESTABLISHED PREREQUISITE?
>
> “No. Once a prerequisite has been legally established and adopted for a course, all students wishing to enroll in that course must be required to meet the prerequisite, and this requirement must be applied consistently” (CCCCO, 1997, pg. 4).

Beginning in Spring 2005, the English 100 component of the ACE program was replaced with a reading lab (later a literacy skills course) that was not articulated with the established sequence. One result was that students “lost one semester of English progression” (see Academy for College Excellence, cbacademy.squarespace.com/why-ace/).

However, CCRC’s subsequent evaluation of the Academy showed that, other things being equal, students who pursued the initial “accelerated” model did better. They had been significantly more likely than students in the nonaccelerated model and students in a comparison group to pass English 100, pass English 1A within two years, and earn degree-applicable and transferable course credits (Jenkins, Zeidenberg, et al., 2009). These results raise questions about how the structure of students’ developmental experiences relate with educational outcomes. The results have also spurred further revision to the English component of the ACE program: in Spring 2010, English 100 is a component of some learning communities, while others include English 255, located two levels below transfer (Cabrillo College, 2010, pp. 41, 54, 56).

Educators must also consider the transfer role of the community colleges when evaluating the structure of remedial sequences. Intermediate Algebra is anchored as the final step in the remedial mathematics sequence, in part, because subsequent transfer-level math courses must have “an explicit intermediate algebra prerequisite” to meet CSU’s quantitative reasoning distribution requirement (CSU Office of the Chancellor, Executive Order Number 1033, pg. 7).

Some in the state, including the ACE program and the Carnegie Foundation for the Advancement of Teaching, are considering approaches to developmental mathematics that place stronger focus on statistical reasoning, however. The underlying question is whether the academic goals of all students are best served by Intermediate Algebra—a question also posed by the approach to developmental mathematics undertaken by **Jackson State Community College** in Tennessee, described above. Similar questions arise in K–12 about whether the “a–g” requirements for four-year university eligibility (which include Algebra II) should be required for all students, with vigorous argument on either side.

Going forward: National momentum, state policies, and new initiatives

Community colleges in general, and developmental education specifically, are occupying an increasingly prominent role in the national conversation about postsecondary success. This attention has in part been generated through the efforts of private grant makers—most notably the Bill & Melinda Gates Foundation and the Lumina Foundation, but including others such as Carnegie Corporation of New York, the Ford Foundation, and the W.K. Kellogg Foundation.

In July 2009, President Barack Obama signaled that community colleges had also officially arrived on the federal government's higher education reform agenda by introducing the American Graduation Initiative (AGI). The House of Representatives subsequently included the AGI in HR 3221. The $10 billion proposal articulated several goals for "transforming America's community colleges for the 21st century" (Goldrick-Rab, 2009). Among the goals were stimulating innovative policies and practices to improve the quality of the community college experience and tracking and measuring student and institutional progress through the development of new data systems. The measure was subsumed into health care reform legislation, however, with many aspects eliminated from consideration.

National momentum for change has not stopped, however, thanks in large part to the private foundation efforts. For example, in April 2010, the Gates Foundation announced its commitment to provide up to $110 million to help research and bring to scale innovative developmental education programs that accelerate students' progress (Bill & Melinda Gates Foundation, 2010). In addition, six national organizations have signed on to a "Call to Action" intended to promote changes that will produce 50% more students with high-quality degrees and certificates by 2020. (See the box on the next page.)

State policy changes are one focus for national foundations

Over time, the foundations interested in community college issues have supported various research and advocacy organizations and initiatives. Among these, Jobs for the Future (JFF) stands out for its longevity, having been in operation since 1983; for its contributions in the areas of education reform and workforce development; and for various community college initiatives with which it is identified.

A substantial focus of JFF's current work is policy change at the state level related specifically to developmental education. JFF has worked with other organizations to advance specific recommendations for state policy levers. Many of these are closely aligned with the Obama Administration's proposed initiatives related to community colleges. For example, a discussion convened in October 2009 by Complete College America resulted in some specific state policy recommendations intended to further goals for "revamping developmental education" (Jobs for the Future and Complete College America, 2009, pg. 1). Those goals included increasing completion rates, shortening time to degree/credential, and defining and supporting more effective and efficient pathways to credit-bearing classes and degrees/credentials.

This and a variety of other national initiatives have identified several areas where state policies can play a key role in achieving those goals. Perhaps most visible is the Achieving the Dream initiative, whose 15 participating states have concentrated their policy efforts in specific areas, according to JFF program director Michael Lawrence Collins (Collins, 2009). Those areas include:

- Reducing the need for developmental education.
- Thinking out assessment and placement policies carefully.

- Making sure policies foster program innovations and their evaluation.
- Developing goals for developmental education, measuring performance appropriately, and evaluating improvement.
- Creating incentives that drive institutions to focus on helping their students meet the goals.

Major national community college initiatives

Funding to support most of the efforts listed below has been provided by private foundations. The most active are the Bill & Melinda Gates Foundation and the Lumina Foundation, but support has come from a wide range of funders interested in college access, success, and workforce development.

- **Achieving the Dream: Community Colleges Count** is a national initiative begun in 2003 to help more community college students succeed. It acts on multiple fronts, including efforts at specific community colleges and in research, public engagement, and public policy. Achieving the Dream is funded by the Lumina Foundation and 18 partner foundations; its lead policy partner is Jobs for the Future.
- The **Developmental Education Initiative** is a new three-year Achieving the Dream project focusing on ways community colleges can leverage state policy to make developmental methods more effective. The initiative involves six state partners that have created state policy frameworks and strategies aimed at dramatically increasing the number of students who complete college preparatory work and move on to college.
- The **Committee on Measures of Student Success** is a group of experts appointed by U.S. Secretary of Education Arne Duncan. The group will "develop recommendations for two-year degree-granting institutions of higher education to comply with the law's graduation and completion rate disclosure requirements," as well as "regarding additional or alternate measures of student success that are comparable alternatives" (U.S. Department of Education, 2010).
- **Complete College America** was formally launched in 2010 with the express goal of increasing the nation's college completion rate through state policy change. The group said it will begin its work with an alliance of 17 states.
- The **Call to Action** is a compact aimed at promoting changes that will produce 50% more students with high-quality degrees and certificates by 2020. The six national organizations co-signing the compact are the American Association of Community Colleges (AACC), the Association of Community College Trustees (ACCT), the Center for Community College Student Engagement, League for Innovation in the Community College, the National Institute for Staff and Organizational Development (NISOD), and the Phi Theta Kappa Honor Society.
- The **Voluntary Framework of Accountability** is a joint effort of AACC, ACCT, and the College Board. The goal of this voluntary system, according to AACC, is to measure outcomes and processes specific to community colleges and "provide opportunities for colleges to benchmark their student progress and completion data against peers and to provide stakeholders with critical information on the colleges" (AACC, 2010).

Creating goals for developmental education and measuring improvement appropriately depend on having good data

Among the most basic measures of community college student and institutional performance are those required by the federal government and included in the Integrated Postsecondary Education System (IPEDS), such as the extent to which students attain associate degrees within three years. These metrics have been criticized as inadequately responsive to the real needs of community colleges and their students, however (e.g., Offenstein and Shulock, 2009). These basic measures do not provide the kind of actionable insights into student outcomes in developmental education that are currently being discussed nationally and in California.

"The first step toward improving performance outcomes in developmental education is to get a firm handle on current student and institutional performance," argues Collins (2009, pg. 17). He adds that the states involved in the Achieving the Dream initiative have focused on some key steps involved in doing so. One is to gather data that clarify the need for developmental education and illuminate how this need varies among different groups of students depending on their age, ethnicity, and full-time and part-time status. This is particularly important given the diverse student bodies that community colleges serve.

The Achieving the Dream initiative has undertaken efforts to identify and test additional performance measures of students' progress through community college. These resonate with many of the variables used in the remedial course-taking analysis conducted for this report. They include:

- Pass rates for developmental courses.
- Completion of a remedial course sequence.
- Enrollment in/completion of first college-level math and English courses.
- Continuous enrollment in the community college system (not just at one campus).

In addition, a new national initiative, the Voluntary Framework for Accountability, is working toward developing some recommended measures that campuses could adopt. Headed by AACC, the initiative's goal is to create a set of measures that can be used by all community colleges and are easy for the public to understand. As summarized by *Inside Higher Ed*, the measures being considered include:

- "College readiness, focused on how students arrive at a community college and how they become able to reach the college level."
- "Success in completing college-level courses."
- "'[C]redit accumulation milestones,' such as earning 15 or 30 credits of college-level work."
- "Completion of degrees or certificate programs."
- "'Overall success indicators' focused on whether individuals achieve whatever their purpose was in enrolling" (Jaschik, 2010).

Offenstein, Moore, and Shulock (2010) recently proposed potential "milestone" measures and "on-track indicators" that community college leaders could use to identify particular barriers to student success in their institutions, and provide early warning signs that students are falling off-track. The present study suggests additional indicators that could also be useful, such as whether a student passes his or her first remedial course in a subject, or delays a second, more advanced course by more than one semester.

CB-21: Improving the measurement of developmental education outcomes in California

The Budget Act of 2007 (Assembly Bill 194) required the Chancellor's Office and others to develop basic skills accountability measures, resulting in the state's first *Basic Skills Accountability Report* (CCCCO, 2009), released in Fall 2009. The report provided "student progress metrics" that tracked a first-time freshmen cohort over eight years, with students sorted by the *lowest level* of remedial course a student took. It looked at three outcomes for these students: completion of a degree-applicable but nontransferable course; completion of a transfer-level course; and transfer, completion of a degree/certificate, and/or becoming transfer-prepared.

Some of the results reported were clearly implausible, however, illustrating the challenges involved in developing accurate data. (See Figure 16.) The data purport that students beginning *four or more levels below* the transfer level in mathematics were *more* successful in completing transfer-level math courses and completing degrees or transfer than students who began at higher levels in the developmental sequence. The descriptive statistics offered in this study—see Appendix Five—show clearly that this is not the case: only 8% of first-time students who began at the Arithmetic level in this study's Fall 2002 cohort completed a college-level mathematics course within seven years.

Figure 16: Outcomes reported for students beginning at the lowest levels of remedial mathematics in the inaugural _Basic Skills Accountability Report_ are implausible (First-time freshmen, 2000–01 to 2007–08)

Level(s) below transfer (credit)	Number of first-time freshman students in cohort	Percentage who completed transfer-level mathematics courses	Percentage who transferred, completed a degree/certificate, and/or became transfer-prepared
1 Level Below	1,474	16.4%	32.8%
2 Levels Below	5,050	15.1%	28.3%
3 Levels Below	41,518	12.3%	27.6%
4+ Levels Below	**32,391**	**21.1%**	**35.6%**

Data: CCCCO, *Basic Skills Accountability Report* (2009), Table D1 EdSource 6/10

This weakness in the data reflects the inconsistency with which colleges coded the course "levels" of their remedial sequences historically using the CB-21 data element. To address this problem, hundreds of disciplinary faculty, the Academic Senate, and the CCCCO undertook a process to "improve, update and correct [the CB-21] coding used to track and report student progress through basic skills" (ASCCC and CCCCO, 2010). The result is a series of rubrics that provides a common framework for coding the "level" of remedial courses, defined in terms of levels *below the transfer level*. The rubrics related to credit courses define four levels below the transfer level in writing (English), reading, and mathematics, with each level defined according to its general learning outcomes, or exit skills.

The implications for accountability reporting could be profound. The new rubrics will enable more meaningful statewide data on student progress through the sequences, even when students change colleges. For example, four levels below transfer in mathematics will reliably signify Arithmetic instruction. The rubrics also provide a foundation for more effectively articulating high school courses and noncredit adult basic education courses with credit instruction. Colleges whose research offices were not already tracking student progress through these sequences will be better able to identify problems, such as attrition between levels.

What the CB-21 rubrics could mean for colleges' existing remedial sequences is less clear, particularly because these sequences vary in the number of levels they offer; some colleges may need to code more than one step in a sequence at a given CB-21 level. Some express concern that the rubrics could reinforce course sequences and structures that are ineffective. But others who agree that colleges should try new approaches view the rubrics as a tool for starting conversations about how local remedial sequences are organized and whether they provide students with efficient pathways to higher-level coursework.

Assessing the need for developmental education is particularly problematic in California

The data included in the *Basic Skills Accountability Report* (CCCCO, 2009) also reflect the historical disconnect between K–12 and community college data in California. For example, although the report provides statewide and college-level data on basic skills enrollments for students who are 19 years old or younger, it does not provide clear insight into how often California high school graduates enter community college needing developmental education. Many pressing policy questions remain unanswered, such as:

- To what extent does the preparation of California high school students vary based on their ethnicity and/or other characteristics, including English learner status and socioeconomic status?
- To what extent does lack of college readiness reflect poor high school achievement on the part of the student, versus a mismatch between what high schools are teaching and what community colleges expect?

In Florida and a few other states, educators and policymakers have data systems that allow them to follow students through the K–12 system, into postsecondary education, and ultimately into the workforce. That can provide rich information for better understanding how students progress through each step in the educational continuum and how the systems fit together, and for evaluating the extent to which various programs and innovations affect that progress.

Currently, California appears to be a long way from even having a statewide K–16 data system in place, much less being able to use it to evaluate the need for and success of developmental education programs at the broadest level. That said, many state policymakers have at least embraced the goal. Legislation passed early in 2010 as part of California's effort to apply for federal Race to the Top (RTT) grants included an expression of legislative intent. California's lack of success in that grant competition, combined with its financial woes, pose complications, however. California was also recently passed over for Institute of Education Sciences (IES) grant funds, provided through the American Recovery and Reinvestment Act (ARRA), intended to support 20 winning states in developing longitudinal data systems linking early childhood through the workforce.

Local community colleges do have some ability to evaluate their *own* students in relation to local high schools, however, thanks in no small part to the California Partnership for Achieving Student Success (Cal-PASS), a locally driven initiative that has received some state funding. About a decade old, Cal-PASS is a voluntary effort organized around local and regional memoranda of understanding (MOUs) among consortia of K–12 school districts, community college districts, and state universities. It provides participating faculty and teachers with longitudinal data tools for inquiring into barriers faced by local students as they transition between institutions, so that educators might consider new approaches. Because the sharing of data among these institutions is governed by regional MOUs, however, the information generated is primarily used locally and, by its very nature, does not provide a systemwide perspective. (For further discussion, see EdSource, 2008.)

At the statewide level, setting goals for the readiness of students coming out of high school is complicated by a lack of clarity in policy about what students should know and be able to do at the end of high school, and for which postsecondary paths. Again, mathematics provides the clearest example.

- California set Algebra I content as the minimum preferred standard for what is taught in eighth grade, an internationally competitive objective (see EdSource, 2009). By 2008, the state had the highest percentage of eighth graders taking Algebra I in the nation (Moore and Shulock, 2009, pg. 2).
- But Algebra I is also California's *de facto* minimum high school *exit* expectation in mathematics. Algebra I is the highest mathematics *course* the state requires for a high school diploma, and provides the most demanding mathematics *content* on the California High School Exit Exam (CAHSEE).
- At the same time, California's predominant college-readiness benchmark is the minimum course-taking requirements (the "a–g") that students must meet to be eligible for admission to the University of California (UC) or California State University (CSU). This typically means completing Algebra I, Geometry, *and* Algebra II before entering college.
- The community college system shares this expectation with respect to its *transfer* function, with Intermediate Algebra (i.e., Algebra II) being the last step in the remedial mathematics sequence. As noted earlier, CSU requires that transfer-level math courses must have "an explicit intermediate algebra prerequisite" to meet the system's quantitative reasoning distribution requirement (CSU Office of the Chancellor, Executive Order Number 1033, pg. 7).
- That said, relative to the *credentialing* function of the community colleges, Intermediate Algebra is considered college-level for the purpose of earning an associate degree.

The upshot is that the California Community Colleges open their doors to a wide variety of students who have successfully met none, one, some, or all of a variety of expectations. Students do not necessarily understand that their high school preparation could land them in remedial instead of college-level courses, depending on their goals.

Movement toward common assessments continues

In addition to ambiguous exit expectations for what students should know and be able to do when they leave high school, the diversity of assessment practices among the California Community Colleges leaves the system's *entrance* expectations unclear. Pressure continues to increase for colleges to adopt a more uniform approach to the assessment of incoming students.

Common assessments would be consistent with federal goals and could be informed by experiences in other states

The federal legislation drafted as part of the administration's American Graduation Initiative (AGI) encouraged states to develop common standards for assessing students' developmental education needs (Pusser and Levin, 2009, pg. 3). State strategies consistent with these goals would address not only the assessments used, but also placement policies, intake processes, and the integration of placement test data into state data systems.

Participants in the Complete College America discussion of the topic also favored standardizing assessment policies and practices across systems, citing the "benefits of increasing student mobility, developing common metrics of success, and encouraging dialogue among faculty on desired learning outcomes" (Jobs for the Future and Complete College America, 2009, pg. 2).

Another benefit of standardizing assessments, proponents nationally argue, is that it sends a clear signal to the K–12 system about college-ready expectations. A range of California stakeholders have also raised this point (RP Group, 2004; Shulock and Moore, 2007; Legislative Analyst's Office, 2008). And one of the more troubling findings of the Stanford Bridge Project was the common misperception among high school students that "community colleges don't have academic standards" (Venezia, Kirst, and Antonio, 2003, pg. 31).

Standardization of assessments and policies across multiple colleges is far from straightforward, however. Experiences from Virginia, Connecticut, and North Carolina—all states participating in the Achieving the Dream initiative—reveal the complexities that can accompany such a re-examination. Each state found that implementing a statewide approach to assessment and placement policy leads to far-reaching questions about curriculum and instruction, counseling, budgeting, and the broad goals of community colleges. Collins (2008) discusses the experiences of the three states as they set out to consider common, systemwide cut scores for student placement.

- In **Virginia**, a statewide discussion that initially focused on how to establish common cut scores led to the discovery of wide variation in the placement processes employed by different colleges in the system. The state then acted to first establish comparable placement practices among the colleges because, in the words of the system's vice chancellor for academic services and research, "[W]e had so many differences in the way our colleges managed the procedures of placement that it's very difficult to compare numbers across colleges" (quoted in Collins, 2008, pg. 7).
- The community college system in **Connecticut** also moved toward common cut scores, driven in part by concern about a lack of comparable data across the system and the friction this caused with the state's four-year colleges. The faculty-led process illuminated a need for better alignment between developmental and gatekeeper courses in English and mathematics. According to the system's chief academic officer, the new policy promised big implications for staffing, professional development, and counseling because, according to projections, "some colleges would need to add up to 10 additional sections of developmental education" (quoted in Collins, 2008, pg. 9).
- The example of **North Carolina**, as related by Collins, shows that deliberations about common assessments and how to set cut scores are also closely related to the goals of community colleges in supporting both access to higher education and standards for college-level instruction. As the former chair of the state's placement committee describes, "looking at what the data said . . . if any of the scores could be lower and we could keep the same . . . probability of success with students, then we saw no reason not to lower the score" (quoted in Collins, 2008, pg. 11).

Similar questions, such as about variations in matriculation practice, would likely be raised in California if the system moved toward common assessments. As noted earlier, much smaller proportions of first-time freshmen who enroll for credit receive orientation, counseling, or follow-up services than receive assessment; and not all nonexempt students are assessed. Matriculation service rates reported by colleges vary widely (CCCCO, 2009). And state funds for matriculation services were cut by nearly 52% in the state budget passed in July 2009. These categorical funds were also granted "flexibility" through 2012–13, so that district boards could elect to use them for alternative purposes.

California could learn a great deal from better assessment data

Without question, the ability to collect statewide data on assessment results would enable California's community colleges to make more sophisticated inquiries into important questions about student success in remedial course sequences that cannot currently be addressed.

For example, the statewide data on placement recommendations in California is currently limited to campus surveys conducted for the *Basic Skills Accountability Report* (CCCCO, 2009). By contrast, a recent study of student outcomes in reaching gatekeeper courses in English and mathematics in the **Virginia Community College System** (Roksa, Jenkins, et al., 2009) was able to consider the placement recommendations for individual students. The researchers learned that 39% of Virginia community college students who were referred to a developmental mathematics course did not enroll in one. The corresponding rates in writing and reading were 35% and 41%, respectively. Moreover, the researchers found that—in both English and mathematics—students who were recommended for developmental coursework were similarly likely to take and pass gatekeeper courses *regardless of whether they actually enrolled in the prior developmental courses to which they had been referred*.

These findings raise interesting questions that the Virginia system can explore further regarding matriculation practices, the effectiveness of developmental instruction, and whether alternative strategies may be enabling some students to succeed in gatekeeper coursework even though their assessment results indicate a lower likelihood of doing so (Roksa, Jenkins, et al., 2009). Similar statewide analyses cannot be conducted in California.

Common assessments are increasingly discussed and remain a possibility

In January 2008, the Board of Governors accepted a report from the Consultation Council Task Force on Assessment pertaining to common assessments for the California Community Colleges. The report described resistance to the idea, noting that "local determination of what best supports student success is a deeply ingrained concept" within the system (Consultation Council Task Force on Assessment, 2008, pg. 7). As an alternative, the Task Force's report recommended exploiting existing uniformity in the use of a few commercial assessments to develop new tools for sharing and comparing assessment data.

The California Community College Assessment Association (CCCAA Test-Development Feasibility Taskforce, 2008) has also pursued the idea of new assessments that would be commonly available to colleges—in particular, instruments developed, owned, and managed by the system. This work has been informed, in part, by dissatisfaction with current commercial assessments. The new assessments could reduce expenditures for commercial licenses and the scoring of writing samples, and improve colleges' abilities to measure lower-level skills in English and ESL, according to CCCAA.

A current proposal originating in the Chancellor's Office—the Online Common Assessment Project, or CCCAssess—would provide colleges with incentives for using common assessments, taking advantage of a difficult fiscal climate for colleges. Grant funding from the William and Flora Hewlett Foundation and the Bill & Melinda Gates Foundation supports exploration of the technical feasibility of the concept. Legislation directing the Board of Governors to pursue a feasibility study and pilot project (Assembly Bill 2682) was introduced in February 2010. (The bill passed the Assembly and was referred to the Senate in June 2010.)

The vision is that CCCAssess would provide centralized delivery of common assessments and be a repository or data warehouse for assessment scores, which are currently not collected at the system level. This centralized approach would make it possible for the system to purchase licenses for assessments in mathematics, writing, and reading, with colleges able to administer as many assessments as needed for free.

Under the concept, colleges would retain the right to administer other, locally selected assessments but would bear the cost of doing so, creating a financial incentive for using the common assessments. The proposed system would also enable students to take practice tests. To the extent this incentive proved compelling for colleges, students would encounter the same assessments regardless of the colleges in which they enroll.

Disciplinary subcommittees of the Academic Senate will review potential tests for common use during the next year. The feasibility study will be presented to the BOG in February 2011, with a pilot to follow. The full vision for the data warehouse also calls for it to include information on students' achievement in K–12, such as transcripts and scores on the California Standards Tests, Early Assessment Program (see the box on the next page), and the CAHSEE. These would be available for counselors to use as "multiple measures" during the assessment process.

Policies to support institutional innovation

For the most part, the national conversation does not question *whether* changes in practice related to developmental education are needed. Instead, it focuses on *how* to support institutional innovation and improve student outcomes, particularly the outcomes of students who start three or more levels below the college level.

In the context of President Obama's goals related to college completion, the National Center for Higher Education Management Systems (NCHEMS) published recommendations regarding potential policy changes in California, funded by the Hewlett Foundation (Jones and Ewell, 2009). The authors criticize the approach to developmental education undertaken at most colleges, which they say consists of a remedial course sequence staffed with untrained adjunct faculty to which additional services sometimes get added.

Calling this approach both ineffective and expensive, Jones and Ewell call for "a completely reformed base model, not an ineffective base model with compensatory add-ons" (Jones and Ewell, 2009, pg. 12). Such a model, they argue, would:

- Be based on fine-grained assessments of students' developmental needs;
- Consist of modularized instructional units;
- Be designed for statewide application;
- Be contextualized for students as far as possible;
- Use technology to a greater degree than is currently typical;
- Have a "high touch" component in the form of coaches and mentors.

Jones and Ewell also point to exemplars such as California's Career Advancement Academies, the I-BEST program in Washington State, and the JFF Breaking Through project.

From a national perspective, Collins (2009) cites a similar list of institutional innovations and makes general recommendations regarding state policies that would support those. The list includes:

- Accelerated developmental education featuring "self-paced, computer-based instruction."
- Supplemental instruction to support "students who test close to the placement test cut score to matriculate in college-level courses" successfully.
- Contextualized programs that link developmental instruction "more tightly to students' personal, educational, and workforce-related goals."
- First-year experiences that provide academic and student services in support of college-level course completion (Collins, 2009, pg. 13).

The Early Assessment Program (EAP)

The California Community Colleges are becoming more involved with the state's longstanding Early Assessment Program (EAP), developed initially by California Department of Education, the State Board of Education, and the California State University (CSU). Offered for the first time in spring 2004, the EAP enabled CSU to provide high school students with early feedback—during the summer before their senior year—about their preparedness for college-level classes in English and math. By giving high school students one year to become better prepared if needed, EAP developers hoped to reduce the proportion of incoming CSU students who need remediation in these subjects.

The developers of the EAP found that CSU's placement expectations and the state's K–12 standards for English and mathematics were aligned, but that CSU's placement tests and the state's high school assessments—the California Standards Tests (CSTs)—did not always emphasize the same things. The solution was to give 11th graders the option to take expanded versions of CSTs in English and math. This decision avoided the need to develop yet another set of tests and standards to which students and teachers would need to respond.

- In 2009, 40% of high school juniors scored proficient or advanced on the regular Grade 11 CST in English Language Arts. However, among those juniors who elected to participate in the EAP in English by taking the augmented version of this CST, just 16% were considered "ready for college." These latter students qualified for exemption from placement testing in English upon enrollment at CSU.
- Only about half of high school juniors were eligible to take the EAP in mathematics in 2009, given that only students who have reached at least Algebra II by grade 11 may participate. Among those juniors who were both eligible and participated in the EAP, 13% were considered "ready for college" and thus qualified for exemption from placement testing in mathematics upon enrollment at CSU. Another 44% were "conditionally ready," meaning that their potential exemption from placement testing in mathematics was conditional on completing another, adequately rigorous mathematics course during their senior year.

As of April 8, 2010, 22 community colleges had agreed to accept some or all EAP results as a basis for exemption from placement testing in English and/or mathematics, and another 16 colleges were "under discussion" to begin doing so. And among these colleges, 21 had identified a local EAP coordinator to conduct outreach to local high school students in coordination with CSU. (See the CCCCO website for more information at www.cccco.edu.)

The goal is to send a clearer signal to high school students and educators that the California Community Colleges have the same academic standards for transfer-level courses as CSU, and to create new efficiencies in the matriculation process by exempting qualified students from placement testing. But community college leaders also acknowledge that they must think broadly about high school outreach—and that it should begin before grade 11—given the open-access mission of the colleges.

The roughly half of students who are not far enough along in their study of mathematics in grade 11 to be eligible for the EAP in that subject are potential community college students, for example. (For further discussion, see EdSource, 2008.) Many of these students will place into a remedial mathematics sequence if and when they arrive at community college. Helping these students well before they leave high school, so they can assess into *higher levels* of these sequences—and thus have a shorter path to college-level study with fewer opportunities for attrition—would be of great service to both colleges and students.

Data: California Department of Education, California State University, California Community Colleges Chancellor's Office

Funding policies can remove barriers and support new models

Related to state policy, the focus among participants in the Complete College America discussion (Jobs for the Future and Complete College America, 2009) was largely on ways for states to leverage their funding systems to support these types of innovations in developmental education and remove policies and regulations that penalize innovation or stand in its way. Collins (2009) goes further in highlighting policies in some Achieving the Dream states that support innovation. For example, he argues that states can do so in part by providing flexibility on funding and financial aid policies that use semester-based enrollment reporting.

California already has regulations that give districts guidance for claiming funding for a variety of course configurations, including open entry/exit courses, distance learning, and independent study. Regulatory changes in 2005–06 also specified that "supplemental learning assistance" would be funded whether it was in the form of a lab required of all students in a class or was targeted to just a subset of students in a course. Tutoring, under specified conditions, is also eligible for funding (CCCCO, 2006).

A major catalyst for innovation can also be the availability of additional resources for pilot programs. This kind of funding is important because of the effort that experimentation requires and because some models that provide extra supports for students are more expensive to operate. It is particularly important that the latter types of programs are well evaluated before they are taken to scale.

The push to innovate in the area of developmental education is often framed in the context of two overarching goals:

- Improving students' rates of successful course completion, and
- Compressing the amount of time required for developmental students to become college-ready.

Both of these goals would not only benefit students, but could also potentially reduce state expenditures on developmental education in the long run. Despite that, substantial financial support for innovation in California is unlikely to come from state sources in the near future. This constraint increases the leverage of private foundations and contributes to their ability to shape innovations based on their interests and beliefs. Colleges wanting to experiment with new approaches will likely look to the Gates Foundation's $110 million investment as a potential source of innovation funds, for example.

Often, consistent state-level data and benchmarks are integral to evaluating the success of innovative programs. They are also a key component of many foundation grants. California's challenges in this area mean that the scale-up potential of any new program concept could be compromised. This could make the state's innovators less likely to get private support for their efforts.

Can funding policy encourage success?

The national conversation on community college student success adds one further reform to the mix: providing incentives for results.

Jones and Ewell (2009) distinguish between incentives that provide funds to institutions that achieve a particular degree-production goal and incentives that provide a fixed amount per degree produced. They say that states have used both approaches, but that there is little evidence that pay-for-performance schemes have lived up to their perceived promise. This may be directly related, according to some analyses, to the low levels of funding included in such schemes, which typically affect 1% to 2% of allocations (Jones and Ewell, 2009, pg. 16–18).

One ongoing model is Washington State's Student Achievement Initiative, which provides extra funding to community colleges that improve their performance on specific student success measures. Started in 2008, the program has been partially funded by the Bill & Melinda Gates Foundation, with awards added to colleges' base budgets going forward. Campuses receive points for improvements in four benchmark areas:

- Progression toward college-level skills, including gains in basic skills and passing pre-collegiate courses in writing and mathematics;
- First-year retention;
- Completion of college-level mathematics courses that are required for a technical or academic degree;
- Completions, including degrees, certificates, and apprenticeship. (See Washington SBCTC, http://www.sbctc.edu/college/e_studentachievement.aspx; see also Washington SBCTC, 2007.)

In a critique of California's funding system for community colleges, Shulock and Moore (2007) urge state leaders to at least enter into a conversation about new funding ideas being explored nationally. They note that, "In many cases these new directions recognize the power of financial incentives to change behaviors and involved the targeted use of funds to encourage the desired outcomes" (Shulock and Moore, 2007, pg. 50). But they criticize traditional "performance funding" models as failing to recognize that "improving performance is an ongoing and costly undertaking and should be institutionalized into the basic funding formula so as to provide a stable and significant funding source" (Shulock and Moore, 2007, pg. 53).

Shulock and Moore propose various approaches to a new funding model, all of which begin with redefining the *workload* upon which FTES funding is based:

> "Workload is currently defined as 3rd week enrollment and colleges are funded to serve it. Alternatively, workload could be defined as teaching students for a full term, serving financially disadvantaged students, guiding students through basic skills, or producing certificates and degrees" (Shulock and Moore, 2007, pg. 54).

Such an approach, they contend, would be more consistent with state goals insofar as policymakers intend to *educate* students rather than merely enroll them.

This approach is beginning to influence debates about community college policy in California. Senate Bill 1143 (Liu), introduced in February 2010, initially proposed to redefine FTES as the average of course enrollment at the census date *and at completion*. At this writing, the bill calls for a task force to study and make recommendations regarding alternative funding options for promoting student success. Whether the bill will become law remains unclear.

Budget realities shape the immediate future in California

Although state policy has reinforced the importance of developmental education as a central component of the mission of the California Community Colleges, financial pressures in the face of the economic downturn may be undercutting local campuses' commitment to it.

As already noted, categorical funds for matriculation have been cut substantially and granted flexibility for other uses. Although basic skills categorical funds remained "protected" from other uses in the final version of the 2009–10 state budget, these funds were reduced from the previous $33.1 million to slightly more than $20 million. Further changes could be on the horizon for these funds: at this writing, state legislators are considering budget language that would require the Chancellor to explore performance-based funding options related to basic skills.

Regardless, there is clear concern about the extent to which colleges will place priority on improving basic skills education. Experiences this year underscore the concern. Faced with significant budget cuts to the system, California lawmakers included in the 2009–10 Budget Act a provision that lowered by 3.34% the number of students the community colleges were required to educate. This "workload reduction" was intended to enable the colleges to limit enrollments and reduce their course offerings, commensurate with cuts to their revenues. The Act also expressed "legislative intent that any necessary reductions in course sections, to the greatest extent possible, be achieved in areas other than basic skills, workforce training, and transfer" (CCCCO, 2010b, pg. 1).

The full impact of these budget challenges on developmental education is unclear at this time; but with the state facing another difficult year, workload reduction is likely to continue. The campuses face pressure from many different directions as they decide how to manage their course offerings. Some of that pressure reflects the decisions by the University of California and California State University systems to cut their own enrollments. That has created an increased demand for transfer courses at the community colleges. To the extent that transfer is perceived as the system's "higher purpose," colleges may act to protect those courses at the expense of their developmental offerings.

CCC Chancellor Jack Scott reported to the Legislature in March 2010 (CCCCO, 2010b) that he had encouraged colleges to protect basic skills, workforce training, and transfer courses in part by changing their approach to offering educational enrichment. Most community colleges in California provide a menu of classes that adults in the community can take for their own enrichment, to brush up their skills in a specific area or even, in the case of physical education courses, to socialize and stay fit. In many communities, the availability of these low-cost options expands the reach and political support campuses enjoy, even though they are not a central part of the state's vision for the community colleges. Scott encouraged the districts to "either stop offering non-core courses or to restructure such courses as community education courses in which the student pays the full cost of instruction" (CCCCO, 2010b, pg. 2). However, a survey that included 49 community college districts indicated that about 73% had made cuts proportionately across all disciplines rather than targeting changes in their community education courses (CCCCO, 2010a).

At a June press briefing, Scott reported that colleges had, in total, cut course sections by 6.3% but only reduced the overall number of students being educated by 0.2% in Fall 2009, compared with Fall 2008. First-time student enrollments were hardest hit, decreasing by 12% (CCCCO, 2010c, pg. 1). Previously, Scott had explained that campuses had increased class sizes and tapped reserves, such that the system was "currently educating 89,000 FTES (or 201,000 headcount students) beyond the levels funded in the state budget" (CCCCO, 2010b, pg. 3).

The conclusions and policy implications of this study

Current enrollment pressures, combined with financial constraints, have created something of a perfect storm for the California Community Colleges. That storm is testing their commitment to developmental education and their ability to strengthen the programs and services they provide to students who enter the colleges needing to improve their basic skills.

But the community colleges cannot afford to ignore the rising call, both in California and nationally, for greater success rates for their students. As long as open access remains a core operating principle for these public institutions, improving developmental education and increasing student success are goals that go hand in hand.

This study provides some insights into how students in California's community colleges have proceeded through remedial course sequences in writing and mathematics, which students take these courses, and the extent to which their starting levels and course-taking behaviors appear to be related to achievement of long-term academic goals. These findings have implications for college officials and state leaders as they consider ways they can continue to pursue both the access and success goals of the system.

Reducing the need for developmental education is a long-term goal

Data limitations make it impossible to say precisely how many of California's high school graduates enroll at community colleges needing to improve their basic skills. Nevertheless, it is clear that the numbers are quite high, creating a severe strain on the colleges and on the state's ability to maintain its support of their open-access mission.

California's state leaders ought to look seriously at every strategy for tackling the complex and long-term challenge of improving students' preparation for community college while they are still in high school. Current efforts to clarify academic expectations across the systems (such as the Early Assessment Program) and promote the use of common assessments are important first steps. It will be crucial to gather information about these changes, evaluate their effectiveness, and continue to improve their implementation in both the K–12 and community college systems.

Delays in remedial course-taking are entwined with other issues

In California, where community colleges have a high degree of local autonomy, some have urged that the state needs to set a uniform policy that immediate remediation (when needed) be mandatory across the system. The quantitative findings from this study are neither strong nor clear enough to support such a policy. Combined with the qualitative research, the findings do illuminate some reasons students delay remedial courses and indicate that those delays take a toll on students and the system, raising implications for local and state policy.

Based on the analysis, delaying a first remedial course appears to be more costly for students in writing than in mathematics. The regression analysis indicated that students who delayed their first writing course for only a year were less likely to complete the developmental sequence or college composition than those who did not delay. **Given limited time and resources, colleges might do well to focus first on encouraging students to enroll early in remedial courses in writing.** However, it is likely that this statewide pattern varies considerably among campuses. Deeper and more detailed research into local patterns would be an important precursor to the implementation of such a strategy on a given campus. Evaluating the impacts of any new strategies could help the system as a whole understand this finding and the conditions under which early remediation in writing is associated with better student outcomes.

In both mathematics and writing, students who delayed taking a second, more advanced course by more than one semester were less likely to attain college-level skill, even after controlling for whether they passed their first course. **Campuses might examine their course schedules to determine ways they could encourage students to enroll in a given remedial sequence continuously, without interruption.** Are there simple changes that could encourage the start of remedial coursework in the fall? Or what programs or policies could provide better bridges from one academic year to the next during the summer months?

Most students in the cohort studied who enrolled in a remedial sequence began doing so during their first year. And overall, students who failed or withdrew from their first math or writing course were less likely to attempt a second, more advanced course in those subjects. **Supporting students' success during their first year, then, could be an important lever for keeping students on a path to completing remedial sequences.** Such support could involve more effective matriculation services on campuses, backed by appropriate state policies that encourage and enhance those local efforts.

Students who enter community college at the lowest levels face daunting odds

Black/African American and Hispanic students in the cohort studied were overrepresented at the lowest levels of the mathematics and writing sequences. The same was true for Asian students in writing. This, in turn, had consequences for these students' likelihood of completing a sequence successfully. In addition, when compared with white students in this study's regression analyses, African American students were more likely to delay their first remedial writing course, less likely to pass their first remedial math course, and less likely to complete a college-level course in either subject—even after controlling for socioeconomic status and other variables.

This raises important questions about student readiness coming from high school. And it raises questions about whether existing developmental approaches address incoming differences among student groups, what might be done differently, and where. For example, two-thirds of all African American community college students in California attend in just five counties: Alameda, Los Angeles, Riverside, Sacramento, and San Diego. This being the case, **a state-led focus on colleges that educate the majority of African American students could have great benefit.**

Innovations in developmental education need to be implemented and evaluated

The analyses also indicate that students' abilities to achieve their long-term goals are clearly associated with their starting levels. When compared with students who began at the highest level of a remedial sequence in this study's regression analyses, students who entered a remedial sequence at lower levels were more likely to pass their first remedial math course, more likely to attempt a more advanced course in math and/or writing, and less likely to delay that second course. And yet these students remain much less likely to complete the remedial sequence or a college-level course in either subject.

Many researchers, in California and nationally, believe that innovations in the structure of remedial courses, instructional approaches, and/or support services are essential for greater student success. **What works where, for which students, and under what conditions warrants extensive and careful investigation.**

On the positive side of the ledger, California's decentralized governance system provides a level of local flexibility that can encourage and support such experimentation. But for local educators to learn more effectively from these efforts—and for the system to move forward deliberately—common frameworks for measuring and evaluating outcomes are also essential. **The system's movement toward more standardized coding of course levels below transfer and other common metrics needs to be done thoughtfully, but it should be encouraged and supported.**

The efficacy of the state's investment in developmental education warrants more attention

Finding resources to finance the development of innovative new models is currently a huge challenge in California. Perhaps more importantly, **it is unclear that the colleges have sufficient resources or motivation to bring successful innovations to scale and fully integrate them into existing curricula and services,** particularly when doing so challenges a powerful status quo and will not clearly be accompanied by increased state support. The irony, of course, is that moving students more rapidly through remedial coursework could ultimately save the state money by increasing the "productivity" of its educational investment and reducing the amount spent on programs that do not lead to student success.

When students attend college but never leave the developmental sequence, it is costly both for them and for the state. Helping students get through developmental sequences in less time would help address this issue. **Developing stronger alternative pathways, and making sure students are aware of those options, could be a good investment for the state and for those students who are currently at the greatest risk of leaving community college empty-handed.** In this study, for example, less than 5% of first-time students overall who enrolled in developmental courses said that a vocational degree or certificate was their goal and roughly the same proportion attained that goal. **The state might be better served if more students were encouraged to participate in high quality career technical programs rather than the emphasis being placed so heavily on transfer courses.** For guidance in doing this more effectively, California might look to other states where the community college systems have long put more emphasis on workforce development.

Growing concerns about student success rates in community colleges have prompted calls for better measures of student progress and for holding colleges more accountable for that progress. In 2010 in California, that momentum crystallized into several proposals to change state policy related to such things as transfer requirements and state funding formulas. These policy initiatives make it clear that the pressure on the community colleges will increase related to delivering developmental education more effectively and in a way that results in better student outcomes.

Technical Appendices

Course-taking patterns, policies, and practices in developmental education in the California Community Colleges

A report to the California Community Colleges Chancellor's Office

June 2010

EdSource

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Technical Appendices

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Appendix One: Stakeholders Consulted

The research team consulted with a range of experts and stakeholders—inside and outside the California Community Colleges—during the course of this study. These activities included early consultations, a February 2010 advisory meeting, and interviews on topics related to policy and practice.

The research team thanks the following individuals for sharing their time and expertise during this process.

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- Dona Boatright (former Vice Chancellor for Educational Services, California Community Colleges Chancellor’s Office)
- George C. Bunch (University of California, Santa Cruz)
- Pamela Burdman (WestEd)
- Linda Collins (Career Ladders)
- Tom deWit (Chabot College)
- Bonnie Edwards (Chancellor’s Office)
- Janet Fulks (Bakersfield College, Academic Senate for California Community Colleges)
- Robert Gabriner (San Francisco State University, RP Group)
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- Erik Skinner (Chancellor's Office)
- Regina Stanback-Stroud (Skyline College)
- Paul Steenhausen (Legislative Analyst's Office)
- Andrea Venezia (WestEd)

Appendix Two: Definitions of English Course Categories

Here we provide a list of the categories (and associated category definitions) into which we coded each English course in which any student of the Fall 2002 first-time cohort enrolled at any time between college entry and Spring 2009. The particular category of a given English course was determined on the basis of information detailed in the COMIS database, descriptions of courses in the course catalogs, and prerequisites specified in the course catalogs. Our basic procedure for coding English courses for a given college was as follows:

1. Determine the **first college-level writing** course, which typically is college composition, as defined under *W0* below.
2. Determine the **first college-level reading** course (if any), defined under *R0* below.
3. Work backwards to determine which courses feed students into the *W0* course and, separately, the *R0* course, and in what order. For example, the *W1* course (defined below) is the first course that feeds into *W0*, *W2* feeds *W1*, and so on. The courses that feed successively the *W0* course and the *R0* are course are defined here as **remedial** courses.
4. Categorize **remaining English courses** on the basis of their relationship, or lack thereof, to the core remedial/college writing and reading sequences at each college. Determination of the nature of these relationships relied heavily, although not exclusively, upon prerequisites, recommended preparation, or advisories specified (or not specified) in the course catalogs.

The resulting course categories are as follows:

W0 **First College-Level Writing**

- The *First College-Level Writing* course is the course that fulfills the general education IGETC 1A requirement (defined as English Composition).
- Common titles of the *First College-Level Writing* course include College Composition, Reading and Composition, Freshman Composition, and College Exposition.
- In all, or nearly all, cases, the *First College-Level Writing* course is the culmination of one or more courses categorized as *Remedial Writing* (and sometimes one or more courses categorized as *Remedial Reading*).
- Sometimes an “honors” version of the *First College-Level Writing* course is offered. Both the “regular” version and the “honors” version receive the same *W0* designation.

W1–W6 **Remedial Writing [*numeric level determined empirically*]**

- *Remedial Writing* courses offer content intended to improve writing skills (including grammar, sentence structure, paragraph construction, essay writing, etc.) for students who are skill-deficient in writing.
- *Remedial Writing* courses may include individualized instructional modules if such modules are the course itself, rather than supplemental to the main

course. Purely supplemental courses should be placed in the category of *Other English Courses*.

- *Remedial Writing* courses generally are sequential (i.e., a lower-level *Remedial Writing* course is a prerequisite for a higher-level *Remedial Writing* course), and the specific numeric level of the course (e.g., *W1*, *W2*, *W3*, *W4*) is determined by the "distance" of the course from the *First College-Level Writing* course (*W0*). "Distance" refers to the number of courses that must be completed to advance to *W0*.
- *Remedial Writing* courses are not transferable for credit to either a California State University (CSU) or University of California (UC).
- *Remedial Writing* courses are not targeted specifically at students who are seeking to prepare for the GED, students who have disabilities, or English-as-a-second-language learners.
- *Remedial Writing* courses present new material and "stand on their own." In other words, *Remedial Writing* courses are not supplemental to another course.
- Colleges may offer a 3- or 4-unit *Remedial Writing* course as well as a series of 1-unit *Remedial Writing* courses that, if completed successfully, "add up" to the single 3- or 4-unit *Remedial Writing* course. In such cases, all of these courses receive the same level designation, which is determined by how far down the remedial ladder is the 3- or 4-unit *Remedial Writing* course.

W+ **Advanced College-Level English**

- *Advanced College-Level English* courses include all courses that meet both of the following criteria: (1) transferable to CSU and/or UC and (2) have a recommended, required, or advised prerequisite of the *First College-Level Writing* course, or have a prerequisite of one or more courses that, themselves, require the *First College-Level Writing* course as a prerequisite.
- *Advanced College-Level English* courses do not include courses that are specifically (and generally exclusively) designed for English-as-a-second-language learners, regardless of whether or not they are accepted for transfer credit.

T0 **Level 0 Transfer English**

- *Level 0 Transfer English* courses include all courses that meet both of the following criteria: (1) transferable to CSU and/or UC and (2) have a recommended, required, or advised prerequisite of the course designated as level *W1* (but not *W0*) and/or the course designated as level *R1* (but not *R0*).
- *Level 0 Transfer English* courses do not include courses that are specifically (and generally exclusively) designed for English-as-a-second-language learners, regardless of whether or not they are accepted for transfer credit.
- Note: A subjective evaluation was conducted of all *T1* courses (see next category) that did not recommend, require, or advise any prerequisites. Such courses were compared to the course offerings of one or more UC schools. Those courses that matched course offerings in one or more UC schools in terms of title and perceived rigor were categorized as *T0*.

T1 **Level 1 Transfer English**

- *Level 1 Transfer English* courses include all courses that are transferable to CSU and/or UC, but that have a recommended, required, or advised prerequisite of the course designated as level *W2*, an English course that is lower in the skill hierarchy than the course designated as level *W2*, or no recommended, required, or advised prerequisite.
- Note: A subjective evaluation was conducted of all *T1* courses that did not recommend, require, or advise any prerequisites. Such courses were compared to the course offerings of one or more UC schools. Those courses that matched course offerings in one or more UC schools in terms of title and perceived rigor were categorized as *T0* (see previous category)

R0 **College-Level Reading**

- *College-Level Reading* courses offer content intended to improve reading skills specifically (not writing skills) and are "stand alone" courses.
- Common titles of the *College-Level Reading* course include "College Reading," "Principles of College Reading," and "Critical Reading."
- In all, or nearly all, cases, *College-Level Reading* courses are the culmination of one or more courses categorized as *Remedial Reading*. In other words, *College-Level Reading* courses are part of an integrated sequence of reading courses, the culmination of which is the *College-Level Reading* course.
- Unlike *Remedial Reading* courses, *College-Level Reading* courses are transferable for elective credit to a CSU and/or a UC. However, *College-Level Reading* courses do not fulfill a general education breadth requirement (i.e., an IGETC or other general education module).
- Any *College-Level Reading* course that is worth less than 2 units of credit should be scrutinized closely to determine if, in fact, it is a "stand alone" course. If it is not a "stand alone" course, it belongs in a category other than *R0*.

R1–R6 **Remedial Reading [*numeric level determined empirically*]**

- *Remedial Reading* courses offer content intended to improve reading skills (including vocabulary, spelling, phonics, reading comprehension, etc.) for students who are skill-deficient in reading.
- *Remedial Reading* courses may include individualized instructional modules if such modules are the course itself, rather than supplemental to the main course. Purely supplemental courses should be placed in the category of *Other English Courses*.
- *Remedial Reading* courses generally are sequential (i.e., a lower-level *Remedial Reading* course is a prerequisite for a higher-level *Remedial Reading* course), and the specific numeric level of the course (e.g., *R1*, *R2*, *R3*, *R4*) is determined by the "distance" of the course from the *College-Level Reading* course (*R0*) or, in the absence of a designated *College-Level Reading* course, the *First College-Level Writing* course (*W0*). "Distance" refers to the number of courses that must be completed to advance to *R0* (or *W0*).

- *Remedial Reading* courses are not transferable for credit to either a CSU or UC.
- *Remedial Reading* courses are not targeted specifically at students who are seeking to prepare for the GED, students who have disabilities, nor English-as-a-second-language learners.
- *Remedial Reading* courses present new material and "stand on their own." In other words, *Remedial Reading* courses are not supplemental to another course.

RS **Speed Reading**

- *Speed Reading* courses are a special case. In most instances, *Speed Reading* courses are transferable for elective credit to a CSU and/or UC.
- However, *Speed Reading* courses generally are not integrated into the remedial reading sequence (i.e., they do not serve as prerequisites for higher-level courses and may not, themselves, have prerequisites).
- *Speed Reading* courses generally are of low unit value (e.g., 1 unit of credit).

WR1–WR6 **Integrated Remedial Writing/Reading [*exact level determined empirically*]**

- *Integrated Remedial Writing/Reading* courses offer content intended to improve both reading and writing skills simultaneously for students who are skill-deficient in reading and writing.
- *Integrated Remedial Writing/Reading* courses may include individualized instructional modules if such modules are the course itself, rather than supplemental to the main course. Purely supplemental courses should be placed in the category of *Other English Courses*.
- *Integrated Remedial Writing/Reading* courses generally are sequential (i.e., a lower-level course is a prerequisite for a higher-level course), and the specific numeric level of the course (e.g., *WR1*, *WR2*, *WR3*, *WR4*) is determined by the distance of the course from the *First College-Level Writing* course (*W0*). "Distance" refers to the number of courses that must be completed to advance to *W0*.
- *Integrated Remedial Writing/Reading* courses are not transferable for credit to either a CSU or UC.
- *Integrated Remedial Writing/Reading* courses are not targeted specifically at students who are seeking to prepare for the GED, students who have disabilities, nor English-as-a-second-language learners.
- *Integrated Remedial Writing/Reading* courses present new material and "stand on their own." In other words, the courses are not supplemental to another course.
- Colleges may offer a 3- or 4-unit *Integrated Remedial Writing/Reading* course as well as a series of 1-unit *Integrated Remedial Writing/Reading* courses that, if completed successfully, "add up" to the single 3- or 4-unit *Integrated Remedial Writing/Reading* course. In such cases, all of these courses receive the same level designation, which is determined by how far down the remedial ladder is the 3- or 4-unit *Integrated Remedial Writing/Reading* course.

V **Vocational Reading or Writing**

- *Vocational Reading or Writing* courses include reading and writing courses that are designed specifically for a particular vocational program or set of vocational programs (e.g., report writing for law enforcement).
- One of the defining features of *Vocational Reading or Writing* courses is that they are not integrated into the remedial writing or remedial reading sequences. In other words, completion of a particular *Vocational Reading or Writing* does not qualify a student to move up to a more advanced reading or writing course in the mainstream reading/writing curriculum.
- Another defining feature of *Vocational Reading or Writing* courses is that the subject matter of the courses revolves centrally around reading and/or writing. In other words, it is not sufficient for the title to include the word "reading" or the word "writing". Instead, the course content as described in the catalog should indicate a focus on developing reading and/or writing skills.

ESL **English-as-a-Second-Language (ESL)**

- *ESL* courses are specifically (and generally exclusively) designed for English-as-a-second-language learners.
- Courses that are specifically (and generally exclusively) designed for English-as-a-second-language learners are categorized as *ESL* regardless of whether the units earned in the course are transferable to a CSU or UC.
- *ESL* courses may include speech/pronunciation courses, in addition to reading and writing courses. However, again, the course is specifically designed for English-as-a-second-language learners.

SV1-SV6 **Sequential Vocational Reading or Writing [a special case]**

- *Vocational Reading or Writing* courses include reading and writing courses that are designed specifically for a particular vocational program.
- In contrast to the category *Vocational Reading and Writing*, these courses are linked to the remedial sequence through their prerequisites, recommended preparation, or advisories.
- The majority of these courses are business courses, including titles such as "Business English," "English for the Professional," and "Business Writing and Presentation Methods."

W1S-W6S **Remedial Spelling [a special case]**

- *Remedial Spelling* Courses are targeted specifically at teaching spelling.
- These courses are not included in the primary remedial sequence of prerequisites leading to *W0*.
- The numeric designation of a *Remedial Spelling* course in relation to *Remedial Writing* takes into consideration
    - Prerequisites or strong recommendations for the course.
    - Course content, especially in the context of other spelling content in remedial writing classes.

R1V-R5V **Remedial Vocabulary [a special case]**

- *Remedial Vocabulary* Courses are targeted specifically at teaching vocabulary.
- These courses are not included in the primary remedial sequence of prerequisites leading to *R0*.
- The numeric designation of a *Remedial Vocabulary* course in relation to *Remedial Reading* takes into consideration:
    - Prerequisites or strong recommendations for the course.
    - Course content, especially in the context of other vocabulary content in remedial reading classes.

O **Other English Courses**

- The category of *Other English Courses* includes any reading or writing that does not fit into one of the previous categories.
- *Other English Courses* includes courses targeted specifically (and generally exclusively) at students who have disabilities, courses targeted specifically (and generally exclusively) at students who are seeking to prepare for the GED, and courses designed to train English tutors.
- *Other English Courses* includes "labs" and other forms of supporting instruction when the course is purely supplemental to one or more other courses from the previous categories.
- *Other English Courses* includes Early Child Education (ECE) and Child Development courses when such courses are focused on teaching educators how to deliver reading and writing instruction.
- *Other English Courses* includes Directed Study courses, Independent Study courses, Linguistics courses, and Special Topics courses unless there is a compelling reason to place such courses into another category.

Appendix Three: The Difficulty of Tracking Student Progress through Remedial Reading Sequences

This study was unable to attempt to track student progress through remedial reading sequences. This is a consequence of:

- How our analyses of student progress through the *writing* sequence were conducted, and
- The wide variation among colleges in the use of integrated writing/reading courses.

For the sake of our analyses, any given course could only be designated as part of one sequence—in this case, writing or reading. Our operating assumption was that integrated writing/reading courses should be treated, first and foremost, as part of the *writing* sequence. This assumption was validated by institutional researchers present at a February 2009 technical advisory meeting. The 2009 *Basic Skills Accountability Report* also provides a strong practical warrant for this assumption: far more students are served by a far greater number of basic skills writing sections, compared with students and sections in reading.

As a consequence, integrated writing/reading courses were coded as part of each college's writing sequence, and *not* as part of its reading sequence. This raises complications for analyzing student progress through reading sequences, however, given that half of colleges in the study employed some form of integrated writing/reading course. As described earlier, a few colleges did not offer a separate reading sequence at all. In other colleges, integrated writing/reading courses "interrupted" the reading sequence at one or more particular levels, creating a "gap."

Consider an example. **Los Angeles Harbor College** offered integrated courses at one, two, and three levels below Freshman Composition. But some students also took a non-integrated reading course *four* levels below Freshman Composition, which served as a prerequisite for the lowest integrated course. Having coded integrated writing/reading courses as *writing* courses, however, we would not be able to track student progress in a reading sequence at Los Angeles Harbor College beyond a single lower-level course. Any data resulting from such an analysis would misrepresent students' actual course-taking patterns.

Unfortunately, this problem is difficult to remedy. One seeming solution is to simply code integrated writing/reading courses as *both* writing and reading courses, for the purpose of two different analyses. But this would cause further problems. As noted above, the *Basic Skills Accountability Report* shows that many more students are served by many more basic skills writing than reading sections. Counting all integrated courses as part of the reading sequence would contaminate the reading cohort with large numbers of students *who are not actually reading students*. This would misrepresent both student progress and participation in the reading sequence. This is a particular problem to the extent that all colleges in the Los Angeles Community College District, which serves especially large numbers of students, offered integrated courses of some form.

The research team also considered the possibility of performing an analysis of student progress in remedial reading that would be limited only to colleges that offered a complete reading sequence. But this also is problematic. Our analyses track *student* progress, and approximately one-third of students in the Fall 2002 cohort who took a remedial course changed colleges at some point during the seven-year time period analyzed. Students' subsequent colleges may have adopted different structures for developmental reading.

Appendix Four: A Sampling of Actual Student Course-taking

There was ***tremendous variation*** in how students in this study moved through—or did not move through—the remedial writing and mathematics sequences. Table 1 tracks the cohort of students starting three levels below college mathematics (i.e. pre-algebra) in Fall 2002 and the many different course-taking paths they actually took during their first two years of community college attendance. The table demonstrates the impossibility of summarizing the most common remedial course-taking *trajectories* that students undertook on their way to college-level study.

To summarize this behavior in a form that can be understood and analyzed, we use the economical set of remedial course-taking *variables* outlined in the "Data sources and variables considered" section of the main report.

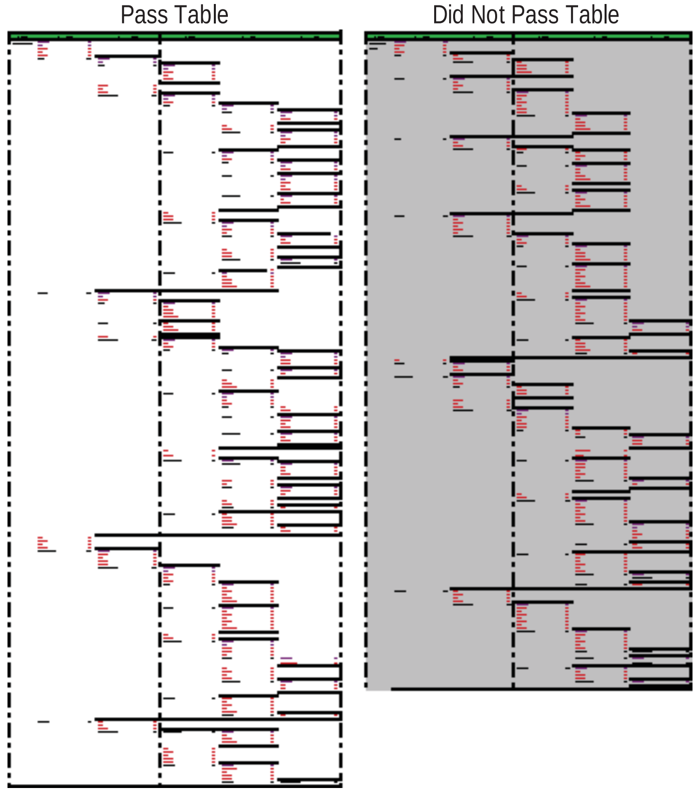
Table 1: Math Trajectories of Students Starting 3 Levels below College Mathematics (i.e. Pre-algebra) in Fall 2002, over 2 Years

Total Cohort = 5,322 students
54% of these students **passed** their initial math course (3) on the first attempt
We stop following trajectories of cohorts smaller than 1% of students who initially passed
46% of these students **did not pass** their initial math course (3) on the first attempt
We stop following trajectories of cohorts smaller than 1% of students who initially did not pass
(Did not pass = failed or withdrew)

Coding of the Sequence Levels:
0=College Math
1=Intermediate Algebra / Geometry
2=Beginning Algebra
3=Pre-algebra
4=Arithmetic

Overview of Table: See Following Pages for Detail

Pass Table | Did Not Pass Table



Pass Table (Part 1 of 4)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
passed 3 on first attempt	no longer enrolled	6%								
	passed 0	<1%								
	did not pass 0	<1%								
	passed 1	<1%								
	did not pass 1	<1%								
	passed 2	**32%**	no longer enrolled	2%						
			passed 0	<1%						
			passed 1	**2%**	no longer enrolled	<1%				
					passed 0	1%				
					did not pass 0	<1%				
					passed 1	<1%				
					did not pass 1	<1%				
					enrolled but no math	<1%				
			did not pass 1	<1%						
			passed 2	<1%						
			did not pass 2	<1%						
			not enrolled or no math	**27%**	no longer enrolled	<1%				
					passed 0	<1%				
					did not pass 0	<1%				
					passed 1	**8%**	no longer enrolled	<1%		
							passed 0	3%		
							did not pass 0	**2%**	no longer enrolled	<1%
									passed 0	<1%
									did not pass 0	<1%
									not enrolled or no math	<1%
							passed 1	<1%		
							did not pass 1	<1%		
							enrolled but no math	**3%**	no longer enrolled	<1%
									passed 0	<1%
									did not pass 0	<1%
									passed 1	<1%
									not enrolled or no math	**3%**
							not enrolled	<1%		
					did not pass 1	**7%**	no longer enrolled	<1%		
							passed 0	<1%		
							did not pass 0	<1%		
							passed 1	**2%**	no longer enrolled	<1%
									passed 0	<1%
									did not pass 0	<1%
									not enrolled or no math	**1%**
							did not pass 1	**2%**	no longer enrolled	<1%
									passed 0	<1%
									did not pass 0	<1%
									passed 1	<1%
									did not pass 1	<1%
									not enrolled or no math	**2%**
							enrolled but no math	**2%**	no longer enrolled	<1%
									nb	<1%
									did not pass 1	<1%
									not enrolled or no math	**2%**
							not enrolled	<1%		
					passed 2	<1%				
					did not pass 2	<1%				
					did not pass 3	<1%				
					enrolled but no math	**8%**	no longer enrolled	<1%		
							passed 0	<1%		
							did not pass 0	<1%		
							passed 1	<1%		
							did not pass 1	**1%**	no longer enrolled	<1%
									passed 1	<1%
									did not pass 1	<1%
									not enrolled or no math	<1%
							passed 2	<1%		
							did not pass 2	<1%		
							did not pass 3	<1%		
							enrolled but no math	**4%**	no longer enrolled	<1%
									not enrolled or no math	**4%**
									passed 1	<1%
							not enrolled	<1%		

Pass Table (Part 2 of 4)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
					not enrolled	2%	passed 0	<1%		
							passed 1	<1%		
							did not pass 1	<1%		
							did not pass 2	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
	did not pass 2	33%	no longer enrolled	4%						
			passed 0	<1%						
			did not pass 1	<1%						
			passed 2	2%	no longer enrolled	<1%				
					passed 1	<1%				
					did not pass 1	<1%				
					did not pass 2	<1%				
					enrolled but no math	<1%				
					not enrolled	<1%				
			did not pass 2	1%	passed 2	<1%				
					did not pass 2	<1%				
					enrolled but no math	<1%				
					not enrolled	<1%				
			did not pass 4	<1%						
			not enrolled or no math	26%	no longer enrolled	<1%				
					passed 1	<1%				
					did not pass 1	<1%				
					passed 2	5%	no longer enrolled	<1%		
							passed 1	2%	no longer enrolled	<1%
									passed 0	<1%
									did not pass 0	<1%
									did not pass 1	<1%
									not enrolled or no math	2%
							did not pass 1	2%	no longer enrolled	<1%
									passed 1	<1%
									not enrolled or no math	2%
							passed 2	<1%		
							did not pass 2	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
					did not pass 2	8%	no longer enrolled	<1%		
							passed 0	<1%		
							passed 1	<1%		
							did not pass 1	<1%		
							passed 2	1%	passed 1	<1%
									did not pass 1	<1%
									not enrolled or no math	<1%
							did not pass 2	1%	no longer enrolled	<1%
									did not pass 1	<1%
									passed 2	<1%
									did not pass 2	<1%
									not enrolled or no math	1%
							enrolled but no math	3%	no longer enrolled	<1%
									passed 2	<1%
									did not pass 2	<1%
									not enrolled or no math	3%
							not enrolled	1%	not enrolled or no math	1%
					passed 3	<1%				
					did not pass 3	<1%				
					enrolled but no math	8%	no longer enrolled	<1%		
							enrolled but no math	3%	no longer enrolled	<1%
									passed 1	<1%
									passed 2	<1%
									did not pass 2	<1%
									not enrolled or no math	2%
							did not pass 0	<1%		
							passed 2	<1%		
							did not pass 2	2%	no longer enrolled	<1%
									did not pass 0	<1%
									passed 2	<1%
									not enrolled or no math	1%
							passed 3	<1%		
							did not pass 3	<1%		
							not enrolled	1%	passed 3	<1%
									not enrolled or no math	1%

Pass Table (Part 3 of 4)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
							did not pass 3	<1%		
							not enrolled	**1%**	passed 3	<1%
									not enrolled or no math	**1%**
					not enrolled	**4%**	passed 2	<1%		
							did not pass 2	<1%		
							did not pass 3	<1%		
							enrolled but no math	<1%		
							not enrolled	**3%**	passed 2	<1%
									did not pass 2	<1%
									not enrolled or no math	**3%**
	passed 3	<1%								
	did not pass 3	<1%								
	passed 4	<1%								
	did not pass 4	<1%								
	enrolled but no math	20%	no longer enrolled	3%						
			did not pass 1	<1%						
			passed 2	<1%						
			did not pass 2	<1%						
			did not pass 3	<1%						
			not enrolled or no math	**17%**	no longer enrolled	<1%				
					passed 0	<1%				
					did not pass 0	<1%				
					passed 1	<1%				
					did not pass 1	<1%				
					passed 2	**2%**	no longer enrolled	<1%		
							passed 1	<1%		
							did not pass 1	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
					did not pass 2	**3%**	no longer enrolled	<1%		
							passed 1	<1%		
							did not pass 1	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
					passed 3	<1%				
					did not pass 3	<1%				
					enrolled but no math	**8%**	no longer enrolled	<1%		
							passed 0	<1%		
							did not pass 0	<1%		
							did not pass 1	<1%		
							passed 2	<1%		
							did not pass 2	**1%**	no longer enrolled	<1%
									not enrolled or no math	<1%
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							enrolled but no math	**4%**	no longer enrolled	<1%
									passed 2	<1%
									passed 3	<1%
									not enrolled or no math	**3%**
							not enrolled	<1%		
					not enrolled	**3%**	did not pass 1	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							enrolled but no math	<1%		
							not enrolled	**2%**	passed 2	<1%
									not enrolled or no math	**2%**

Pass Table (Part 4 of 4)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
	not enrolled	**6%**	passed 1	<1%						
			passed 2	<1%						
			did not pass 2	<1%						
			not enrolled or no math	**5%**	**enrolled but no math**	**1%**	no longer enrolled	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
					passed 1	<1%				
					did not pass 1	<1%				
					passed 2	<1%				
					did not pass 2	<1%				
					did not pass 3	<1%				
					not enrolled	**3%**	no longer enrolled	<1%		
							enrolled but no math	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							did not pass 4	<1%		
							not enrolled	**2%**	**not enrolled or no math**	**2%**
									passed 2	<1%

Did Not Pass Table (Part 1 of 3)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004
did not pass 3 on first attempt	no longer enrolled	18%							
	did not pass 0	<1%							
	passed 1	<1%							
	did not pass 1	<1%							
	passed 2	1%	passed 1	<1%					
			did not pass 1	<1%					
			not enrolled or no math	**1%**	passed 1	<1%			
					did not pass 1	<1%			
					did not pass 2	<1%			
					enrolled but no math	<1%			
					not enrolled	<1%			
	did not pass 2	4%	no longer enrolled	<1%					
			passed 2	<1%					
			did not pass 2	<1%					
			passed 3	<1%					
			not enrolled or no math	**3%**	no longer enrolled	<1%			
					did not pass 1	<1%			
					passed 2	<1%			
					did not pass 2	<1%			
					passed 3	<1%			
					did not pass 3	<1%			
					did not pass 4	<1%			
					enrolled but no math	**1%**	no longer enrolled	<1%	
							passed 2	<1%	
							did not pass 2	<1%	
							did not pass 3	<1%	
							enrolled but no math	<1%	
							not enrolled	<1%	
					not enrolled	<1%			
	passed 3	7%	no longer enrolled	<1%					
			passed 2	<1%					
			did not pass 2	<1%					
			not enrolled or no math	**6%**	did not pass 1	<1%			
					passed 2	**1%**	passed 1	<1%	
							did not pass 1	<1%	
							passed 2	<1%	
							enrolled but no math	<1%	
					did not pass 2	**2%**	no longer enrolled	<1%	
							passed 1	<1%	
							passed 2	<1%	
							did not pass 2	<1%	
							enrolled but no math	<1%	
							not enrolled	<1%	
					passed 3	<1%			
					did not pass 3	<1%			
					enrolled but no math	**2%**	no longer enrolled	<1%	
							passed 2	<1%	
							did not pass 2	<1%	
							passed 3	<1%	
							enrolled but no math	<1%	
							not enrolled	<1%	
					not enrolled	<1%			
	did not pass 3	15%	no longer enrolled	2%					
			passed 2	<1%					
			did not pass 2	<1%					
			passed 3	<1%					
			did not pass 3	<1%					
			passed 4	<1%					
			not enrolled or no math	**12%**	no longer enrolled	<1%			
					passed 2	<1%			
					did not pass 2	<1%			
					passed 3	**1%**	no longer enrolled	<1%	
							passed 2	<1%	
							did not pass 2	<1%	
							did not pass 3	<1%	
							enrolled but no math	<1%	
							not enrolled	<1%	

Did Not Pass Table (Part 2 of 3)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
					did not pass 3	**2%**	no longer enrolled	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							enrolled but no math	<1%		
							not enrolled	<1%		
					passed 4	<1%				
					did not pass 4	<1%				
					enrolled but no math	**5%**	no longer enrolled	<1%		
							passed 2	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							enrolled but no math	**2%**	no longer enrolled	<1%
									passed 0	<1%
									did not pass 3	<1%
									not enrolled or no math	**2%**
							not enrolled	<1%		
					not enrolled	**3%**	passed 3	<1%		
							did not pass 3	<1%		
							did not pass 4	<1%		
							enrolled but no math	<1%		
							not enrolled	**2%**	passed 3	<1%
									not enrolled or no math	**2%**
	passed 4	<1%								
	did not pass 4	**1%**	no longer enrolled	<1%						
			passed 4	<1%						
			did not pass 4	<1%						
			not enrolled or no math	<1%						
	enrolled but no math	**34%**	no longer enrolled	<1%						
			passed 2	<1%						
			did not pass 2	<1%						
			passed 3	**1%**	passed 2	<1%				
					did not pass 2	<1%				
					did not pass 3	<1%				
					enrolled but no math	<1%				
			did not pass 3	<1%						
			passed 4	<1%						
			did not pass 4	<1%						
			not enrolled or no math	**26%**	no longer enrolled	<1%				
					passed 0	<1%				
					did not pass 0	<1%				
					passed 1	<1%				
					did not pass 1	<1%				
					did not pass 2	<1%				
					passed 3	**2%**	passed 1	<1%		
							passed 2	<1%		
							did not pass 2	**1%**	no longer enrolled	<1%
									did not pass 1	<1%
									did not pass 2	<1%
									not enrolled or no math	<1%
							enrolled but no math	0%		
							not enrolled	0%		
					did not pass 3	**3%**	no longer enrolled	<1%		
							did not pass 0	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							enrolled but no math	**2%**	no longer enrolled	<1%
									passed 3	<1%
									not enrolled or no math	**1%**
							not enrolled	<1%		
					passed 4	<1%				
					did not pass 4	<1%				

Did Not Pass Table (Part 3 of 3)

Fall 2002	Spring 2003		Summer 2003		Fall 2003		Spring 2004		Summer 2004	
					enrolled but no math	13%	no longer enrolled	2%		
							passed 2	<1%		
							did not pass 2	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							enrolled but no math	6%	no longer enrolled	<1%
									passed 0	<1%
									passed 2	<1%
									did not pass 3	<1%
									passed 4	<1%
									not enrolled or no math	5%
							not enrolled	2%	passed 2	<1%
									did not pass 3	<1%
									not enrolled or no math	2%
					not enrolled	7%	did not pass 1	<1%		
							passed 2	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							enrolled but no math	2%	no longer enrolled	<1%
									not enrolled or no math	1%
									passed 3	<1%
							not enrolled	4%	did not pass 3	<1%
									not enrolled or no math	4%
	not enrolled	17%	passed 2	<1%						
			did not pass 2	<1%						
			passed 3	<1%						
			did not pass 4	<1%						
			not enrolled or no math	17%	no longer enrolled	<1%				
					did not pass 1	<1%				
					passed 2	<1%				
					did not pass 2	<1%				
					passed 3	<1%				
					did not pass 3	<1%				
					passed 4	<1%				
					did not pass 4	<1%				
					enrolled but no math	4%	no longer enrolled	<1%		
							did not pass 1	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							passed 4	<1%		
							did not pass 4	<1%		
							not enrolled	1%	not enrolled or no math	1%
									passed 2	<1%
							enrolled but no math	1%	no longer enrolled	<1%
									not enrolled or no math	1%
					not enrolled	11%	no longer enrolled	<1%		
							passed 3	<1%		
							did not pass 3	<1%		
							did not pass 4	<1%		
							enrolled but no math	2%	no longer enrolled	<1%
									not enrolled or no math	2%
							not enrolled	8%	not enrolled or no math	8%

Appendix Five: Descriptive Statistics on the Fall 2002 Cohort

Note: For discussion and summary of data and variables shown in this section, see the **Data Sources and Variables Considered** in the main report.

Table 1: Students Who Enrolled in a Remedial Sequence vs. All First-time Students: Student Demographic Characteristics

Fall 2002 First-Time Students		All First-Time Students		Remedial Math Segment		Remedial Writing Segment		Remedial Reading Segment	
All Students		122,427	**100%**	49,997	**100%**	38,672	**100%**	13,052	**100%**
Age at College Entry	<20	67,148	55%	39,401	79%	30,704	79%	10,139	78%
	20-25	18,654	15%	6,110	12%	4,578	12%	1,647	13%
	>25	35,888	29%	4,468	9%	3,376	9%	1,257	10%
	missing	737	1%	18	0%	14	0%	9	0%
Race/Ethnicity	White	47,838	39%	19,629	39%	13,090	34%	3,374	26%
	Black	9,054	7%	3,996	8%	3,176	8%	1,279	10%
	Hispanic	40,079	33%	17,301	35%	14,537	38%	5,770	44%
	Asian	10,924	9%	3,865	8%	3,830	10%	1,319	10%
	Other	6,453	5%	3,209	6%	2,541	7%	851	7%
	missing	8,079	7%	1,997	4%	1,498	4%	459	4%
Sex	male	58,652	48%	22,318	45%	17,770	46%	5,636	43%
	female	62,494	51%	27,536	55%	20,800	54%	7,376	57%
	missing	1,281	1%	143	0%	102	0%	40	0%
Citizenship	U.S. citizen	96,202	79%	42,762	86%	32,086	83%	10,452	80%
	not U.S. citizen	21,274	17%	6,275	13%	5,748	15%	2,426	19%
	missing	4,951	4%	960	2%	838	2%	174	1%
Fee Waiver in 2002/2003	received	33,617	27%	19,422	39%	15,973	41%	6,368	49%
	did not receive	88,810	73%	30,575	61%	22,699	59%	6,684	51%
% BA or Greater in Zip Code	< 12.50%	29,940	24%	12,522	25%	10,433	27%	4,183	32%
	12.50% - 24.99%	42,869	35%	18,284	37%	14,137	37%	4,586	35%
	25.00% - 37.49%	24,041	20%	9,891	20%	7,150	18%	2,317	18%
	> 37.49%	19,817	16%	7,807	16%	5,805	15%	1,603	12%
	missing	5,760	5%	1,493	3%	1,147	3%	363	3%

Table 2: Students Who Enrolled in a Remedial Sequence vs. All First-time Students: Student Goals, Global Enrollment Patterns, and Academic Outcome

Fall 2002 First-Time Students		**All First-Time Students**		**Remedial Math Segment**		**Remedial Writing Segment**		**Remedial Reading Segment**	
Academic Goal (at initial enrollment)	transfer & associate's degree	34,796	28%	21,123	42%	15,754	41%	5,181	40%
	transfer only	9,161	7%	5,090	10%	3,895	10%	1,113	9%
	academic associate's degree	5,238	4%	2,733	5%	2,188	6%	775	6%
	vocational associate's degree	2,088	2%	921	2%	835	2%	337	3%
	certificate	3,130	3%	827	2%	632	2%	233	2%
	other job-related	16,876	14%	4,032	8%	3,321	9%	1,375	11%
	abstract	10,672	9%	2,724	5%	2,062	5%	671	5%
	remediation	6,799	6%	1,436	3%	1,233	3%	514	4%
	undecided	22,557	18%	9,783	20%	7,647	20%	2,464	19%
	not reported	11,110	9%	1,328	3%	1,105	3%	389	3%
Average Unit Course Load (1st Year; Fall & Spring semesters only)	0.000-5.999	49,019	40%	6,583	13%	5,162	13%	1,724	13%
	6.000-8.999	18,041	15%	8,426	17%	6,667	17%	2,356	18%
	9.000-11.999	19,117	16%	12,050	24%	9,424	24%	3,301	25%
	12.000 or greater	36,250	30%	22,938	46%	17,419	45%	5,671	43%
Course Success Ratio (1st Year)	0.000-0.249	20,514	17%	7,333	15%	5,650	15%	1,999	15%
	0.250-0.499	12,222	10%	7,318	15%	5,811	15%	2,121	16%
	0.500-0.749	21,537	18%	12,525	25%	9,927	26%	3,488	27%
	0.750-1.000	67,073	55%	22,647	45%	17,130	44%	5,401	41%
	no valid grades reported	1,081	1%	174	0%	154	0%	43	0%
Duration of CC Attendance (excluding winter intersessions)	1 semester	31,102	25%	2,837	6%	2,327	6%	741	6%
	2-3 semesters	28,357	23%	8,295	17%	6,611	17%	2,263	17%
	4-6 semesters	24,989	20%	12,380	25%	9,592	25%	3,171	24%
	7-9 semesters	18,186	15%	11,606	23%	8,567	22%	2,691	21%
	10-12 semesters	11,371	9%	8,286	17%	6,320	16%	2,112	16%
	> 12 semesters	8,422	7%	6,593	13%	5,255	14%	2,074	16%
Transfer Prepared	total transferrable units earned < 60	102,405	84%	36,582	73%	28,738	74%	10,135	78%
	total transferrable units earned ≥ 60	20,022	16%	13,415	27%	9,934	26%	2,917	22%
Academic Outcome	transfer with credential	7,403	6%	4,947	10%	3,523	9%	1,006	8%
	transfer without credential	15,264	12%	7,379	15%	5,504	14%	1,367	10%
	academic associate's degree	2,536	2%	2,010	4%	1,435	4%	430	3%
	vocational associate's degree	1,412	1%	1,136	2%	873	2%	327	3%
	certificate	2,325	2%	1,130	2%	927	2%	293	2%
	no credential & no transfer	93,487	76%	33,395	67%	26,410	68%	9,629	74%

Table 3: Students Who Enrolled in a Remedial Mathematics Sequence, by Starting Level: Demographic Characteristics

Fall 2002 First-Time Students		**Remedial Math Segment**		**First Math Course = Interm Algebra or Geometry**		**First Math Course = Beginning Algebra**		**First Math Course = Pre-Algebra**		**First Math Course = Arithmetic**	
All Students		49,997	**100%**	11,466	**100%**	16,843	**100%**	10,325	**100%**	11,363	**100%**
	**Proportion in sequence starting at each level:*		*100%*		*23%*		*34%*		*21%*		*23%*
Age at College Entry	<20	39,401	79%	10,518	92%	13,886	82%	7,701	75%	7,296	64%
	20-25	6,110	12%	701	6%	1,883	11%	1,511	15%	2,015	18%
	>25	4,468	9%	244	2%	1,068	6%	1,110	11%	2,046	18%
	missing	18	0%	3	0%	6	0%	3	0%	6	0%
Race/Ethnicity	White	19,629	39%	5,497	48%	7,351	44%	3,794	37%	2,987	26%
	Black	3,996	8%	513	4%	1,042	6%	873	8%	1,568	14%
	Hispanic	17,301	35%	2,816	25%	5,275	31%	4,032	39%	5,178	46%
	Asian	3,865	8%	1,285	11%	1,327	8%	661	6%	592	5%
	Other	3,209	6%	854	7%	1,159	7%	587	6%	609	5%
	missing	1,997	4%	501	4%	689	4%	378	4%	429	4%
Sex	male	22,318	45%	5,773	50%	7,905	47%	4,334	42%	4,306	38%
	female	27,536	55%	5,671	49%	8,881	53%	5,975	58%	7,009	62%
	missing	143	0%	22	0%	57	0%	16	0%	48	0%
Citizenship	U.S. citizen	42,762	86%	9,919	87%	14,622	87%	8,716	84%	9,505	84%
	not U.S. citizen	6,275	13%	1,405	12%	1,893	11%	1,354	13%	1,623	14%
	missing	960	2%	142	1%	328	2%	255	2%	235	2%
Fee Waiver in 2002/2003	received	19,422	39%	3,380	29%	5,974	35%	4,227	41%	5,841	51%
	did not receive	30,575	61%	8,086	71%	10,869	65%	6,098	59%	5,522	49%
% BA or Greater in Zip Code	< 12.50%	12,522	25%	2,065	18%	3,588	21%	2,643	26%	4,226	37%
	12.50% - 24.99%	18,284	37%	4,071	36%	6,125	36%	3,943	38%	4,145	36%
	25.00% - 37.49%	9,891	20%	2,674	23%	3,676	22%	1,931	19%	1,610	14%
	> 37.49%	7,807	16%	2,366	21%	2,879	17%	1,516	15%	1,046	9%
	missing	1,493	3%	290	3%	575	3%	292	3%	336	3%

*Percentages do not sum to 100% due to rounding

Table 4: Students Who Enrolled in a Remedial Mathematics Sequence, by Starting Level: Student Goals, Global Enrollment Patterns, and Academic Outcome

Fall 2002 First-Time Students		**Remedial Math Segment**		**First Math Course = Interm Algebra or Geometry**		**First Math Course = Beginning Algebra**		**First Math Course = Pre-Algebra**		**First Math Course = Arithmetic**	
Academic Goal	transfer & associate's degree	21,123	42%	5,667	49%	7,717	46%	4,194	41%	3,545	31%
(at initial enrollment)	transfer only	5,090	10%	1,702	15%	1,749	10%	929	9%	710	6%
	academic associate's degree	2,733	5%	394	3%	901	5%	704	7%	734	6%
	vocational associate's degree	921	2%	87	1%	282	2%	229	2%	323	3%
	certificate	827	2%	100	1%	245	1%	191	2%	291	3%
	other job-related	4,032	8%	529	5%	1,052	6%	881	9%	1,570	14%
	abstract	2,724	5%	467	4%	902	5%	620	6%	735	6%
	remediation	1,436	3%	181	2%	286	2%	298	3%	671	6%
	undecided	9,783	20%	2,046	18%	3,255	19%	2,116	20%	2,366	21%
	not reported	1,328	3%	293	3%	454	3%	163	2%	418	4%
Average Unit Course Load	0.000-5.999	6,583	13%	719	6%	1,731	10%	1,636	16%	2,497	22%
(1st Year; Fall &	6.000-8.999	8,426	17%	1,245	11%	2,637	16%	1,979	19%	2,565	23%
Spring semesters only)	9.000-11.999	12,050	24%	2,499	22%	4,127	25%	2,650	26%	2,774	24%
	12.000 or greater	22,938	46%	7,003	61%	8,348	50%	4,060	39%	3,527	31%
Course Success Ratio (1st Year)	0.000-0.249	7,333	15%	1,180	10%	2,449	15%	1,666	16%	2,038	18%
	0.250-0.499	7,318	15%	1,441	13%	2,504	15%	1,583	15%	1,790	16%
	0.500-0.749	12,525	25%	2,738	24%	4,262	25%	2,664	26%	2,861	25%
	0.750-1.000	22,647	45%	6,088	53%	7,577	45%	4,375	42%	4,607	41%
	no valid grades reported	174	0%	19	0%	51	0%	37	0%	67	1%
Duration of CC Attendance	1 semester	2,837	6%	341	3%	852	5%	621	6%	1,023	9%
(excluding winter	2-3 semesters	8,295	17%	1,300	11%	2,657	16%	1,867	18%	2,471	22%
intersessions)	4-6 semesters	12,380	25%	2,831	25%	4,090	24%	2,579	25%	2,880	25%
	7-9 semesters	11,606	23%	3,379	29%	4,055	24%	2,141	21%	2,031	18%
	10-12 semesters	8,286	17%	2,153	19%	3,026	18%	1,633	16%	1,474	13%
	> 12 semesters	6,593	13%	1,462	13%	2,163	13%	1,484	14%	1,484	13%
Transfer Prepared	total transferrable units earned < 60	36,582	73%	6,475	56%	11,995	71%	8,266	80%	9,846	87%
	total transferrable units earned ≥ 60	13,415	27%	4,991	44%	4,848	29%	2,059	20%	1,517	13%
Academic Outcome	transfer with credential	4,947	10%	1,925	17%	1,818	11%	745	7%	459	4%
	transfer without credential	7,379	15%	2,904	25%	2,717	16%	1,085	11%	673	6%
	academic associate's degree	2,010	4%	583	5%	772	5%	362	4%	293	3%
	vocational associate's degree	1,136	2%	261	2%	457	3%	205	2%	213	2%
	certificate	1,130	2%	147	1%	362	2%	257	2%	364	3%
	no credential & no transfer	33,395	67%	5,646	49%	10,717	64%	7,671	74%	9,361	82%

Table 5: Students Who Enrolled in a Remedial Mathematics Sequence, by Starting Level: Student Course-Taking Patterns

Fall 2002 First-Time Students		Remedial Math Segment		First Math Course = Interm Algebra or Geometry		First Math Course = Beginning Algebra		First Math Course = Pre-Algebra		First Math Course = Arithmetic	
Units Attempted in First Math	< 3 units	3,624	7%	96	1%	500	3%	355	3%	2,673	24%
	3+ units	46,373	93%	11,370	99%	16,343	97%	9,970	97%	8,690	76%
Term of First Remedial Math Course	Fall 2002	27,453	55%	6,776	59%	9,567	57%	5,322	52%	5,788	51%
	Spring 2003	9,481	19%	2,168	19%	3,051	18%	2,053	20%	2,209	19%
	Summer 2003	707	1%	159	1%	237	1%	157	2%	154	1%
	Fall 2003	3,505	7%	797	7%	1,184	7%	761	7%	763	7%
	Spring 2004	2,368	5%	502	4%	777	5%	501	5%	588	5%
	after Spring 2004	6,483	13%	1,064	9%	2,027	12%	1,531	15%	1,861	16%
Grade in First Remedial Math Course	A	6,881	14%	1,634	14%	2,394	14%	1,544	15%	1,309	12%
	B	7,817	16%	2,016	18%	2,668	16%	1,775	17%	1,358	12%
	C	8,011	16%	2,134	19%	2,960	18%	1,649	16%	1,268	11%
	D	3,671	7%	967	8%	1,426	8%	719	7%	559	5%
	F	6,366	13%	1,488	13%	2,348	14%	1,267	12%	1,263	11%
	Credit	2,570	5%	105	1%	263	2%	505	5%	1,697	15%
	No Credit	1,670	3%	91	1%	210	1%	404	4%	965	8%
	Withdrawal	11,204	22%	2,704	24%	4,035	24%	2,144	21%	2,321	20%
	Ungraded	524	1%	62	1%	121	1%	91	1%	250	2%
	missing/undetermined	1,283	3%	265	2%	418	2%	227	2%	373	3%
	passed	25,803	52%	5,951	52%	8,406	50%	5,564	54%	5,882	52%
	did not pass	24,194	48%	5,515	48%	8,437	50%	4,761	46%	5,481	48%
Attempted Second Math Course	attempted	27,639	55%	7,064	62%	9,138	54%	5,985	58%	5,452	48%
	did not attempt	22,358	45%	4,402	38%	7,705	46%	4,340	42%	5,911	52%
Delay of Second Math Course	no delay	12,433	25%	2,767	24%	4,124	24%	3,010	29%	2,532	22%
	1 semester	3,923	8%	883	8%	1,216	7%	997	10%	827	7%
	2 semesters	3,878	8%	1,121	10%	1,258	7%	745	7%	754	7%
	3 semesters	1,757	4%	570	5%	594	4%	297	3%	296	3%
	>3 semesters	5,648	11%	1,723	15%	1,946	12%	936	9%	1,043	9%
	no second math course	22,358	45%	4,402	38%	7,705	46%	4,340	42%	5,911	52%
Highest Math Course Completed	college-level math	13,096	26%	5,806	51%	4,670	28%	1,661	16%	959	8%
	interm algebra/geometry	6,160	12%	2,534	22%	2,258	13%	833	8%	535	5%
	beginning algebra	7,592	15%	189	2%	4,466	27%	1,655	16%	1,282	11%
	pre-algebra	3,969	8%	36	0%	143	1%	2,767	27%	1,023	9%
	basic arithmetic	3,590	7%	21	0%	67	0%	96	1%	3,406	30%
	voc math or did not pass any math	15,590	31%	2,880	25%	5,239	31%	3,313	32%	4,158	37%

Table 6: Remedial Mathematics Sequence Course-Taking Pattern Means, from Regression: Student Demographic Characteristics

Fall 2002 First-Time Students		**Mean Level of First Math**	**% Attempted at least 3 Units in First Math**	**Mean Delay of First Math**	**% Passed First Math on First Try (includes ungraded as passing)**	**% Attempted Second (More Advanced) Math Course**	**Mean Delay of Second (More Advanced) Math Course**	**% Completed Interm Algebra, Geometry, or Higher Math Course**	**% Completed College Algebra or Higher Math Course**
All Students		2.43	93%	1.91	52%	55%	2.23	39%	26%
Age at College Entry	<20	2.30	94%	1.69	50%	58%	2.32	42%	29%
	20-25	2.79	91%	2.49	55%	47%	1.99	27%	16%
	>25	3.11	86%	2.99	64%	45%	1.62	22%	12%
	missing	2.67	89%	0.89	44%	33%	1.50	11%	0%
Race/Ethnicity	White	2.22	95%	1.89	54%	57%	2.23	43%	30%
	Black	2.87	86%	2.25	39%	41%	2.54	21%	12%
	Hispanic	2.67	92%	1.89	50%	54%	2.27	33%	22%
	Asian	2.14	94%	1.98	57%	63%	2.07	52%	37%
	Other	2.30	92%	1.70	53%	57%	2.03	42%	27%
	missing	2.37	93%	1.71	53%	55%	2.14	40%	28%
Sex	male	2.32	93%	1.89	47%	51%	2.25	37%	25%
	female	2.52	92%	1.92	55%	59%	2.22	40%	27%
	missing	2.63	90%	0.90	46%	38%	1.59	25%	19%
Citizenship	U.S. citizen	2.42	93%	1.87	51%	55%	2.28	38%	26%
	not U.S. citizen	2.51	92%	2.27	60%	59%	1.98	42%	28%
	missing	2.61	94%	1.22	47%	40%	1.80	27%	17%
Fee Waiver in 2002/2003	received	2.65	91%	1.69	51%	55%	2.18	34%	23%
	did not receive	2.30	94%	2.05	52%	56%	2.27	41%	28%
% BA or Greater in Zip Code	< 12.50%	2.72	92%	1.96	49%	51%	2.31	31%	20%
	12.50% - 24.99%	2.45	92%	1.95	52%	54%	2.21	37%	25%
	25.00% - 37.49%	2.25	95%	1.81	52%	58%	2.28	43%	30%
	> 37.49%	2.16	93%	1.83	53%	62%	2.16	49%	36%
	missing	2.45	92%	1.94	52%	51%	1.98	35%	23%

Table 7: Remedial Mathematics Sequence Course-Taking Pattern Means, from Regression: Student Goals, Global Enrollment Patterns, and Academic Outcome

Fall 2002 First-Time Students		**Mean Level of First Math**	**% Attempted at least 3 Units in First Math**	**Mean Delay of First Math**	**% Passed First Math on First Try (includes ungraded as passing)**	**% Attempted Second (More Advanced) Math Course**	**Mean Delay of Second (More Advanced) Math Course**	**% Completed Interm Algebra, Geometry, or Higher Math Course**	**% Completed College Algebra or Higher Math Course**
Academic Goal (at initial enrollment)	transfer & associate's degree	2.27	94%	1.58	51%	60%	2.23	44%	31%
	transfer only	2.13	96%	1.62	54%	63%	2.13	50%	36%
	academic associate's degree	2.65	93%	2.09	50%	47%	2.18	28%	16%
	vocational associate's degree	2.86	91%	2.21	51%	44%	2.14	21%	11%
	certificate	2.81	90%	2.87	48%	43%	2.00	23%	15%
	other job-related	2.87	92%	2.75	52%	46%	2.41	25%	15%
	abstract	2.60	93%	2.50	51%	49%	2.30	32%	20%
	remediation	3.02	79%	3.06	54%	41%	2.40	24%	15%
	undecided	2.49	91%	1.98	51%	54%	2.27	37%	25%
	not reported	2.53	88%	1.38	50%	45%	1.94	30%	20%
Average Unit Course Load (1st Year; Fall & Spring semesters only)	0.000-5.999	2.90	85%	4.66	51%	38%	2.31	20%	11%
	6.000-8.999	2.70	92%	2.39	46%	43%	2.73	26%	14%
	9.000-11.999	2.47	93%	1.69	47%	52%	2.63	33%	21%
	12.000 or greater	2.18	95%	1.05	56%	66%	1.94	51%	38%
Course Success Ratio (1st Year)	0.000-0.249	2.62	91%	2.39	14%	24%	4.33	12%	6%
	0.250-0.499	2.51	92%	1.52	26%	37%	3.46	19%	10%
	0.500-0.749	2.45	93%	1.62	45%	54%	2.57	33%	20%
	0.750-1.000	2.33	93%	2.01	76%	72%	1.66	57%	41%
	no valid grades reported	2.87	87%	4.56	29%	27%	2.60	17%	7%
Duration of CC Attendance (excluding winter intersessions)	1 semester	2.82	89%	0.01	26%	0%	----------	3%	0%
	2-3 semesters	2.66	91%	1.30	37%	19%	0.86	8%	1%
	4-6 semesters	2.44	93%	1.95	48%	45%	1.62	25%	14%
	7-9 semesters	2.24	94%	2.12	61%	71%	2.03	52%	38%
	10-12 semesters	2.29	94%	2.32	60%	80%	2.61	61%	46%
	> 12 semesters	2.45	93%	2.50	60%	87%	3.06	66%	47%
Academic Outcome	transfer with credential	1.95	91%	1.29	74%	97%	1.80	96%	91%
	transfer without credential	1.94	92%	1.43	62%	75%	1.88	68%	57%
	academic associate's degree	2.18	96%	1.73	75%	89%	2.52	79%	58%
	vocational associate's degree	2.33	95%	2.40	78%	71%	2.41	54%	26%
	certificate	2.74	96%	3.38	56%	50%	2.92	23%	8%
	no credential & no transfer	2.62	96%	2.05	44%	42%	2.45	21%	9%

Table 8: Remedial Mathematics Sequence Course-Taking Pattern Means, from Regression: Student Course-Taking Patterns

Fall 2002 First-Time Students		Mean Level of First Math	% Attempted at least 3 Units in First Math	Mean Delay of First Math	% Passed First Math on First Try (includes ungraded as passing)	% Attempted Second (More Advanced) Math Course	Mean Delay of Second (More Advanced) Math Course	% Completed Interm Algebra, Geometry, or Higher Math Course	% Completed College Algebra or Higher Math Course
First Nonvoc Math Course Attempted	college-level math		----------	---------	----------	----------	----------	----------	----------
	interm algebra/geometry		99%	1.48	52%	62%	2.57	73%	51%
	beginning algebra		97%	1.78	50%	54%	2.32	41%	28%
	pre-algebra		97%	2.15	54%	58%	1.82	24%	16%
	basic arithmetic		76%	2.31	52%	48%	2.11	13%	8%
	vocational math only or no math		----------	---------	----------	----------	----------	----------	----------
Units Attempted in First Math	< 3 units			1.84	55%	43%	2.94	18%	12%
	3+ units			1.91	51%	56%	2.19	40%	27%
Term of First Remedial Math Course	Fall 2002				52%	57%	2.14	41%	28%
	Spring 2003				50%	54%	2.96	38%	27%
	Summer 2003				62%	67%	1.89	47%	33%
	Fall 2003				50%	56%	2.01	40%	26%
	Spring 2004				50%	52%	2.68	35%	23%
	after Spring 2004				55%	47%	1.51	30%	18%
Grade in First Remedial Math Course	A					82%	1.02	65%	48%
	B					80%	1.21	59%	41%
	C					77%	1.39	54%	35%
	D					49%	3.78	32%	22%
	F					29%	5.07	18%	12%
	Credit					71%	1.44	34%	22%
	No Credit					33%	3.65	12%	8%
	Withdrawal					28%	5.46	18%	12%
	Ungraded					23%	5.49	19%	7%
	missing/undetermined					29%	4.28	19%	14%
	passed					78%	1.26	56%	38%
	did not pass					32%	4.79	20%	13%
Attempted Second Math Course	attempted							64%	47%
	did not attempt							6%	0%
Delay of Second Math Course	no delay							66%	49%
	1 semester							65%	49%
	2 semesters							64%	47%
	3 semesters							63%	47%
	>3 semesters							62%	43%
	no second math course							6%	0%
Highest Math Course Completed	college-level math	1.83	97%	1.34	75%	100%	1.99		
	interm algebra/geometry	1.90	96%	1.96	74%	77%	2.46		
	beginning algebra	2.53	93%	2.09	73%	64%	2.38		
	pre-algebra	3.20	93%	2.34	75%	65%	2.19		
	basic arithmetic	3.92	72%	2.48	80%	37%	2.48		
	voc math or did not pass	2.56	92%	2.02	0%	7%	3.26		

Table 9: Students Who Enrolled in a Remedial Writing Sequence, by Starting Level: Demographic Characteristics

Fall 2002 First-Time Students		**Remedial Writing Segment**		**First Writing Course = Level 1 Writing**		**First Writing Course = Level 2 Writing**		**First Writing Course = Level 3 Writing**		**First Writing Course = Level 4/5 Writing**	
All Students		38,672	**100%**	20,190	**100%**	12,932	**100%**	4,355	**100%**	1,195	**100%**
	**Proportion in sequence starting at each level:*		*100%*		*52%*		*33%*		*11%*		*3%*
Age at College Entry	<20	30,704	79%	16,749	83%	10,124	78%	3,098	71%	733	61%
	20-25	4,578	12%	2,078	10%	1,646	13%	641	15%	213	18%
	>25	3,376	9%	1,357	7%	1,156	9%	615	14%	248	21%
	missing	14	0%	6	0%	6	0%	1	0%	1	0%
Race/Ethnicity	White	13,090	34%	8,322	41%	3,711	29%	901	21%	156	13%
	Black	3,176	8%	1,262	6%	1,121	9%	580	13%	213	18%
	Hispanic	14,537	38%	6,601	33%	5,422	42%	1,966	45%	548	46%
	Asian	3,830	10%	1,769	9%	1,335	10%	556	13%	170	14%
	Other	2,541	7%	1,369	7%	866	7%	223	5%	83	7%
	missing	1,498	4%	867	4%	477	4%	129	3%	25	2%
Sex	male	17,770	46%	9,333	46%	5,936	46%	1,982	46%	519	43%
	female	20,800	54%	10,798	53%	6,967	54%	2,366	54%	669	56%
	missing	102	0%	59	0%	29	0%	7	0%	7	1%
Citizenship	U.S. citizen	32,086	83%	17,472	87%	10,305	80%	3,480	80%	360	30%
	not U.S. citizen	5,748	15%	2,219	11%	2,330	18%	839	19%	829	69%
	missing	838	2%	499	2%	297	2%	36	1%	6	1%
Fee Waiver in 2002/2003	received	15,973	41%	7,194	36%	5,747	44%	2,374	55%	658	55%
	did not receive	22,699	59%	12,996	64%	7,185	56%	1,981	45%	537	45%
% BA or Greater in Zip Code	< 12.50%	10,433	27%	4,610	23%	3,745	29%	1,626	37%	452	38%
	12.50% - 24.99%	14,137	37%	7,645	38%	4,557	35%	1,578	36%	357	30%
	25.00% - 37.49%	7,150	18%	3,905	19%	2,432	19%	655	15%	158	13%
	> 37.49%	5,805	15%	3,433	17%	1,805	14%	377	9%	190	16%
	missing	1,147	3%	597	3%	393	3%	119	3%	38	3%

*Percentages do not sum to 100% due to rounding

Table 10: Students Who Enrolled in a Remedial Writing Sequence, by Starting Level: Student Goals, Global Enrollment Patterns, and Academic Outcome

Fall 2002 First-Time Students		**Remedial Writing Segment**		**First Writing Course = Level 1 Writing**		**First Writing Course = Level 2 Writing**		**First Writing Course = Level 3 Writing**		**First Writing Course = Level 4/5 Writing**	
Academic Goal	transfer & associate's degree	15,754	41%	8,781	43%	5,157	40%	1,486	34%	330	28%
(at initial enrollment)	transfer only	3,895	10%	2,270	11%	1,289	10%	288	7%	48	4%
	academic associate's degree	2,188	6%	1,023	5%	848	7%	278	6%	39	3%
	vocational associate's degree	835	2%	367	2%	299	2%	116	3%	53	4%
	certificate	632	2%	295	1%	237	2%	80	2%	20	2%
	other job-related	3,321	9%	1,408	7%	1,261	10%	546	13%	106	9%
	abstract	2,062	5%	977	5%	697	5%	303	7%	85	7%
	remediation	1,233	3%	393	2%	414	3%	248	6%	178	15%
	undecided	7,647	20%	3,982	20%	2,442	19%	899	21%	324	27%
	not reported	1,105	3%	694	3%	288	2%	111	3%	12	1%
Average Unit Course Load	0.000-5.999	5,162	13%	2,271	11%	1,810	14%	794	18%	287	24%
(1st Year; Fall & Spring semesters only)	6.000-8.999	6,667	17%	3,132	16%	2,401	19%	920	21%	214	18%
	9.000-11.999	9,424	24%	4,833	24%	3,207	25%	1,085	25%	299	25%
	12.000 or greater	17,419	45%	9,954	49%	5,514	43%	1,556	36%	395	33%
Course Success Ratio (1st Year)	0.000-0.249	5,650	15%	2,833	14%	1,923	15%	677	16%	217	18%
	0.250-0.499	5,811	15%	2,832	14%	2,069	16%	736	17%	174	15%
	0.500-0.749	9,927	26%	5,006	25%	3,447	27%	1,181	27%	293	25%
	0.750-1.000	17,130	44%	9,458	47%	5,447	42%	1,737	40%	488	41%
	no valid grades reported	154	0%	61	0%	46	0%	24	1%	23	2%
Duration of CC Attendance	1 semester	2,327	6%	1,022	5%	824	6%	344	8%	137	11%
(excluding winter intersessions)	2-3 semesters	6,611	17%	3,154	16%	2,355	18%	869	20%	233	19%
	4-6 semesters	9,592	25%	4,982	25%	3,220	25%	1,106	25%	284	24%
	7-9 semesters	8,567	22%	4,917	24%	2,646	20%	821	19%	183	15%
	10-12 semesters	6,320	16%	3,514	17%	2,036	16%	605	14%	165	14%
	> 12 semesters	5,255	14%	2,601	13%	1,851	14%	610	14%	193	16%
Transfer Prepared	total transferrable units earned < 60	28,738	74%	13,979	69%	10,040	78%	3,708	85%	1,011	85%
	total transferrable units earned ≥ 60	9,934	26%	6,211	31%	2,892	22%	647	15%	184	15%
Academic Outcome	transfer with credential	3,523	9%	2,285	11%	989	8%	194	4%	55	5%
	transfer without credential	5,504	14%	3,517	17%	1,566	12%	339	8%	82	7%
	academic associate's degree	1,435	4%	886	4%	415	3%	111	3%	23	2%
	vocational associate's degree	873	2%	502	2%	291	2%	65	1%	15	1%
	certificate	927	2%	420	2%	324	3%	153	4%	30	3%
	no credential & no transfer	26,410	68%	12,580	62%	9,347	72%	3,493	80%	990	83%

Table 11: Students Who Enrolled in a Remedial Writing Sequence, by Starting Level: Student Course-Taking Patterns

Fall 2002 First-Time Students		Remedial Writing Segment		First Writing Course = Level 1 Writing		First Writing Course = Level 2 Writing		First Writing Course = Level 3 Writing		First Writing Course = Level 4/5 Writing	
Units Attempted in First Writing	< 3 units	739	2%	61	0%	183	1%	198	5%	297	25%
	3+ units	37,933	98%	20,129	100%	12,749	99%	4,157	95%	898	75%
Term of First Remedial Writing Course	Fall 2002	22,541	58%	12,167	60%	7,440	58%	2,281	52%	653	55%
	Spring 2003	7,256	19%	3,684	18%	2,451	19%	923	21%	198	17%
	Summer 2003	562	1%	297	1%	176	1%	76	2%	13	1%
	Fall 2003	2,484	6%	1,250	6%	815	6%	322	7%	97	8%
	Spring 2004	1,616	4%	779	4%	554	4%	230	5%	53	4%
	after Spring 2004	4,213	11%	2,013	10%	1,496	12%	523	12%	181	15%
Grade in First Remedial Writing Course	A	3,934	10%	2,475	12%	1,060	8%	256	6%	143	12%
	B	7,203	19%	4,465	22%	2,173	17%	396	9%	169	14%
	C	6,043	16%	3,498	17%	1,999	15%	400	9%	146	12%
	D	2,554	7%	1,378	7%	919	7%	188	4%	69	6%
	F	2,688	7%	1,601	8%	871	7%	157	4%	59	5%
	Credit	6,175	16%	2,169	11%	2,390	18%	1,398	32%	218	18%
	No Credit	2,302	6%	712	4%	922	7%	567	13%	101	8%
	Withdrawal	6,591	17%	3,419	17%	2,198	17%	757	17%	217	18%
	Ungraded	261	1%	86	0%	93	1%	67	2%	15	1%
	missing/undetermined	921	2%	387	2%	307	2%	169	4%	58	5%
	passed	23,616	61%	12,693	63%	7,715	60%	2,517	58%	691	58%
	did not pass	15,056	39%	7,497	37%	5,217	40%	1,838	42%	504	42%
Attempted Second Writing Course	attempted	23,829	62%	12,579	62%	8,127	63%	2,479	57%	644	54%
	did not attempt	14,843	38%	7,611	38%	4,805	37%	1,876	43%	551	46%
Delay of Second Writing Course	no delay	11,905	31%	6,034	30%	4,349	34%	1,208	28%	314	26%
	1 semester	3,461	9%	1,710	8%	1,219	9%	440	10%	92	8%
	2 semesters	3,334	9%	1,853	9%	1,060	8%	331	8%	90	8%
	3 semesters	1,343	3%	785	4%	391	3%	127	3%	40	3%
	>3 semesters	3,786	10%	2,197	11%	1,108	9%	373	9%	108	9%
	no second writing course	14,843	38%	7,611	38%	4,805	37%	1,876	43%	551	46%
Highest Writing Course Completed	college-level composition or higher	15,648	40%	10,098	50%	4,435	34%	912	21%	203	17%
	transferrable (below college comp)	154	0%	81	0%	53	0%	16	0%	4	0%
	one level below college	7,655	20%	5,221	26%	1,859	14%	468	11%	107	9%
	two levels below college	3,671	9%	90	0%	3,010	23%	485	11%	86	7%
	three levels below college	1,275	3%	22	0%	33	0%	1,130	26%	90	8%
	four levels below college	319	1%	3	0%	7	0%	3	0%	306	26%
	five levels below college	34	0%	0	0%	0	0%	0	0%	34	3%
	voc writing or did not pass any writing	9,916	26%	4,675	23%	3,535	27%	1,341	31%	365	31%

Table 12: Remedial Writing Sequence Course-Taking Pattern Means, from Regression: Student Demographic Characteristics

Fall 2002 First-Time Students		Mean Level of First Writing	% Attempted at least 3 Units in First Writing	Mean Delay of First Writing	% Passed First Writing on First Try (includes ungraded as passing)	% Attempted Second (More Advanced) Writing Course	Mean Delay of Second (More Advanced) Writing Course	% Completed Level 1 or Higher Writing Course	% Completed College Composition or Higher
All Students		1.66	98%	1.65	61%	62%	1.85	61%	40%
Age at College Entry	<20	1.61	99%	1.39	61%	65%	1.85	64%	44%
	20-25	1.78	97%	2.41	57%	49%	1.93	50%	29%
	>25	1.93	92%	2.96	65%	44%	1.79	49%	24%
	missing	1.79	86%	0.57	79%	43%	0.83	43%	0%
Race/Ethnicity	White	1.46	99%	1.53	64%	63%	1.77	66%	45%
	Black	1.93	97%	2.04	50%	51%	2.07	45%	27%
	Hispanic	1.76	98%	1.66	60%	60%	1.92	57%	36%
	Asian	1.77	97%	1.91	64%	70%	1.76	67%	51%
	Other	1.62	99%	1.40	61%	65%	1.95	63%	43%
	missing	1.54	98%	1.44	65%	62%	1.58	64%	44%
Sex	male	1.65	98%	1.62	57%	58%	1.93	57%	37%
	female	1.66	98%	1.67	65%	65%	1.79	64%	43%
	missing	1.63	95%	1.27	55%	43%	1.89	45%	26%
Citizenship	U.S. citizen	1.62	98%	1.55	61%	61%	1.89	61%	40%
	not U.S. citizen	1.89	96%	2.29	65%	66%	1.66	62%	44%
	missing	1.46	99%	0.99	50%	42%	1.48	46%	23%
Fee Waiver in 2002/2003	received	1.79	98%	1.49	60%	62%	1.80	57%	37%
	did not receive	1.57	98%	1.75	62%	62%	1.88	63%	43%
% BA or Greater in Zip Code	< 12.50%	1.81	97%	1.71	57%	57%	1.95	53%	33%
	12.50% - 24.99%	1.62	98%	1.67	61%	61%	1.88	61%	40%
	25.00% - 37.49%	1.59	99%	1.64	63%	65%	1.80	64%	45%
	> 37.49%	1.55	99%	1.47	66%	68%	1.74	70%	51%
	missing	1.65	98%	1.79	62%	59%	1.65	59%	39%

Table 13: Remedial Writing Sequence Course-Taking Pattern Means, from Regression: Student Goals, Global Enrollment Patterns, and Academic Outcome

Fall 2002 First-Time Students		Mean Level of First Writing	% Attempted at least 3 Units in First Writing	Mean Delay of First Writing	% Passed First Writing on First Try (includes ungraded as passing)	% Attempted Second (More Advanced) Writing Course	Mean Delay of Second (More Advanced) Writing Course	% Completed Level 1 or Higher Writing Course	% Completed College Composition or Higher
Academic Goal (at initial enrollment)	transfer & associate's degree	1.59	99%	1.33	63%	68%	1.79	66%	47%
	transfer only	1.52	99%	1.28	65%	71%	1.65	70%	52%
	academic associate's degree	1.70	98%	1.63	59%	54%	1.75	54%	31%
	vocational associate's degree	1.83	94%	1.90	55%	49%	2.19	49%	25%
	certificate	1.73	97%	2.44	59%	52%	2.18	50%	30%
	other job-related	1.81	98%	2.50	58%	51%	1.98	51%	29%
	abstract	1.76	98%	2.21	58%	55%	2.00	52%	33%
	remediation	2.18	88%	2.96	55%	45%	2.12	41%	22%
	undecided	1.68	99%	1.75	60%	60%	1.98	60%	38%
	not reported	1.49	97%	1.08	59%	53%	1.74	56%	34%
Average Unit Course Load (1st Year; Fall & Spring semesters only)	0.000-5.999	1.83	94%	4.35	55%	42%	2.26	46%	24%
	6.000-8.999	1.74	98%	1.98	52%	48%	2.59	47%	27%
	9.000-11.999	1.67	99%	1.38	57%	61%	2.18	58%	36%
	12.000 or greater	1.57	99%	0.86	68%	73%	1.45	72%	53%
Course Success Ratio (1st Year)	0.000-0.249	1.70	98%	2.22	16%	28%	4.20	24%	13%
	0.250-0.499	1.71	98%	1.32	36%	45%	2.86	39%	20%
	0.500-0.749	1.68	99%	1.33	61%	65%	1.98	61%	36%
	0.750-1.000	1.61	98%	1.73	85%	77%	1.29	80%	59%
	no valid grades reported	2.06	88%	4.05	31%	29%	3.27	31%	18%
Duration of CC Attendance (excluding winter intersessions)	1 semester	1.83	94%	0.01	28%	0%	----------	13%	0%
	2-3 semesters	1.73	97%	1.22	44%	24%	0.86	27%	5%
	4-6 semesters	1.66	98%	1.76	59%	54%	1.62	50%	24%
	7-9 semesters	1.57	99%	1.77	71%	78%	1.77	75%	54%
	10-12 semesters	1.60	99%	1.88	72%	88%	2.12	86%	69%
	> 12 semesters	1.70	98%	2.21	72%	92%	2.22	91%	77%
Academic Outcome	transfer with credential	1.44	99%	0.98	86%	98%	1.15	99%	96%
	transfer without credential	1.46	99%	1.06	74%	79%	1.35	82%	68%
	academic associate's degree	1.49	99%	1.34	85%	96%	1.69	99%	90%
	vocational associate's degree	1.53	99%	2.25	84%	81%	1.92	96%	61%
	certificate	1.78	98%	3.04	68%	59%	2.58	64%	29%
	no credential & no transfer	1.74	98%	1.81	53%	51%	2.18	48%	24%

Table 14: Remedial Writing Sequence Course-Taking Pattern Means, from Regression: Student Course-Taking Patterns

Fall 2002 First-Time Students		**Mean Level of First Writing**	**% Attempted at least 3 Units in First Writing**	**Mean Delay of First Writing**	**% Passed First Writing on First Try (includes ungraded as passing)**	**% Attempted Second (More Advanced) Writing Course**	**Mean Delay of Second (More Advanced) Writing Course**	**% Completed Level 1 or Higher Writing Course**	**% Completed College Composition or Higher**
First Nonvoc Writing Course Attempted	college-level composition or higher		----------	----------	----------	----------	----------	----------	----------
	transferrable (below college comp)		----------	----------	----------	----------	----------	----------	----------
	one level below college composition		100%	1.53	63%	62%	2.01	76%	50%
	two levels below college composition		99%	1.71	60%	63%	1.64	49%	34%
	three levels below college composition		95%	1.85	58%	57%	1.76	32%	21%
	four levels below college composition		70%	2.22	58%	50%	1.78	23%	14%
	five levels below college composition		100%	1.36	59%	73%	1.79	44%	32%
	vocational writing only or no writing		----------	----------	----------	----------	----------	----------	----------
Units Attempted in First Writing	< 3 units			1.90	56%	31%	2.82	23%	14%
	3+ units			1.64	61%	62%	1.84	61%	41%
Term of First Remedial Writing Course	Fall 2002				62%	64%	1.70	63%	43%
	Spring 2003				58%	61%	2.50	59%	39%
	Summer 2003				74%	70%	1.45	71%	48%
	Fall 2003				58%	60%	1.73	59%	39%
	Spring 2004				60%	56%	2.47	55%	36%
	after Spring 2004				60%	51%	1.41	54%	31%
Grade in First Remedial Writing Course	A					82%	0.94	88%	67%
	B					82%	1.05	87%	60%
	C					77%	1.32	81%	47%
	D					46%	3.90	41%	28%
	F					30%	5.07	25%	15%
	Credit					81%	1.15	73%	51%
	No Credit					37%	3.85	27%	17%
	Withdrawal					28%	5.20	24%	15%
	Ungraded					25%	5.85	43%	13%
	missing/undetermined					31%	4.12	26%	17%
	passed					80%	1.14	82%	55%
	did not pass					33%	4.57	28%	18%
Attempted Second Writing Course	attempted							85%	65%
	did not attempt							21%	0%
Delay of Second Writing Course	no delay							87%	69%
	1 semester							86%	68%
	2 semesters							84%	63%
	3 semesters							83%	61%
	>3 semesters							80%	55%
	no second writing course							21%	0%
Highest Writing Course Completed	college-level composition or higher	1.44	99%	1.29	83%	100%	1.64		
	transferrable (below college comp)	1.63	99%	1.25	68%	100%	3.02		
	one level below college	1.41	99%	1.88	81%	59%	2.15		
	two levels below college	2.16	97%	1.89	81%	56%	1.88		
	three levels below college	3.02	96%	2.12	83%	44%	1.82		
	four levels below college	3.93	54%	2.21	86%	30%	1.93		
	five levels below college	5.00	100%	0.97	88%	44%	2.80		
	voc writing or did not pass any writing	1.74	97%	1.87	0%	8%	4.01		

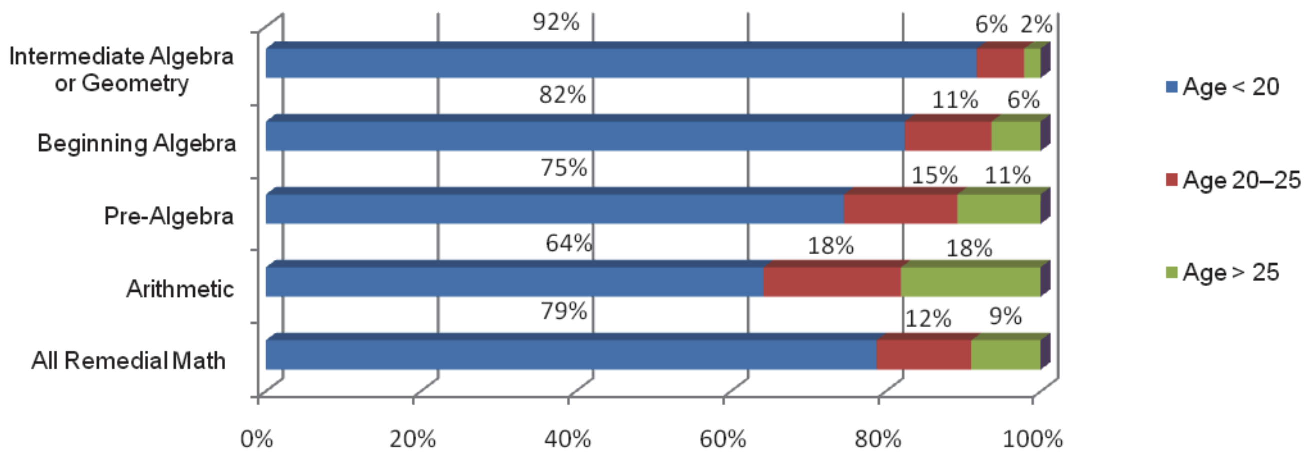
Appendix Six: Variation among Students Who Enrolled in Remedial Mathematics and Writing Sequences, Depending on Starting Level

Note: See Appendix Five, Tables 3-5 and 9-11, for supporting descriptive data.

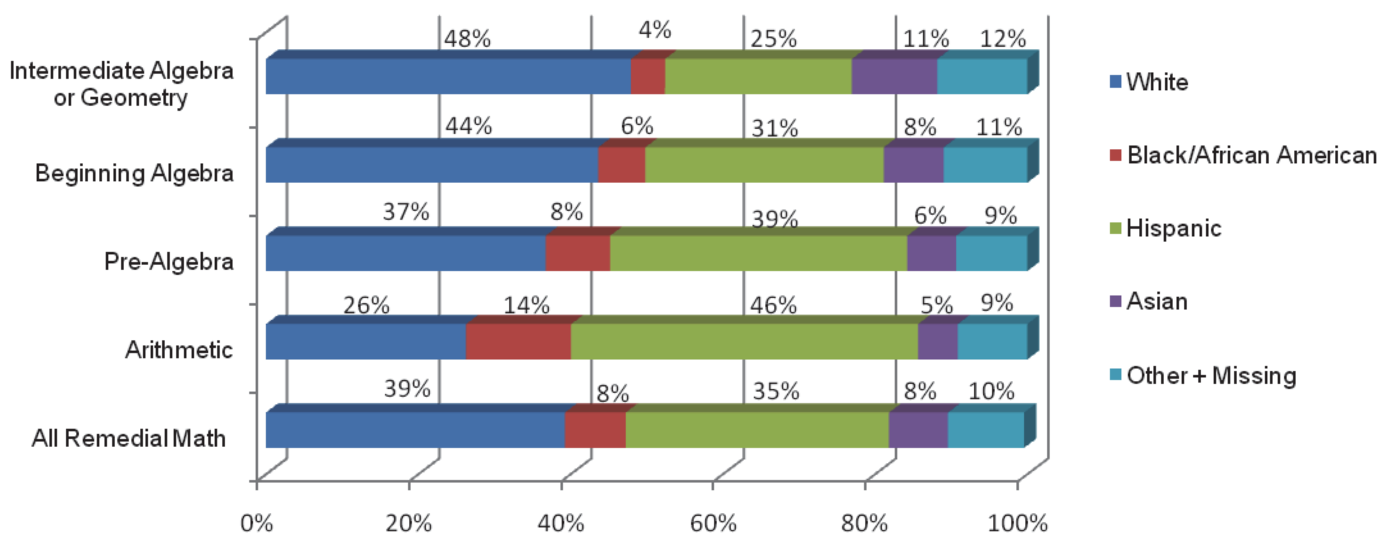
Figure 1: Selected Descriptive Charts, Fall 2002 cohort

Student characteristics and outcomes in the *remedial mathematics sequence*:
It depends on where you start

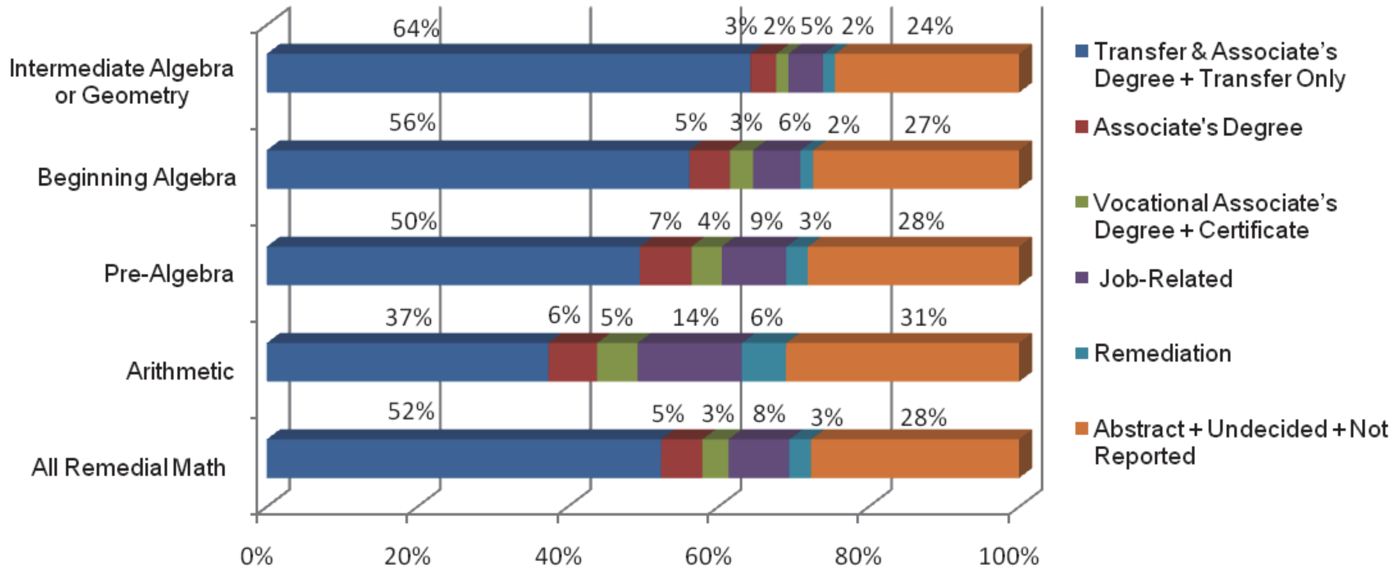
1A. Age (at the time of college entry) of students who enrolled in the remedial mathematics sequence, by starting level and overall



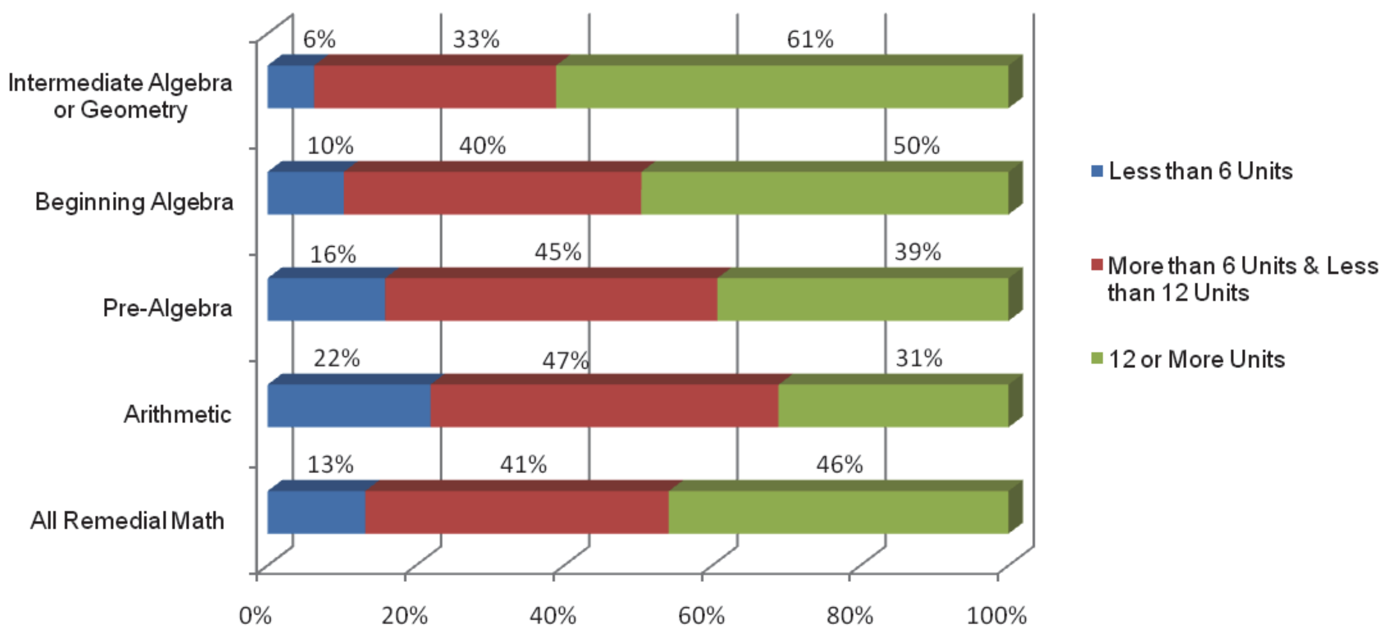
1B. Race/ethnicity of students who enrolled in the remedial mathematics sequence, by starting level and overall



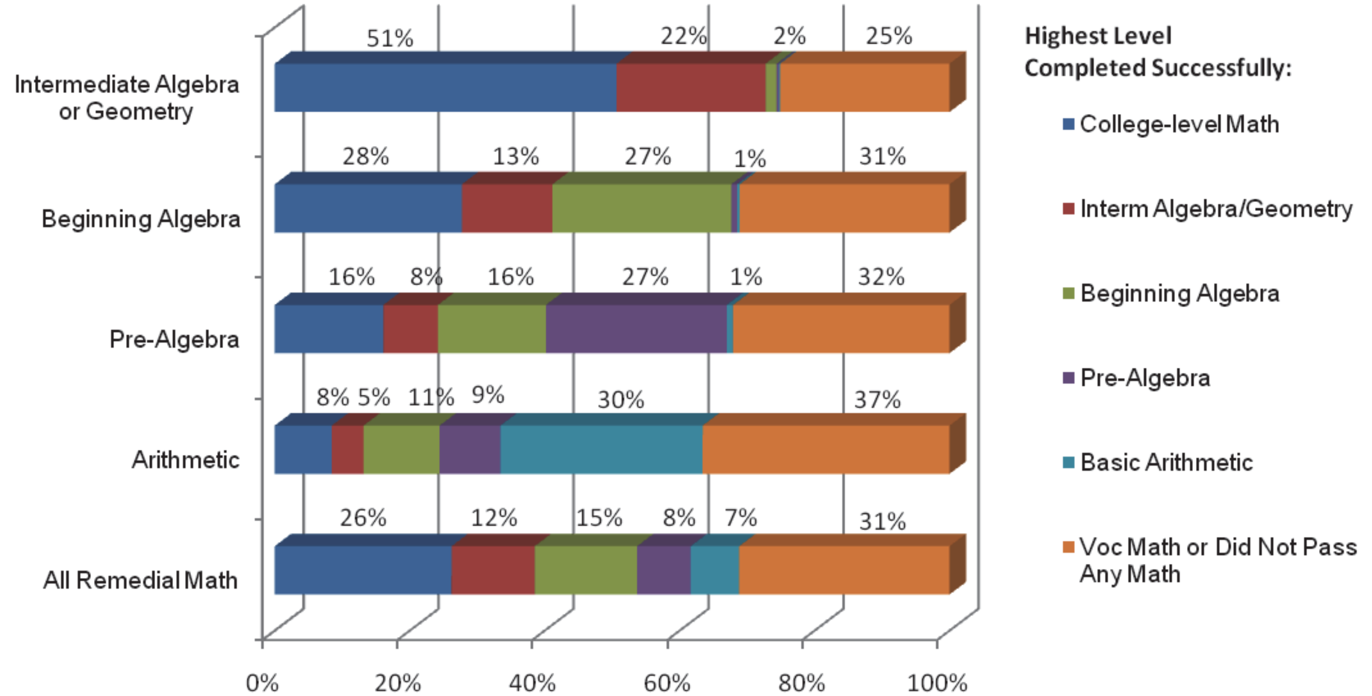
1C. Academic goals of students who enrolled in the remedial mathematics sequence, by starting level and overall



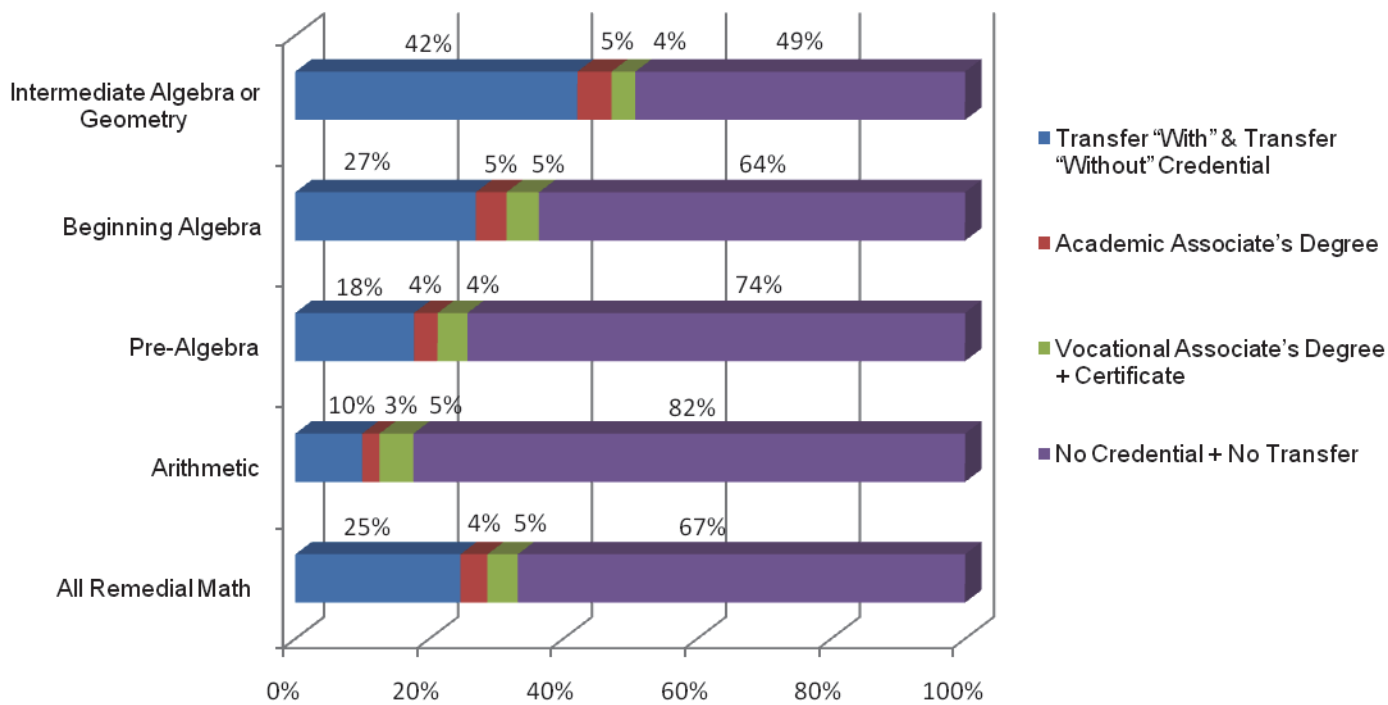
1D. Average first-year unit loads of students who enrolled in the remedial mathematics sequence, by starting level and overall



1E. Highest mathematics course completed by students who enrolled in the remedial mathematics sequence, by starting level and overall



1F. Ultimate academic outcomes of students who enrolled in the remedial mathematics sequence, by starting level and overall

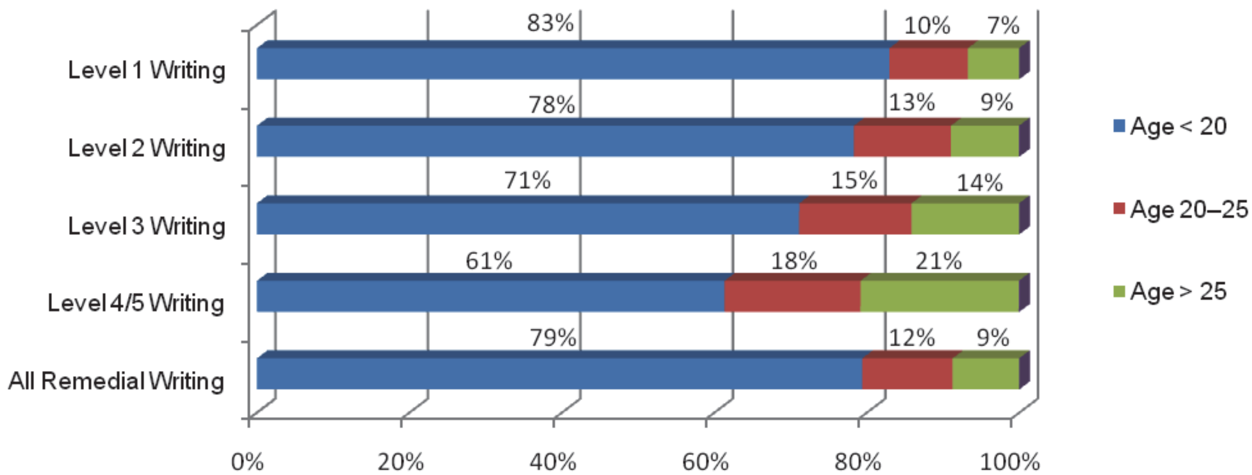


Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

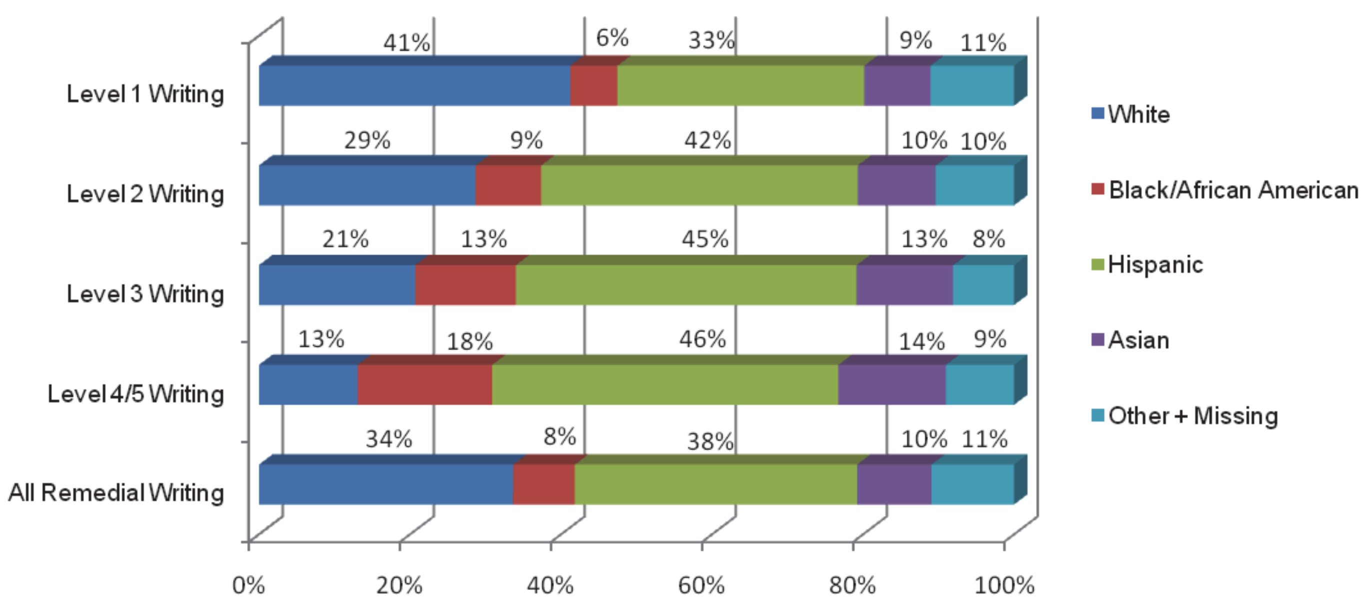
Figure 2: Selected Descriptive Charts (Fall 2002 cohort)

Student characteristics and outcomes in the *remedial writing sequence*: It depends on where you start

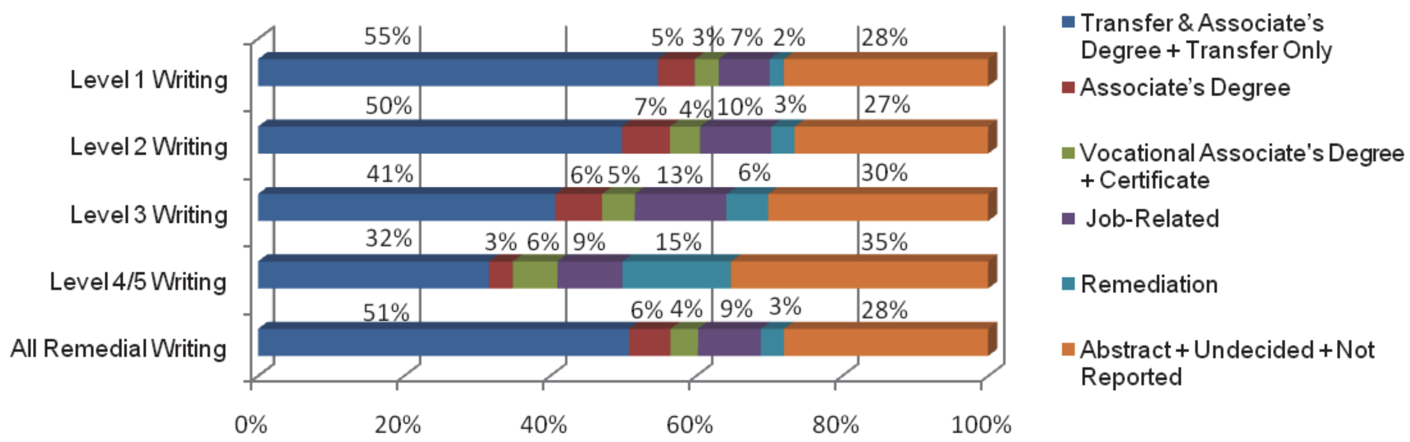
2A. Age (at the time of college entry) of students who enrolled in the remedial writing sequence, by starting level and overall



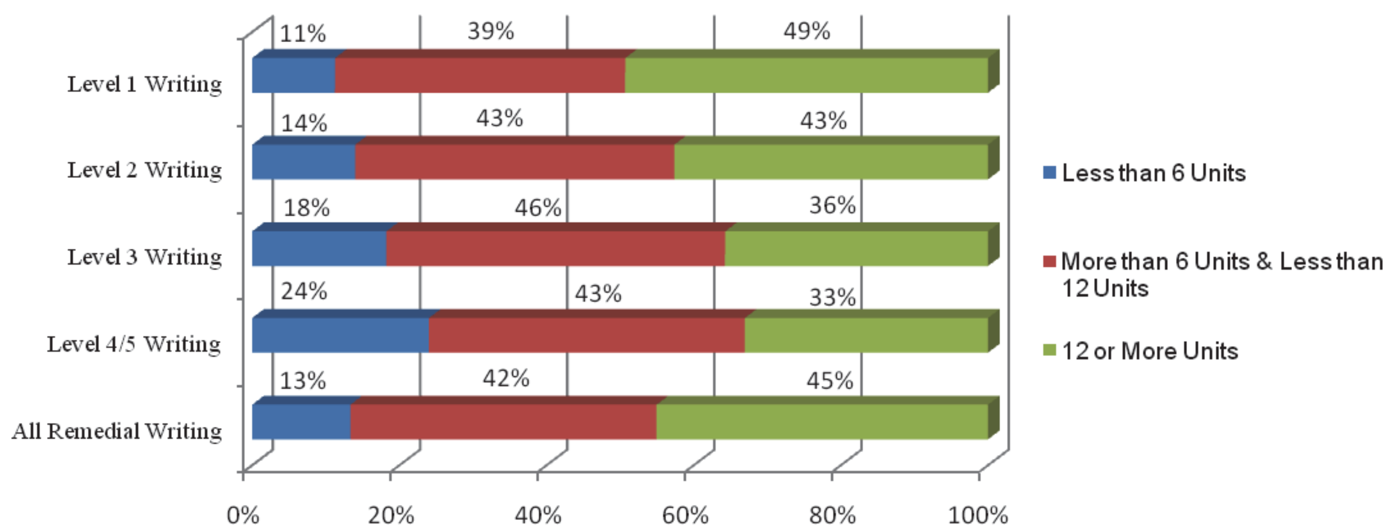
2B. Race/ethnicity of students who enrolled in the remedial writing sequence, by starting level and overall



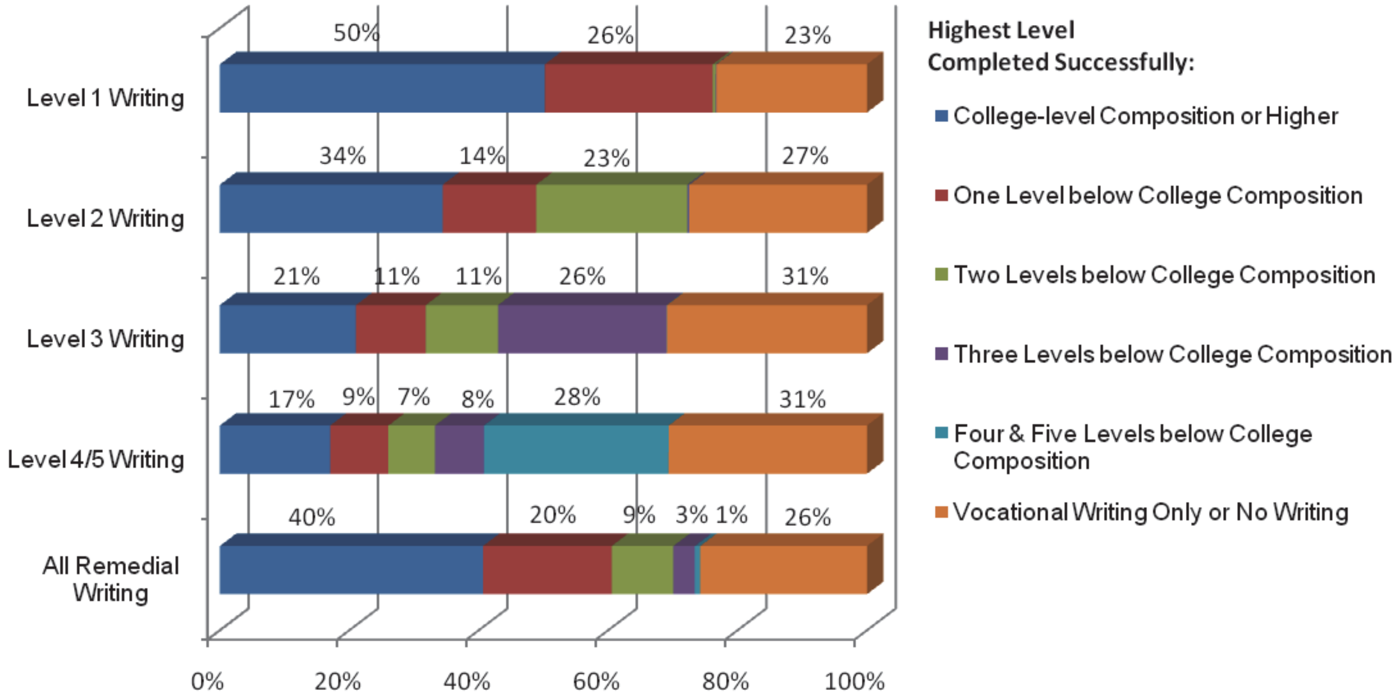
2C. Academic goals of students who enrolled in the remedial writing sequence, by starting level and overall



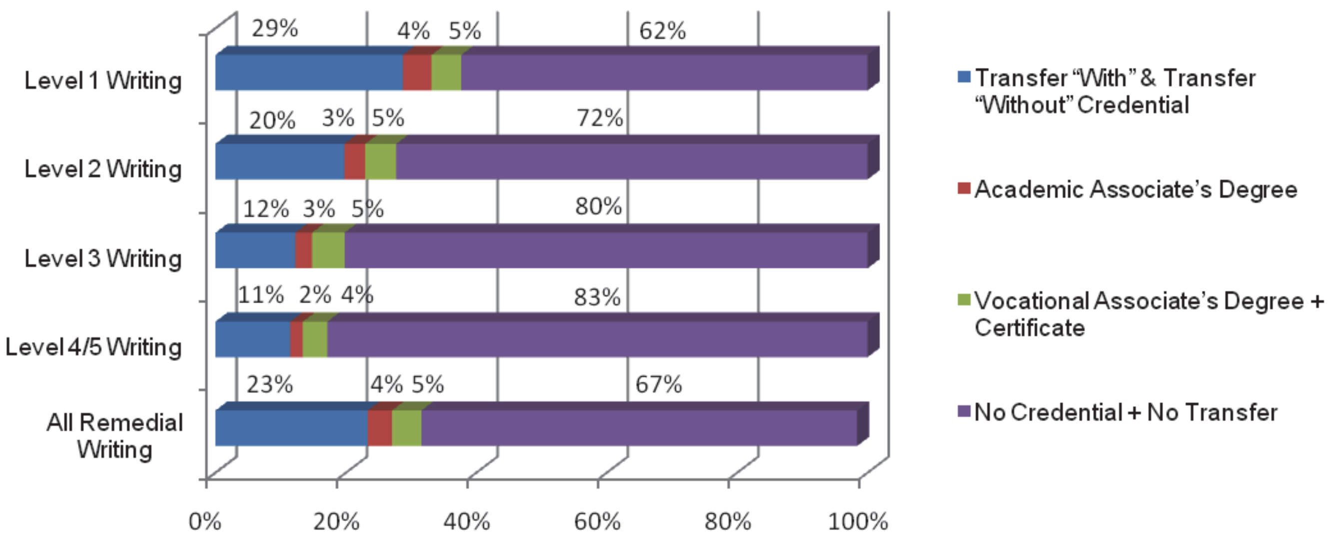
2D. Average first-year unit loads of students who enrolled in the remedial writing sequence, by starting level and overall



2E. Highest writing course completed by students who enrolled in the remedial writing sequence, by starting level and overall



2F. Ultimate academic outcomes of students who enrolled in the remedial writing sequence, by starting level and overall



Data: Student course enrollment records provided by CCC Chancellor's Office Management Information System (COMIS) matched with course listings, descriptions, and prerequisites from the 2002–03 through 2008–09 course catalogs of the colleges. EdSource 6/10

Appendix Seven: Regression Tables

List of Tables

Table 13: Multinomial logistic regression analysis of various long-term credential and transfer outcomes on remedial math course-taking, math attainment, and selected other variables, for those remedial math students who attempted a second math course and remained in the system for at least 10 semesters (N = 12,294; excluded outcome = no credential and no transfer)

Table 14: Multinomial logistic regression analysis of various long-term credential and transfer outcomes on remedial writing course-taking, writing attainment, and selected other variables, for those remedial writing students who attempted a second writing course and remained in the system for at least 10 semesters (N = 10,376; excluded outcome = no credential and no transfer)

Table 1: Logistic regression analysis of delaying (or not) the first remedial math course, among those students who attempted at least one remedial math course

	Model #	1-1	1-2	1-3	1-4	1-5	1-6
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	8,204	12,314	11,561	8,257	6,575	46,911
	pseudo r^2	0.06	0.08	0.10	0.10	0.12	0.09
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref	ref
	beg algebra	0.12	0.13*	-0.08	-0.05	-0.04	0.01
	pre-algebra	0.25*	0.19*	0.04	0.06	0.07	0.12*
	arithmetic	0.15	0.19*	-0.05	0.00	0.02	0.05
Avg Course Unit Load	0.000-5.999	1.34*	1.89*	2.22*	2.47*	2.45*	1.96*
	6.000-8.999	0.65*	0.97*	1.27*	1.28*	1.33*	1.11*
	9.000-11.999	0.27*	0.52*	0.67*	0.69*	0.71*	0.61*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.24*	-0.25*	0.09	-0.04	0.02	-0.10*
	0.250-0.499	-0.34*	-0.34*	-0.05	-0.21*	-0.19*	-0.21*
	0.500-0.749	-0.24*	-0.20*	-0.03	-0.19*	-0.21*	-0.15*
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-1.04*
	4-6 sem	----------	----------	----------	----------	----------	-0.38*
	7-9 sem	----------	----------	----------	----------	----------	-0.23*
	10-12 sem	----------	----------	----------	----------	----------	-0.08*
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.04	0.05	0.38*	0.24*	0.20	0.17*
	>25	0.04	0.15	0.55*	0.50*	0.40*	0.30*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	0.19*	0.18*	0.11	0.06	0.05	0.12*
	Hispanic	0.01	-0.07	-0.08	-0.20*	-0.21*	-0.11*
	Asian	0.15	0.07	-0.13	-0.02	0.15	0.02
	Other	-0.15	-0.10	-0.23*	-0.13	-0.29*	-0.19*
	missing	-0.04	0.16	0.05	0.05	0.24	0.08
Sex	female	0.02	-0.10*	-0.06	-0.02	-0.06	-0.05*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref
	not U.S.	-0.02	0.10	0.02	0.01	0.08	0.06
	missing	-0.17	-0.06	-0.48*	-0.22	0.21	-0.18*
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.10	0.05	0.08	0.10	0.01	0.07*
	acad AS/AA	0.00	0.09	0.13	0.23*	0.14	0.12*
	voc AS/AA	-0.03	0.29*	0.25	-0.03	0.12	0.16*

	certificate	0.30	0.31*	0.65*	0.41*	0.35	0.41*
	other job-related	0.16	0.27*	0.41*	0.30*	0.26*	0.30*
	abstract	0.25*	0.29*	0.06	0.09	0.16	0.19*
	remediation	-0.08	-0.06	0.20	0.51*	0.65*	0.17*
	undecided	0.04	0.00	0.02	0.15*	-0.06	0.03
	not reported	0.24*	-0.25	-0.05	0.39*	0.71*	0.12
Fee Waiver	received	0.02	0.13*	0.06	0.06	0.00	0.06*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.22*	-0.10*	-0.10	-0.08	-0.22*	-0.13*
	25.00% - 37.49%	-0.22*	-0.02	-0.09	-0.22*	-0.29*	-0.15*
	> 37.49%	-0.33*	-0.07	-0.17*	-0.19*	-0.28*	-0.19*
	missing	-0.16	0.03	0.11	0.00	-0.20	-0.01
Constant		-0.87*	-0.64*	-0.56*	-0.37*	-0.14	-0.23*

Notes:
1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 2: Logistic regression analysis of delaying (or not) the first remedial writing course, among those students who attempted at least one remedial writing course

	Model #	2-1	2-2	2-3	2-4	2-5	2-6
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	6,539	9,537	8,538	6,293	5,242	36,149
	pseudo r^2	0.06	0.09	0.11	0.13	0.13	0.10
Level of First Writing	level 1	ref	ref	ref	ref	ref	ref
	level 2	0.15*	0.04	-0.07	-0.02	0.03	0.03
	level 3	0.13	0.17*	0.18*	0.11	0.26*	0.16*
	level 4/5	-0.11	-0.16	-0.31	0.34	0.58*	0.01
Avg Course Unit Load	0.000-5.999	1.48*	2.03*	2.33*	2.79*	2.35*	2.07*
	6.000-8.999	0.68*	0.93*	1.13*	1.26*	1.23*	1.05*
	9.000-11.999	0.20*	0.51*	0.52*	0.67*	0.61*	0.53*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.09	0.08	0.31*	0.25*	0.14	0.12*
	0.250-0.499	-0.11	-0.02	0.10	0.21*	-0.07	0.03
	0.500-0.749	-0.09	0.05	-0.04	0.01	-0.14*	-0.03
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-1.03*
	4-6 sem	----------	----------	----------	----------	----------	-0.38*
	7-9 sem	----------	----------	----------	----------	----------	-0.24*
	10-12 sem	----------	----------	----------	----------	----------	-0.12*
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.12	0.24*	0.58*	0.43*	0.43*	0.33*
	>25	0.15	0.56*	0.58*	1.01*	0.89*	0.56*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	0.23*	0.26*	0.24*	0.02	0.46*	0.23*
	Hispanic	0.00	-0.08	-0.01	-0.11	-0.05	-0.06*
	Asian	0.09	0.17	0.25*	0.06	0.08	0.13*
	Other	0.16	-0.02	0.03	-0.28*	-0.26*	-0.08
	missing	0.07	-0.04	0.03	0.16	0.14	0.04
Sex	female	-0.09	-0.17*	-0.11*	-0.14*	-0.13*	-0.13*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref
	not U.S.	-0.09	0.21*	0.18*	0.35*	0.39*	0.23*
	missing	0.14	0.14	-0.27	-0.23	0.13	0.04
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.16	-0.05	-0.02	-0.05	0.10	0.01
	acad AS/AA	-0.02	-0.08	0.02	0.13	0.29*	0.04
	voc AS/AA	0.13	0.14	0.41*	-0.12	-0.10	0.13
	certificate	0.34	0.16	0.45*	0.33	0.62*	0.36*
	other job-related	0.32*	0.24*	0.12	-0.04	0.26*	0.20*

	abstract	-0.01	0.12	0.16	0.12	-0.04	0.08
	remediation	0.12	0.23	0.39*	0.54*	0.36	0.27*
	undecided	0.09	0.11	-0.04	-0.04	0.08	0.05
	not reported	0.10	-0.19	0.04	-0.07	0.44	0.02
Fee Waiver	received	0.02	0.11*	0.00	0.06	-0.05	0.04
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.16*	0.00	-0.07	-0.07	-0.05	-0.07*
	25.00% - 37.49%	-0.03	0.04	-0.01	-0.05	0.01	-0.01
	> 37.49%	-0.30*	-0.03	-0.22*	-0.09	-0.04	-0.14*
	missing	0.32*	0.22	0.16	0.05	-0.32	0.17*
Constant		-1.11*	-0.95*	-0.83*	-0.78*	-0.68*	-0.56*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 3: Logistic regression analysis of passing (or not) the first remedial math course on the first attempt

	Model #	3-1	3-2	3-3	3-4	3-5	3-6
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	8,204	12,314	11,561	8,257	6,575	46,911
	pseudo r^2	0.24	0.20	0.15	0.13	0.12	0.18
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref	ref
	beg algebra	0.19*	0.10	0.18*	0.26*	0.18*	0.16*
	pre-algebra	0.48*	0.46*	0.45*	0.75*	0.53*	0.50*
	arithmetic	0.51*	0.43*	0.35*	0.69*	0.69*	0.49*
Units in First Math	3+ units	-0.45*	-0.34*	-0.10	-0.26*	0.07	-0.24*
Term of First Math	Fall 2002	ref	ref	ref	ref	ref	ref
	Spring 2003	-0.85*	-0.38*	-0.29*	-0.21*	-0.25*	-0.39*
	Summer 2003	-0.44	-0.10	0.16	-0.22	0.31	-0.05
	Fall 2003	-1.45*	-0.63*	-0.38*	-0.34*	-0.22*	-0.52*
	Spring 2004	-1.61*	-0.74*	-0.34*	-0.26*	-0.24*	-0.52*
	> Spring 2004	-0.53*	-0.16*	0.08	0.13	0.05	-0.03
Avg Course Unit Load	0.000-5.999	-0.28*	-0.38*	-0.34*	-0.35*	-0.14	-0.31*
	6.000-8.999	-0.01	-0.15*	-0.17*	-0.10	-0.07	-0.10*
	9.000-11.999	0.00	-0.27*	-0.03	-0.02	-0.14*	-0.10*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-3.52*	-2.81*	-2.26*	-2.17*	-2.13*	-2.65*
	0.250-0.499	-2.35*	-2.26*	-2.22*	-1.85*	-1.65*	-2.07*
	0.500-0.749	-1.40*	-1.42*	-1.41*	-1.17*	-1.10*	-1.30*
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-0.44*
	4-6 sem	----------	----------	----------	----------	----------	-0.23*
	7-9 sem	----------	----------	----------	----------	----------	0.03
	10-12 sem	----------	----------	----------	----------	----------	0.01
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.29*	0.38*	0.33*	0.36*	0.21*	0.32*
	>25	0.37*	0.33*	0.20*	0.47*	0.43*	0.36*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	-0.57*	-0.57*	-0.62*	-0.45*	-0.48*	-0.55*
	Hispanic	-0.10	-0.25*	-0.13*	-0.11	-0.18*	-0.17*
	Asian	0.06	0.04	0.02	0.25*	0.21*	0.11*
	Other	-0.04	-0.13	0.06	0.02	0.40*	0.03
	missing	-0.06	-0.06	-0.24*	0.09	-0.06	-0.08
Sex	female	0.11*	0.23*	0.20*	0.18*	0.07	0.17*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref
	not U.S.	-0.14	0.10	0.19*	0.27*	0.25*	0.14*

	missing	0.18	0.16	0.01	0.71*	0.35	0.21*
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.07	0.07	0.11	0.03	-0.04	0.06
	acad AS/AA	0.08	-0.11	-0.15	-0.13	0.12	-0.06
	voc AS/AA	0.30	-0.21	0.29	-0.38*	-0.12	-0.05
	certificate	0.28	-0.34*	-0.41*	-0.41*	-0.37	-0.26*
	other job-related	0.02	-0.15	-0.09	-0.26*	-0.11	-0.12*
	abstract	-0.03	-0.06	0.07	0.24	-0.12	0.01
	remediation	0.08	-0.30*	-0.32*	-0.02	-0.14	-0.14*
	undecided	0.01	0.01	0.11	0.05	-0.05	0.03
	not reported	0.11	0.04	0.30	0.08	0.45	0.15*
Fee Waiver	received	-0.16*	-0.05	-0.11*	-0.14*	-0.08	-0.11*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.07	0.01	0.02	0.06	0.10	0.04
	25.00% - 37.49%	0.00	0.02	0.01	0.04	0.08	0.03
	> 37.49%	0.04	0.04	0.00	-0.01	0.01	0.02
	missing	0.23	0.05	0.11	-0.10	-0.21	0.05
Constant		1.49*	1.46*	1.22*	1.01*	0.75*	1.35*

Notes:

1. “ref” is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 4: Logistic regression analysis of passing (or not) the first remedial writing course on the first attempt

	Model #	4-1	4-2	4-3	4-4	4-5	4-6
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	6,539	9,537	8,538	6,293	5,242	36,149
	pseudo r^2	0.27	0.21	0.18	0.16	0.12	0.21
Level of First Writing	level 1	ref	ref	ref	ref	ref	ref
	level 2	0.01	-0.01	0.12	0.14	0.14	0.06*
	level 3	0.08	0.16*	0.16	0.23*	0.20	0.15*
	level 4/5	0.18	0.31*	0.11	0.25	0.25	0.22*
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref	ref
	Spring 2003	-1.04*	-0.50*	-0.36*	-0.14	-0.34*	-0.49*
	Summer 2003	0.26	-0.06	0.17	0.19	-0.04	0.02
	Fall 2003	-1.64*	-0.78*	-0.37*	-0.01	-0.07	-0.54*
	Spring 2004	-1.44*	-0.66*	-0.21	-0.27	0.26	-0.42*
	> Spring 2004	-0.93*	-0.06	0.02	0.16	0.07	-0.10*
Avg Course Unit Load	0.000-5.999	-0.44*	-0.45*	-0.50*	-0.46*	-0.20	-0.41*
	6.000-8.999	-0.36*	-0.33*	-0.33*	-0.26*	-0.14	-0.27*
	9.000-11.999	-0.16*	-0.13*	-0.15*	-0.13	-0.04	-0.10*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-3.84*	-3.09*	-2.71*	-2.64*	-2.46*	-3.00*
	0.250-0.499	-2.36*	-2.31*	-2.19*	-2.37*	-2.02*	-2.21*
	0.500-0.749	-1.26*	-1.24*	-1.32*	-1.32*	-1.13*	-1.23*
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-0.63*
	4-6 sem	----------	----------	----------	----------	----------	-0.31*
	7-9 sem	----------	----------	----------	----------	----------	-0.04
	10-12 sem	----------	----------	----------	----------	----------	0.00
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.10	0.01	0.08	-0.03	-0.13	0.03
	>25	0.27*	0.15	0.13	0.00	-0.24	0.11*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	-0.49*	-0.48*	-0.43*	-0.20	-0.14	-0.38*
	Hispanic	0.03	-0.14*	-0.09	0.05	-0.18	-0.08*
	Asian	0.06	-0.16	-0.20*	-0.42*	-0.51*	-0.27*
	Other	-0.05	-0.01	-0.23*	-0.20	0.08	-0.09
	missing	0.04	0.13	0.02	-0.05	0.18	0.07
Sex	female	0.26*	0.30*	0.37*	0.40*	0.20*	0.31*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref
	not U.S.	-0.18	-0.17*	-0.16	-0.13	-0.34*	-0.19*
	missing	0.13	0.13	-0.10	0.20	0.24	0.07

Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.02	0.05	-0.04	-0.14	-0.03	-0.02
	acad AS/AA	-0.20	-0.07	0.03	-0.15	0.24	-0.05
	voc AS/AA	-0.25	0.00	-0.57*	-0.19	-0.45*	-0.27*
	certificate	-0.17	-0.19	-0.35	-0.20	0.05	-0.20
	other job-related	-0.19	-0.23*	-0.15	-0.23	-0.03	-0.20*
	abstract	-0.30*	0.02	-0.09	-0.32*	0.06	-0.12*
	remediation	-0.29	-0.62*	-0.42*	-0.82*	-0.22	-0.49*
	undecided	0.15	-0.12	-0.08	-0.08	0.00	-0.05
	not reported	0.34*	0.31*	-0.10	0.22	-0.78*	0.12
Fee Waiver	received	-0.16*	0.01	-0.13*	-0.12	-0.03	-0.08*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.13	0.13*	0.05	0.04	0.14	0.10*
	25.00% - 37.49%	0.18	0.13	0.04	0.06	0.13	0.10*
	> 37.49%	0.32*	0.40*	0.24*	0.18	0.14	0.27*
	missing	0.14	0.49*	0.05	-0.04	-0.03	0.16*
Constant		1.84*	1.83*	2.04*	1.98*	1.88*	2.09*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 5: Logistic regression analysis of attempting (or not) a second (more advanced) math course

	Model #	5-1	5-2	5-3	5-4	5-5	5-6
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	8,204	12,314	11,561	8,257	6,575	46,911
	pseudo r^2	0.34	0.30	0.26	0.19	0.16	0.38
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref	ref
	beg algebra	0.34*	0.08	-0.20*	-0.04	0.30*	0.01
	pre-algebra	0.95*	0.61*	0.33*	0.56*	1.10*	0.57*
	arithmetic	0.80*	0.62*	0.23*	0.49*	1.02*	0.52*
Units in First Math	3+ units	0.97*	0.83*	0.80*	0.56*	0.36*	0.73*
Term of First Math	Fall 2002	ref	ref	ref	ref	ref	ref
	Spring 2003	-1.79*	-0.54*	-0.31*	-0.39*	-0.04	-0.58*
	Summer 2003	-3.07*	-0.46*	-0.47*	-0.37	0.37	-0.51*
	Fall 2003	-1.71*	-0.85*	-0.63*	-0.40*	-0.45*	-0.74*
	Spring 2004	-2.06*	-1.44*	-0.80*	-0.65*	-0.56*	-1.04*
	> Spring 2004	-1.86*	-1.31*	-1.27*	-1.27*	-1.12*	-1.40*
Grade in First Math	passed	2.82*	2.35*	2.06*	1.74*	1.60*	2.15*
Avg Course Unit Load	0.000-5.999	-0.95*	-0.68*	-0.62*	-0.39*	-0.59*	-0.65*
	6.000-8.999	-0.67*	-0.71*	-0.59*	-0.40*	-0.28*	-0.56*
	9.000-11.999	-0.37*	-0.47*	-0.51*	-0.34*	-0.34*	-0.43*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.21	-0.48*	-0.50*	-0.68*	0.06	-0.50*
	0.250-0.499	-0.24*	-0.66*	-0.85*	-0.63*	-0.15	-0.61*
	0.500-0.749	-0.11	-0.48*	-0.40*	-0.38*	0.01	-0.34*
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-3.98*
	4-6 sem	----------	----------	----------	----------	----------	-2.63*
	7-9 sem	----------	----------	----------	----------	----------	-1.49*
	10-12 sem	----------	----------	----------	----------	----------	-0.75*
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.06	-0.08	-0.17*	-0.19	-0.25	-0.10*
	>25	-0.18	-0.53*	-0.60*	-0.92*	-0.75*	-0.60*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	-0.11	-0.16	-0.44*	-0.18	-0.20	-0.25*
	Hispanic	0.00	-0.17*	-0.15*	0.09	0.21*	-0.06
	Asian	-0.01	0.04	-0.18	0.16	0.53*	0.04
	Other	-0.01	-0.11	-0.34*	-0.17	0.34	-0.13*
	missing	0.21	0.11	-0.10	0.26	0.24	0.09
Sex	female	0.21*	0.11*	0.16*	0.11	0.14	0.12*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref

	not U.S.	0.32*	0.00	-0.13	-0.02	-0.02	-0.02
	missing	0.29	0.12	0.08	-0.09	0.42	0.19
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.14	0.26*	0.02	-0.14	-0.21	0.06
	acad AS/AA	-0.15	-0.35*	-0.53*	-0.80*	-0.57*	-0.46*
	voc AS/AA	-0.52*	-0.47*	-1.10*	-0.83*	-0.96*	-0.77*
	certificate	-0.80*	-0.28	-1.09*	-0.08	-0.50	-0.55*
	other job-related	-0.42*	-0.38*	-0.54*	-0.44*	-0.40*	-0.43*
	abstract	-0.40*	-0.21*	-0.27*	-0.42*	-0.43*	-0.30*
	remediation	-0.80*	-0.60*	-0.52*	-0.61*	-0.48*	-0.60*
	undecided	-0.23*	-0.09	-0.19*	-0.16	-0.22*	-0.15*
	not reported	0.08	0.12	-0.08	-0.61*	0.01	-0.07
Fee Waiver	received	-0.05	-0.13*	-0.07	-0.04	-0.05	-0.07*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.18	0.01	-0.03	0.24*	0.23*	0.09*
	25.00% - 37.49%	0.12	0.12	0.02	0.30*	0.34*	0.15*
	> 37.49%	0.27*	0.14	0.25*	0.42*	0.33*	0.26*
	missing	0.22	0.02	0.09	0.60*	0.29	0.18*
Constant		-3.68*	-1.32*	0.25	0.72*	0.81*	1.43*

Notes:
1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 6: Logistic regression analysis of attempting (or not) a second (more advanced) writing course

	Model #	**6-1**	**6-2**	**6-3**	**6-4**	**6-5**	**6-6**
	Duration of Attendance (semesters)	2-3	4-6	7-9	10-12	13+	2+
	N	6,539	9,537	8,538	6,293	6,575	36,149
	pseudo r^2	0.29	0.26	0.26	0.21	0.19	0.40
Level of First Writing	level 1	ref	ref	ref	ref	ref	ref
	level 2	0.55*	0.46*	0.48*	0.49*	0.81*	0.49*
	level 3	0.53*	0.39*	0.26*	0.61*	0.47*	0.41*
	level 4/5	0.24	0.53*	0.40	0.23	0.12	0.36*
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref	ref
	Spring 2003	-1.36*	-0.55*	-0.34*	-0.31*	-0.04	-0.60*
	Summer 2003	-2.51*	-0.90*	-0.91*	-0.44	-0.77*	-0.94*
	Fall 2003	-1.89*	-0.92*	-0.62*	-0.43*	-0.25	-0.80*
	Spring 2004	-2.24*	-1.52*	-1.19*	-0.78*	-0.53*	-1.25*
	> Spring 2004	-1.47*	-1.25*	-1.47*	-1.45*	-1.46*	-1.51*
Grade in First Writing	passed	2.31*	2.14*	1.98*	1.89*	1.63*	2.06*
Avg Course Unit Load	0.000-5.999	-1.04*	-0.69*	-0.44*	-0.45*	-0.34	-0.64*
	6.000-8.999	-0.85*	-0.69*	-0.48*	-0.61*	0.05	-0.61*
	9.000-11.999	-0.38*	-0.30*	-0.25*	-0.26*	-0.25	-0.30*
	> 11.999	ref	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.36*	-0.33*	-0.71*	-0.32*	-0.19	-0.41*
	0.250-0.499	-0.14	-0.56*	-0.80*	-0.60*	-0.29	-0.50*
	0.500-0.749	0.14	-0.30*	-0.34*	-0.14	-0.09	-0.17*
	> 0.749	ref	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------	-4.20*
	4-6 sem	----------	----------	----------	----------	----------	-2.78*
	7-9 sem	----------	----------	----------	----------	----------	-1.61*
	10-12 sem	----------	----------	----------	----------	----------	-0.68*
	> 12 sem	----------	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref	ref
	20-25	0.09	-0.25*	-0.26*	-0.23	-0.53*	-0.18*
	>25	-0.30*	-0.65*	-0.91*	-1.05*	-0.98*	-0.74*
Race/Ethnicity	White	ref	ref	ref	ref	ref	ref
	Black	-0.09	-0.09	-0.13	0.16	0.33	-0.04
	Hispanic	0.02	-0.06	-0.02	0.24*	0.39*	0.03
	Asian	-0.27	-0.09	0.17	0.43*	0.33	0.06
	Other	0.18	0.02	0.14	0.46*	0.79*	0.18*
	missing	0.16	0.06	0.32	0.32	0.34	0.18*
Sex	female	0.06	0.22*	0.29*	0.28*	0.41*	0.21*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref	ref
	not U.S.	0.10	0.03	-0.05	0.05	-0.16	0.00

	missing	0.41*	0.20	-0.08	0.16	0.23	0.22
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref	ref
	transfer only	0.22	-0.02	0.09	0.22	-0.01	0.09
	acad AS/AA	-0.08	-0.49*	-0.38*	-0.52*	-0.71*	-0.40*
	voc AS/AA	-0.39	-0.29	-1.09*	-0.51	-0.23	-0.55*
	certificate	-0.20	-0.71*	-0.67*	-0.09	-0.16	-0.47*
	other job-related	-0.33*	-0.32*	-0.53*	-0.21	-0.36	-0.36*
	abstract	-0.30	-0.08	-0.38*	-0.03	-0.26	-0.18*
	remediation	-0.36	-0.24	-0.47*	-0.40	-0.53	-0.40*
	undecided	-0.15	-0.17*	-0.30*	-0.30*	-0.28	-0.23*
	not reported	-0.24	0.00	0.24	-0.11	-0.57	-0.06
Fee Waiver	received	-0.09	-0.14*	-0.13	-0.24*	-0.13	-0.14*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.01	0.00	0.15	0.20	0.05	0.05
	25.00% - 37.49%	0.01	0.08	0.07	0.35*	0.16	0.10*
	> 37.49%	-0.07	0.13	0.22*	0.10	0.45*	0.12*
	missing	0.17	0.15	0.24	0.72*	-0.18	0.20*
Constant		-1.85*	-0.25*	0.93*	1.39*	1.80*	2.46*

Notes:
1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 7: Logistic regression analysis of delaying (or not) a second (more advanced) math course, among those students who attempted such a course

	Model #	7-1	7-2	7-3	7-4	7-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	5,518	8,163	6,574	5,720	25,975
	pseudo r^2	0.29	0.28	0.30	0.33	0.30
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref
	beg algebra	-0.43*	-0.47*	-0.40*	-0.44*	-0.43*
	pre-algebra	-0.56*	-0.70*	-0.81*	-1.07*	-0.79*
	arithmetic	-0.68*	-0.91*	-0.84*	-0.89*	-0.84*
Units in First Math	3+ units	-0.95*	-1.02*	-0.90*	-1.42*	-1.07*
Term of First Math	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	2.97*	2.62*	2.53*	2.68*	2.69*
	Summer 2003	0.01	0.05	0.12	0.06	0.07
	Fall 2003	-0.71*	-0.29*	-0.22	-0.01	-0.27*
	Spring 2004	2.75*	2.08*	2.15*	2.12*	2.18*
	> Spring 2004	0.27	0.17	0.32*	0.24*	0.26*
Grade in First Math	passed	-2.35*	-2.70*	-2.85*	-2.95*	-2.69*
Avg Course Unit Load	0.000-5.999	0.94*	0.87*	0.58*	0.59*	0.75*
	6.000-8.999	0.95*	0.99*	0.69*	0.67*	0.83*
	9.000-11.999	0.66*	0.53*	0.51*	0.59*	0.55*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.09	0.03	0.38*	0.34	0.11
	0.250-0.499	-0.31*	-0.15	0.04	-0.09	-0.13*
	0.500-0.749	-0.15	-0.10	0.08	0.11	0.00
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-0.49*
	7-9 sem	----------	----------	----------	----------	-0.22*
	10-12 sem	----------	----------	----------	----------	-0.10*
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	-0.21*	-0.29*	0.20	-0.04	-0.10
	>25	-0.41*	-0.18	0.11	0.30*	-0.06
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.12	0.01	-0.26	0.04	-0.09
	Hispanic	-0.23*	-0.19*	-0.22*	0.10	-0.15*
	Asian	0.20	-0.28*	-0.48*	-0.35*	-0.28*
	Other	-0.19	-0.20	-0.26	0.21	-0.13
	missing	0.06	-0.18	-0.18	0.30	-0.03
Sex	female	0.08	0.15*	0.25*	0.04	0.14*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref

	not U.S.	0.13	-0.06	-0.10	-0.16	-0.07
	missing	-0.12	-0.24	0.55	0.04	-0.02
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.00	-0.02	-0.07	0.04	-0.02
	acad AS/AA	0.03	0.39*	-0.10	0.08	0.11
	voc AS/AA	-0.08	-0.30	-0.07	0.59*	0.01
	certificate	-0.08	0.06	-0.35	0.14	-0.03
	other job-related	0.15	0.36*	0.04	0.21	0.19*
	abstract	0.15	0.00	-0.17	0.12	0.01
	remediation	-0.07	-0.22	0.23	0.17	0.02
	undecided	0.03	-0.04	0.14	0.16	0.06
	not reported	-0.04	-0.07	-0.07	0.88*	0.07
Fee Waiver	received	0.01	0.00	-0.09	0.01	-0.02
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.15	0.00	-0.01	-0.11	-0.07
	25.00% - 37.49%	-0.16	-0.02	-0.02	0.01	-0.06
	> 37.49%	-0.25*	-0.13	-0.12	-0.16	-0.16*
	missing	0.29	-0.14	-0.44*	-0.30	-0.11
Constant		2.47*	3.14*	3.20*	3.80*	3.35*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 8: Logistic regression analysis of delaying (or not) a second (more advanced) writing course, among those students who attempted such a course

	Model #	8-1	8-2	8-3	8-4	8-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	5,114	6,693	5,536	4,840	22,183
	pseudo r^2	0.27	0.28	0.29	0.28	0.28
Level of First Writing	level 1	ref	ref	ref	ref	ref
	level 2	-0.30*	-0.43*	-0.59*	-0.67*	-0.49*
	level 3	-0.39*	-0.40*	-0.44*	-0.45*	-0.41*
	level 4/5	-0.32	-0.39	-0.65*	-0.42*	-0.43*
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	2.99*	2.76*	2.57*	2.44*	2.69*
	Summer 2003	-0.51	-0.24	0.21	0.70*	0.14
	Fall 2003	-0.81*	-0.21	-0.06	0.00	-0.21*
	Spring 2004	3.18*	2.63*	2.12*	2.41*	2.47*
	> Spring 2004	-0.13	-0.05	0.39*	0.37*	0.21*
Grade in First Writing	passed	-1.93*	-2.49*	-2.87*	-2.87*	-2.50*
Avg Course Unit Load	0.000-5.999	1.21*	1.08*	0.47*	0.65*	0.82*
	6.000-8.999	0.79*	0.81*	0.69*	0.68*	0.74*
	9.000-11.999	0.48*	0.49*	0.41*	0.45*	0.46*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	0.26	0.60*	0.47*	0.17	0.33*
	0.250-0.499	-0.02	0.35*	0.20	0.18	0.18*
	0.500-0.749	0.04	0.06	0.13	0.18*	0.11*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-0.46*
	7-9 sem	----------	----------	----------	----------	-0.25*
	10-12 sem	----------	----------	----------	----------	-0.07
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	-0.21	0.00	0.35*	0.04	0.05
	>25	-0.06	-0.10	0.25	0.07	0.05
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.21	0.08	-0.02	0.11	-0.02
	Hispanic	0.02	-0.01	-0.22*	0.07	-0.04
	Asian	0.19	-0.24*	-0.15	0.12	-0.04
	Other	0.08	0.02	-0.10	-0.06	-0.02
	missing	-0.09	-0.02	-0.42*	0.41	-0.07
Sex	female	0.06	-0.14*	-0.14*	-0.08	-0.08*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.17	-0.10	-0.01	0.07	-0.04

	missing	0.05	-0.26	0.29	-0.02	-0.04
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	-0.13	-0.24*	-0.22	-0.06	-0.18*
	acad AS/AA	-0.10	-0.22	0.24	-0.04	-0.05
	voc AS/AA	0.06	-0.36	0.23	0.75*	0.17
	certificate	-0.10	0.44	0.15	-0.04	0.11
	other job-related	0.13	-0.09	0.20	0.24	0.10
	abstract	-0.15	-0.12	0.06	-0.01	-0.08
	remediation	0.34	-0.51*	-0.06	-0.09	-0.09
	undecided	0.14	-0.01	0.18*	0.22*	0.12*
	not reported	0.22	0.10	0.46	0.43	0.27*
Fee Waiver	received	-0.03	0.07	-0.13	-0.08	-0.04
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.15	-0.03	-0.09	-0.04	-0.07
	25.00% - 37.49%	-0.17	-0.16	-0.02	-0.17	-0.12*
	> 37.49%	-0.08	-0.05	-0.09	-0.01	-0.06
	missing	-0.09	-0.19	-0.25	-0.01	-0.12
Constant		0.82*	1.61*	2.25*	2.05*	1.84*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 9: Logistic regression analysis of completing successfully (or not) a math course in intermediate algebra, geometry, or a higher-level math course, among those students who attempted a second math course, excluding students whose first math course was intermediate algebra or geometry

	Model #	9-1	9-2	9-3	9-4	9-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	4,122	5,629	4,875	4,508	19,134
	pseudo r^2	0.35	0.29	0.19	0.14	0.27
Level of First Math	interm alg/geom	----------	----------	----------	----------	----------
	beg algebra	ref	ref	ref	ref	ref
	pre-algebra	-2.20*	-1.94*	-1.44*	-1.38*	-1.72*
	arithmetic	-3.10*	-2.60*	-2.23*	-1.97*	-2.41*
Units in First Math	3+ units	-0.63*	-0.05	-0.17	-0.13	-0.20*
Term of First Math	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	-0.15	-0.18	0.00	0.04	-0.06
	Summer 2003	-0.99*	-0.69*	0.13	0.00	-0.30*
	Fall 2003	-0.42*	-0.24	-0.36*	0.06	-0.21*
	Spring 2004	-1.16*	-0.33	-0.25	-0.20	-0.33*
	> Spring 2004	0.01	-0.53*	-0.56*	-0.39*	-0.47*
Grade in First Math	passed	0.25	0.34*	0.35*	0.29*	0.31*
Delay of Second Math	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.32	-0.19	-0.21	-0.12	-0.20*
	2 sem delay	-0.78*	-0.71*	-0.40*	-0.21	-0.50*
	3 sem delay	-1.08*	-0.74*	-0.78*	-0.46*	-0.72*
	> 3 sem delay	-0.54*	-0.90*	-0.89*	-0.73*	-0.82*
Avg Course Unit Load	0.000-5.999	-0.66*	-0.44*	-0.32*	0.08	-0.31*
	6.000-8.999	-0.28*	-0.42*	-0.10	0.07	-0.18*
	9.000-11.999	-0.31*	-0.15	-0.07	-0.01	-0.16*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-1.37*	-1.19*	-0.53*	-0.35*	-0.86*
	0.250-0.499	-2.00*	-1.26*	-0.83*	-0.54*	-1.10*
	0.500-0.749	-1.61*	-1.17*	-0.52*	-0.45*	-0.89*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-2.31*
	7-9 sem	----------	----------	----------	----------	-1.10*
	10-12 sem	----------	----------	----------	----------	-0.39*
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.23	0.02	-0.14	-0.09	-0.01
	>25	0.21	-0.27*	-0.38*	-0.42*	-0.30*
Race/Ethnicity	White	ref	ref	ref	ref	ref

	Black	-0.32	-0.36*	-0.24	-0.31*	-0.32*
	Hispanic	-0.40*	-0.13	0.02	0.12	-0.09*
	Asian	0.31	0.10	0.43*	0.12	0.19*
	Other	-0.36	-0.09	0.02	0.23	-0.05
	missing	-0.08	0.06	0.21	0.63*	0.19
Sex	female	0.07	0.16*	0.11	-0.09	0.06
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.24	0.19	0.19	0.19	0.10
	missing	0.56	0.48	-0.12	0.15	0.31*
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.23	0.16	0.12	0.17	0.18*
	acad AS/AA	-0.45*	0.09	-0.42*	-0.25	-0.24*
	voc AS/AA	-0.16	-1.25*	-0.39	-0.37	-0.58*
	certificate	-0.64	-0.41	-0.17	-0.03	-0.26
	other job-related	-0.35	-0.36*	-0.36*	-0.10	-0.27*
	abstract	-0.14	0.09	0.20	-0.18	0.00
	remediation	-0.14	-0.35	-0.43	0.00	-0.25*
	undecided	-0.08	-0.10	0.09	0.08	0.00
	not reported	0.29	0.33	0.41	-0.24	0.20
Fee Waiver	received	-0.14	-0.30*	-0.24*	-0.13	-0.22*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.00	-0.14	-0.12	0.02	-0.07
	25.00% - 37.49%	0.01	-0.08	-0.06	0.10	-0.01
	> 37.49%	0.15	0.13	0.02	0.19	0.12*
	missing	-0.04	0.14	-0.24	0.11	-0.01
Constant		2.19*	2.48*	2.54*	2.32*	3.36*

Notes:
1. “ref” is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 10: Logistic regression analysis of completing successfully (or not) a Level 1 writing course or a higher-level writing course, among those students who attempted a second writing course, excluding students whose first writing course was a Level 1 writing course

	Model #	10-1	10-2	10-3	10-4	10-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	2,490	2,867	2,506	2,463	10,345
	pseudo r^2	0.21	0.21	0.17	0.14	0.26
Level of First Writing	level 1	----------	----------	----------	----------	----------
	level 2	ref	ref	ref	ref	ref
	level 3	-1.42*	-1.23*	-1.16*	-0.98*	-1.21*
	level 4/5	-2.12*	-1.90*	-1.32*	-1.54*	-1.66*
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	-0.51*	-0.18	-0.36*	0.19	-0.30*
	Summer 2003	-1.37*	-0.97*	-0.37	-0.09	-0.69*
	Fall 2003	-0.36	-0.66*	-0.77*	-0.58*	-0.56*
	Spring 2004	-0.41	-1.14*	-1.35*	-0.60	-0.96*
	> Spring 2004	-0.37	-0.79*	-1.12*	-1.26*	-0.93*
Grade in First Writing	passed	0.25	0.24	0.35*	0.53*	0.32*
Delay of Second Writing	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.31	-0.17	0.06	-0.07	-0.13
	2 sem delay	-0.33*	-0.78*	-0.61*	-0.24	-0.52*
	3 sem delay	-0.83*	-0.95*	-0.65*	-0.28	-0.73*
	> 3 sem delay	-0.35*	-0.98*	-0.91*	-0.72*	-0.76*
Avg Course Unit Load	0.000-5.999	-0.33	0.09	-0.15	0.01	-0.05
	6.000-8.999	-0.45*	-0.18	0.04	-0.14	-0.20*
	9.000-11.999	-0.27*	-0.02	0.01	0.00	-0.11
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-1.55*	-1.14*	-0.31	-0.44	-0.97*
	0.250-0.499	-1.78*	-1.47*	-1.14*	-0.50*	-1.34*
	0.500-0.749	-1.11*	-0.94*	-0.65*	-0.47*	-0.87*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-2.94*
	7-9 sem	----------	----------	----------	----------	-1.86*
	10-12 sem	----------	----------	----------	----------	-0.77*
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.09	0.03	0.34	-0.09	0.08
	>25	0.20	-0.36	0.09	-0.31	-0.12
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	0.02	-0.75*	-0.73*	-0.62*	-0.46*
	Hispanic	-0.19	-0.57*	-0.50*	-0.08	-0.36*

	Asian	-0.06	-0.26	-0.14	-0.08	-0.14
	Other	-0.51*	-0.45*	-0.40	-0.38	-0.43*
	missing	0.23	-0.32	0.58	-0.14	0.01
Sex	female	0.25*	0.07	0.29*	0.18	0.17*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.08	0.36*	0.06	-0.05	0.06
	missing	0.07	-0.31	-0.53	----------	-0.02
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.38*	0.17	0.05	-0.31	0.16
	acad AS/AA	0.09	-0.30	-0.23	-0.45	-0.16
	voc AS/AA	0.33	0.00	-0.46	-0.69	-0.06
	certificate	-0.20	-0.91*	-0.23	-1.06*	-0.68*
	other job-related	-0.09	-0.08	-0.05	-0.19	-0.06
	abstract	0.23	-0.25	-0.38	-0.33	-0.11
	remediation	-0.69*	-0.70*	-0.48	-0.39	-0.64*
	undecided	0.19	-0.07	0.07	0.04	0.04
	not reported	-0.13	0.02	-0.50	-0.93	-0.27
Fee Waiver	received	-0.24*	-0.12	-0.33*	-0.31	-0.25*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.32*	0.16	0.18	0.25	0.22*
	25.00% - 37.49%	0.41*	0.10	0.40	0.17	0.25*
	> 37.49%	0.82*	0.29	-0.03	0.47	0.40*
	missing	0.31	0.03	0.49	-0.39	0.16
Constant		1.24*	2.73*	3.33*	3.53*	4.21*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 11: Logistic regression analysis of completing successfully (or not) a college-level math course, among those students who attempted a second math course

	Model #	11-1	11-2	11-3	11-4	11-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	5,518	8,163	6,574	5,720	25,975
	pseudo r^2	0.48	0.32	0.20	0.17	0.29
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref
	beg algebra	-2.23*	-1.50*	-1.43*	-1.34*	-1.60*
	pre-algebra	-3.62*	-2.81*	-2.20*	-2.35*	-2.69*
	arithmetic	-4.51*	-3.36*	-2.87*	-2.72*	-3.21*
Units in First Math	3+ units	-0.36	-0.06	-0.11	-0.19	-0.16*
Term of First Math	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	0.07	0.00	-0.01	0.03	0.03
	Summer 2003	-0.32	-0.28	-0.08	-0.20	-0.18
	Fall 2003	-0.55*	-0.20	-0.18	-0.25*	-0.23*
	Spring 2004	-0.63	-0.37*	-0.18	-0.02	-0.19*
	> Spring 2004	-0.28	-0.46*	-0.54*	-0.47*	-0.48*
Grade in First Math	passed	0.29*	0.04	0.01	0.13	0.10*
Delay of Second Math	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.25	-0.16	-0.14	-0.13	-0.16*
	2 sem delay	-0.68*	-0.60*	-0.48*	-0.23*	-0.46*
	3 sem delay	-0.73*	-0.76*	-0.67*	-0.32*	-0.59*
	> 3 sem delay	-0.27	-0.84*	-0.95*	-0.79*	-0.83*
Avg Course Unit Load	0.000-5.999	-0.81*	-0.78*	-0.26*	0.02	-0.44*
	6.000-8.999	-0.99*	-0.64*	-0.08	-0.05	-0.37*
	9.000-11.999	-0.91*	-0.33*	-0.14	0.02	-0.29*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-1.90*	-1.44*	-0.82*	-0.21	-1.01*
	0.250-0.499	-2.42*	-1.67*	-1.01*	-0.48*	-1.25*
	0.500-0.749	-2.00*	-1.23*	-0.61*	-0.37*	-0.95*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-2.01*
	7-9 sem	----------	----------	----------	----------	-0.81*
	10-12 sem	----------	----------	----------	----------	-0.20*
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.21	-0.03	-0.09	-0.23*	-0.09
	>25	0.15	-0.32*	-0.57*	-0.47*	-0.42*
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.61*	-0.49*	-0.25	-0.39*	-0.41*
	Hispanic	-0.68*	-0.07	-0.06	-0.08	-0.17*

	Asian	-0.34	0.07	0.09	0.05	-0.01
	Other	-0.58*	-0.26*	-0.12	-0.21	-0.29*
	missing	-0.07	0.00	0.13	0.15	0.05
Sex	female	0.23*	0.16*	0.02	-0.10	0.06*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.17	0.00	0.09	0.24*	0.07
	missing	-0.30	0.38	0.07	0.51	0.22
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.07	0.18	-0.05	0.07	0.09
	acad AS/AA	-0.31	-0.20	-0.41*	-0.49*	-0.36*
	voc AS/AA	-0.64	-1.62*	-0.69*	-0.23	-0.77*
	certificate	-0.51	-0.63*	-0.33	-0.25	-0.40*
	other job-related	-0.50*	-0.42*	-0.31*	-0.02	-0.28*
	abstract	-0.25	-0.09	0.05	-0.30	-0.14
	remediation	-0.02	-0.23	-0.34	-0.07	-0.25*
	undecided	-0.15	-0.01	-0.05	-0.08	-0.07
	not reported	0.48	0.10	0.17	0.01	0.14
Fee Waiver	received	-0.13	-0.32*	-0.15*	-0.01	-0.17*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.18	0.00	0.06	-0.07	0.01
	25.00% - 37.49%	0.14	0.21*	0.14	0.07	0.14*
	> 37.49%	0.37*	0.36*	0.32*	0.19	0.32*
	missing	0.00	0.42*	0.08	0.31	0.19
Constant		2.55*	2.84*	2.90*	2.72*	3.57*

Notes:

1. “ref” is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 12: Logistic regression analysis of completing successfully (or not) a college-level writing course, among those students who attempted a second writing course

	Model #	12-1	12-2	12-3	12-4	12-5
	Duration of Attendance (semesters)	4-6	7-9	10-12	13+	4+
	N	5,114	6,693	5,536	4,840	22,183
	pseudo r^2	0.31	0.28	0.17	0.13	0.28
Level of First Writing	level 1	ref	ref	ref	ref	ref
	level 2	-1.56*	-1.69*	-1.18*	-1.11*	-1.43*
	level 3	-2.58*	-2.70*	-1.95*	-1.73*	-2.24*
	level 4/5	-3.54*	-3.23*	-2.43*	-2.00*	-2.62*
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	-0.36*	-0.23*	-0.15	0.17	-0.15*
	Summer 2003	-1.36*	-0.80*	-0.17	-0.29	-0.57*
	Fall 2003	-0.49*	-0.49*	-0.54*	-0.17	-0.41*
	Spring 2004	-0.49	-0.76*	-0.54*	-0.16	-0.51*
	> Spring 2004	0.09	-0.83*	-0.66*	-0.71*	-0.66*
Grade in First Writing	passed	0.12	0.23*	0.30*	0.27*	0.23*
Delay of Second Writing	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.18	-0.02	-0.14	-0.31*	-0.14*
	2 sem delay	-0.49*	-0.59*	-0.54*	-0.42*	-0.52*
	3 sem delay	-0.66*	-1.02*	-0.48*	-0.55*	-0.67*
	> 3 sem delay	-0.48*	-0.91*	-0.99*	-0.93*	-0.86*
Avg Course Unit Load	0.000-5.999	-0.62*	-0.27	-0.20	-0.03	-0.29*
	6.000-8.999	-0.57*	-0.33*	-0.04	0.16	-0.22*
	9.000-11.999	-0.53*	-0.33*	-0.08	0.06	-0.27*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-1.89*	-1.11*	-0.67*	-0.12	-1.01*
	0.250-0.499	-2.03*	-1.57*	-0.82*	-0.52*	-1.30*
	0.500-0.749	-1.51*	-1.11*	-0.59*	-0.31*	-0.97*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	-2.69*
	7-9 sem	----------	----------	----------	----------	-1.52*
	10-12 sem	----------	----------	----------	----------	-0.71*
	> 12 sem	----------	----------	----------	----------	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.08	-0.13	-0.02	-0.07	-0.06
	>25	-0.27	-0.33*	-0.34*	-0.33*	-0.37*
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.31*	-0.35*	-0.09	-0.42*	-0.27*
	Hispanic	-0.40*	-0.25*	-0.15	-0.11	-0.25*
	Asian	0.14	0.07	0.32*	0.10	0.13

	Other	-0.33*	-0.21	0.13	0.02	-0.13
	missing	0.28	-0.13	0.73*	-0.13	0.16
Sex	female	0.22*	0.16*	0.09	0.15	0.14*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.06	0.42*	0.05	0.14	0.14*
	missing	-0.33	-0.40	0.03	-0.35	-0.27
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.10	0.05	-0.08	-0.08	0.03
	acad AS/AA	-0.34*	-0.27	-0.45*	-0.40*	-0.36*
	voc AS/AA	-0.09	-0.69*	-0.48	-0.79*	-0.54*
	certificate	-0.51	-0.52	-0.80*	-0.34	-0.56*
	other job-related	-0.29	-0.36*	-0.28*	-0.44*	-0.33*
	abstract	0.15	-0.06	-0.20	-0.44*	-0.10
	remediation	-0.44	-0.44	-0.52*	-0.70*	-0.57*
	undecided	-0.03	-0.04	-0.11	-0.24*	-0.09
	not reported	-0.30	0.42	-0.60*	0.04	-0.11
Fee Waiver	received	-0.28*	-0.18*	-0.18*	-0.21*	-0.24*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	0.18	0.21*	0.06	-0.01	0.12*
	25.00% - 37.49%	0.41*	0.29*	0.22	0.07	0.26*
	> 37.49%	0.67*	0.56*	0.44*	0.18	0.49*
	missing	0.27	0.52*	0.27	0.32	0.34*
Constant		1.80*	2.71*	2.78*	3.13*	4.00*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 13: Multinomial logistic regression analysis of various long-term credential and transfer outcomes on remedial math course-taking, math attainment, and selected other variables, for those remedial math students who attempted a second math course and remained in the system for at least 10 semesters (*N* = 12,294; excluded outcome = no credential and no transfer)

		Certificate	Voc Assoc Degree	Acad Assoc Degree	Transfer without Credential	Transfer with Credential
Highest Math Course	college math	-0.58*	0.21	1.79*	2.49*	4.24*
	interm alg/geom	-0.26	0.26*	0.76*	0.53*	1.37*
	all other outcomes	ref	ref	ref	ref	ref
Level of First Math	interm alg/geom	ref	ref	ref	ref	ref
	beg algebra	0.13	0.10	0.20*	0.18*	0.27*
	pre-algebra	0.13	-0.24	0.15	0.06	0.47*
	arithmetic	0.31	-0.17	0.16	-0.25*	0.46*
Units in First Math	3+ units	0.18	0.41*	0.11	-0.17	0.10
Term of First Math	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	0.01	-0.16	-0.04	0.26*	0.04
	Summer 2003	0.38	-1.25*	-0.01	0.58*	0.31
	Fall 2003	0.14	-0.29	0.07	0.38*	0.19
	Spring 2004	-0.40	-0.09	-0.03	0.33*	0.21
	> Spring 2004	0.28	-0.22	-0.10	0.23*	0.25*
Grade in First Math	passed	0.02	0.47*	0.17	-0.48*	-0.28*
Delay of Second Math	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.36	-0.10	-0.04	-0.36*	-0.08
	2 sem delay	-0.12	0.11	-0.11	-0.31*	-0.08
	3 sem delay	0.11	-0.13	0.12	-0.07	-0.01
	> 3 sem delay	0.08	0.20	0.24*	-0.45*	-0.14
Avg Course Unit Load	0.000-5.999	-0.63*	-0.85*	-0.90*	-0.68*	-0.93*
	6.000-8.999	-0.33*	-0.42*	-0.51*	-0.55*	-0.57*
	9.000-11.999	0.06	-0.31*	-0.22*	-0.35*	-0.47*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.77*	-1.46*	-1.16*	-0.31*	-0.95*
	0.250-0.499	-0.95*	-1.46*	-0.80*	-0.39*	-0.72*
	0.500-0.749	-0.50*	-0.86*	-0.71*	-0.22*	-0.39*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	----------
	7-9 sem	----------	----------	----------	----------	----------
	10-12 sem	-0.43*	-0.40*	-0.40*	0.64*	0.57*
	> 12 sem	ref	ref	ref	ref	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.25	0.32*	-0.07	-0.35*	-0.15

	>25	0.57*	1.15*	0.44*	-0.74*	0.07
Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.18	-0.55*	-0.13	0.35*	0.40*
	Hispanic	0.05	-0.43*	-0.31*	-0.36*	-0.12
	Asian	0.15	-0.52*	-0.46*	0.03	-0.13
	Other	-0.10	-0.15	-0.25	-0.08	-0.14
	missing	-0.26	-0.17	0.07	-0.08	-0.07
Sex	female	-0.09	0.00	0.37*	0.07	0.39*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	0.01	0.20	-0.40*	-0.20*	-0.23*
	missing	0.61	0.26	0.66*	-0.07	0.46
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	-0.41	-0.03	-0.21	0.03	-0.18
	acad AS/AA	0.32	0.53*	0.44*	-0.18	-0.16
	voc AS/AA	0.48	1.03*	0.31	-0.20	-0.34
	certificate	1.05*	0.45	0.20	0.01	0.05
	other job-related	0.31	0.46*	0.28*	-0.39*	-0.12
	abstract	-0.19	0.14	0.01	-0.07	-0.11
	remediation	-0.22	0.30	-0.40	0.01	-0.58*
	undecided	0.08	-0.02	0.22*	-0.06	-0.05
	not reported	0.41	0.49	0.23	0.07	0.45
Fee Waiver	received	-0.05	0.07	0.06	-0.06	0.23*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.15	-0.05	0.08	0.10	0.08
	25.00% - 37.49%	-0.09	-0.23	-0.04	0.24*	0.09
	> 37.49%	-0.18	-0.55*	-0.23*	0.44*	0.10
	missing	0.03	-0.65	0.24	0.19	-0.14
Constant		-2.22*	-2.08*	-2.27*	-1.98*	-4.14*

Notes:

1. “ref” is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Table 14: Multinomial logistic regression analysis of various long-term credential and transfer outcomes on remedial writing course-taking, writing attainment, and selected other variables, for those remedial writing students who attempted a second writing course and remained in the system for at least 10 semesters (*N* = 10,376; excluded outcome = no credential and no transfer)

		Certificate	Voc Assoc Degree	Acad Assoc Degree	Transfer without Credential	Transfer with Credential
Highest Writing Course	college comp	-0.24	1.43*	2.88*	1.49*	4.20*
	level 1	0.32	1.48*	1.46*	-0.21	1.66*
	all other outcomes	ref	ref	ref	ref	ref
Level of First Writing	level 1	ref	ref	ref	ref	ref
	level 2	0.18	0.11	-0.15	-0.01	-0.03
	level 3	0.39*	-0.30	-0.22	-0.53*	-0.27*
	level 4/5	0.25	-0.39	-0.12	-0.17	-0.01
Term of First Writing	Fall 2002	ref	ref	ref	ref	ref
	Spring 2003	0.02	0.01	-0.07	0.07	0.10
	Summer 2003	0.21	0.43	-0.31	0.24	0.19
	Fall 2003	0.05	0.14	0.10	0.16	0.11
	Spring 2004	0.32	0.18	0.07	0.32*	0.36*
	> Spring 2004	0.25	0.14	-0.35*	-0.21	-0.15
Grade in First Writing	passed	0.37*	0.29*	0.07	-0.06	0.00
Delay of Second Writing	no delay	ref	ref	ref	ref	ref
	1 sem delay	-0.16	0.07	-0.13	-0.07	-0.13
	2 sem delay	0.07	0.17	-0.12	-0.13	-0.10
	3 sem delay	0.06	0.13	-0.23	-0.12	-0.08
	> 3 sem delay	0.45*	0.07	-0.16	-0.52*	-0.55*
Avg Course Unit Load	0.000-5.999	-0.47*	-1.12*	-0.87*	-0.67*	-0.99*
	6.000-8.999	-0.33*	-0.56*	-0.66*	-0.64*	-0.73*
	9.000-11.999	0.14	-0.39*	-0.23*	-0.40*	-0.58*
	> 11.999	ref	ref	ref	ref	ref
Course Success Ratio	0.000-0.249	-0.85*	-1.63*	-1.34*	-0.38*	-0.96*
	0.250-0.499	-0.88*	-1.29*	-0.78*	-0.28*	-0.70*
	0.500-0.749	-0.25*	-0.84*	-0.75*	-0.24*	-0.50*
	> 0.749	ref	ref	ref	ref	ref
Duration of Attendance	2-3 sem	----------	----------	----------	----------	----------
	4-6 sem	----------	----------	----------	----------	----------
	7-9 sem	----------	----------	----------	----------	----------
	10-12 sem	-0.49*	-0.41*	-0.44*	0.47*	0.44*
	> 12 sem	ref	ref	ref	ref	ref
Age at College Entry	< 20	ref	ref	ref	ref	ref
	20-25	0.24	0.38*	0.05	-0.30*	-0.17
	>25	0.73*	0.95*	0.50*	-0.87*	-0.19

Race/Ethnicity	White	ref	ref	ref	ref	ref
	Black	-0.02	-0.47*	-0.25	0.30*	-0.03
	Hispanic	0.01	-0.40*	-0.30*	-0.26*	-0.04
	Asian	-0.36	-0.37*	-0.09	0.82*	0.41*
	Other	-0.43	-0.30	-0.26	-0.04	-0.23
	missing	0.13	0.26	0.09	0.28	0.25
Sex	female	0.11	-0.13	0.15*	-0.18*	0.13*
Citizenship	U.S. citizen	ref	ref	ref	ref	ref
	not U.S.	-0.01	0.46*	-0.03	0.26*	0.20*
	missing	0.51	0.32	0.74*	0.00	0.60*
Academic Goal	transfer + AS/AA	ref	ref	ref	ref	ref
	transfer only	0.15	-0.06	-0.08	0.05	-0.01
	acad AS/AA	0.25	0.49*	0.31	-0.31	-0.30*
	voc AS/AA	0.37	0.63*	0.17	-0.27	-0.79*
	certificate	1.20*	-0.07	0.01	-0.41	-0.12
	other job-related	0.17	0.30	0.26	-0.40*	-0.15
	abstract	-0.07	0.16	-0.13	-0.16	-0.08
	remediation	0.24	0.19	-0.02	-0.23	-0.71*
	undecided	0.05	0.04	0.34*	-0.01	-0.08
	not reported	0.04	0.87*	0.72*	0.39	0.83*
Fee Waiver	received	-0.05	0.02	0.05	-0.15*	0.16*
% BA+ in Zip Code	< 12.50%	ref	ref	ref	ref	ref
	12.50% - 24.99%	-0.36*	-0.09	0.07	0.18*	0.03
	25.00% - 37.49%	-0.14	-0.39*	-0.03	0.27*	0.18
	> 37.49%	-0.20	-0.54*	-0.27*	0.44*	0.15
	missing	-0.24	-0.48	0.20	0.17	0.18
Constant		-2.56*	-2.83*	-3.31*	-1.96*	-4.51*

Notes:

1. "ref" is the referent or comparison category for a given set of dummy variables.
2. * indicates that the coefficient is statistically significant at the $p \leq 0.05$ level or greater (i.e., no distinction is made between $p \leq 0.05$, $p \leq 0.01$, or $p \leq 0.001$).

Appendix Eight: Charts Summarizing the Quantitative Findings

Variables correlated with movement through California's remedial mathematics and writing sequences, among students in the first-time Fall 2002 cohort

The following six charts summarize the quantitative findings from the regression analyses conducted for this study—discussed in detail by Peter Riley Bahr on pages 46–57 of the main report—as these relate to student movement through remedial sequences.

In particular, the charts provide a "bird's-eye view" of how differences in student course-taking behaviors, demographics, and other variables appeared to correlate with the likelihood of a student in the Fall 2002 cohort to:

1. Delay a first remedial course.
2. Achieve a passing grade on the first attempt in the first remedial course.
3. After the first remedial course, enroll in a second (more advanced) course.
4. Among students who attempted a second (more advanced) course, delay this second course.
5. Successfully complete a remedial mathematics course one level below college algebra, or a remedial writing course one level below college composition.
6. Successfully complete a college-level course in mathematics or writing.

The variables that generally had the **strongest** relationships with each of these outcomes, in mathematics and writing respectively, are printed in **blue type** in each chart that follows.

In addition, each summary chart specifies the *pages in the main report* where the corresponding regression analyses were discussed in detail, and the *particular regression tables in Appendix Seven* from which these summaries were distilled.

1. Who tends to *delay* their first remedial course?

Limit: **Students attended more than one semester.**

Note: **Students who persist for longer periods of time have more opportunity to enroll in a first remedial mathematics or writing course. See pages 44–46 of the main report for additional cautionary considerations.**

Mathematics (46,911 students)	Writing (36,149 students)
Net of other variables…	
Related to starting level	
• There were **no consistent differences between students who began at different levels of a mathematics sequence** with respect to the likelihood of delaying their first remedial course.	• There were **no consistent differences between students who began at different levels of a writing sequence** with respect to the likelihood of delaying their first remedial course.
Related to full-time or part-time enrollment during the first year	
• **Students who enrolled part-time** (on average) during their first year were **more likely to delay** their first remedial mathematics course than were full-time students. The fewer the units a student took per semester during their first year, the more likely they were to delay. Part-time students likely have a lower chance of enrolling in a first remedial math course in any given interval of time simply because part-time students take fewer classes.	• **Student who enrolled part-time** (on average) during their first year were **more likely to delay** their first remedial writing course than were full-time students. The fewer the units a student took per semester during their first year, the more likely they were to delay. Part-time students likely have a lower chance of enrolling in a first remedial writing course in any given interval of time simply because part-time students take fewer classes.
Related to student characteristics and incoming goals	
• **Students residing in zip codes with the highest rates of bachelors-level (or higher) attainment** were **less likely to delay** their first remedial mathematics course, compared with students residing in zip codes with the lowest rates of such attainment. • **Students who entered with an "other job-related" goal** were **more likely to delay** their first remedial mathematics course than students who aspired to transfer with an associate degree.	• **Black/African American, male, non-U.S. citizen, and students who were older than 19 years of age at college entry** were **more likely to delay** their first remedial writing course, compared with white, female, U.S. citizen, and "traditional college-age" students, respectively.

See pages 47–48 of the main report for detailed discussion. See Appendix Seven, Tables 1 and 2, for corresponding regression tables. EdSource 6/10

2. Who tends to *pass* their first remedial course on the first attempt?

Limit: **Students attended more than one semester.**

Mathematics (46,911 students)	Writing (36,149 students)
Net of other variables…	
Related to starting level	
• **Students who began at lower levels** of a mathematics sequence were **more likely to pass** their first remedial mathematics course on the first attempt, compared with students who began in Intermediate Algebra/Geometry.	
Related to delay of first remedial course	
• **Students who enrolled immediately** (in Fall 2002) in their first remedial mathematics course were **more likely to pass** on the first attempt than students who deferred their first remedial mathematics course until Spring 2003 or the 2003–04 academic year. (Students who delayed their first course until **Summer 2003** do not appear to have been disadvantaged, however.)	
Related to passing courses	
• Not surprisingly, **students who passed fewer than 75% of their first-year courses** were **less likely to pass** their first remedial mathematics course on the first attempt, compared with students who passed 75% or more of their first-year courses.	• Not surprisingly, **students who passed fewer than 75% of their first-year courses** were **less likely to pass** their first remedial writing course on the first attempt, compared with students who passed 75% or more of their first-year courses.
Related to full-time or part-time enrollment during the first year	
• **Students who enrolled in fewer than six units per semester** (on average) during their first year were **less likely to pass** their first remedial mathematics course on the first attempt, compared with students who enrolled full-time during their first year.	• **Students who enrolled full-time** (on average) during their first year were generally **more likely to pass** their first writing course on the first attempt, compared with students who enrolled in fewer than 12 units per semester during their first year. The fewer the units a student took per semester during their first year, the lower their likelihood on passing.
Related to student characteristics and incoming goals	
• **Black/African American, male, and "traditional college-age" students** were **less likely to pass** their first remedial mathematics course on the first attempt, compared with white, female, and older students, respectively.	• **Male students** were **less likely to pass** their first remedial writing course on the first attempt, compared with female students.

See pages 48–49 of the main report for detailed discussion. See Appendix Seven, Tables 3 and 4, for corresponding regression tables. EdSource 6/10

3. After the first remedial course, who tends to *enroll in a second, more advanced course*?

Limit: **Students attended more than one semester.**

Mathematics (46,911 students)	Writing (36,149 students)
Net of other variables…	
Related to starting level	
• **Students who began in Arithmetic or Pre-Algebra** were **more likely to attempt** a second, more advanced mathematics course, compared with students who began in Intermediate Algebra/Geometry.	• **Students who began two or three levels below college composition** were **more likely to attempt** a second, more advanced writing course, compared with students who began one level below.
Related to delay of first remedial course	
• **Students who delayed their first remedial mathematics course until Fall 2003 or later** were **less likely to attempt** a second, more advanced mathematics course—even if they enrolled for long periods of time—compared with students who began promptly in Fall 2002.	• **Students who delayed their first remedial writing course** were **less likely to attempt** a second, more advanced writing course, compared with students who began promptly in Fall 2002.
Related to passing courses	
• **Students who did not pass their first remedial mathematics course** were **less likely to attempt** a second, more advanced mathematics course, compared with students who passed their first course on the first attempt.	• **Students who did not pass their first remedial writing course** were **less likely to attempt** a second, more advanced writing course, compared with students who passed their first course on the first attempt. • In addition, **students who passed fewer than 25% of their first-year courses** were **less likely to attempt** a second, more advanced writing course, compared with students who passed 75% or more of their first-year courses.
Related to full-time or part-time enrollment during the first year	
• **Students who enrolled full-time** (on average) during their first year were **more likely to attempt** a second, more advanced mathematics courses than were students who enrolled in fewer than 12 units per semester during their first year.	• **Students who enrolled full-time** (on average) during their first year were **more likely to attempt** a second, more advanced writing courses than were students who enrolled in fewer than 12 units per semester during their first year.
Related to units in first remedial course	
• **Students whose first math course provided fewer than three units** were **less likely to attempt** a second, more advanced mathematics course, compared with students whose first course offered at least 3 units.	
Related to student characteristics and incoming goals	
• **Students who were older than 25 years of age** when they entered community college were **less likely to attempt** a second, more advanced mathematics course than "traditional college-age" students. • **Students residing in zip codes with the highest rates of bachelors-level (or higher) attainment** were **more likely to attempt** a second, more advanced mathematics course, compared with students residing in zip codes with the lowest rates of such attainment. • **Students who entered intending to complete an academic or vocational associate degree, for the purpose of remediation, or with an "abstract" or "other job-related" goal** were **less likely to attempt** a second, more advanced mathematics course than students who aspired to transfer with an associate degree.	• **Students who were older than 25 years of age** when they entered community college were **less likely to attempt** a second, more advanced writing course than "traditional college-age" students. • **Female students** were **more likely to attempt** a second, more advanced writing course than were male students. • **Students who entered intending to complete an academic associate degree** were **less likely to attempt** a second, more advanced writing course than students who aspired to transfer with an associate degree.

See pages 49–51 of the main report for detailed discussion. See Appendix Seven, Tables 5 and 6, for corresponding regression tables. EdSource 6/10

4. Among students who attempt a second, more advanced course, *who tends to delay their second course*? ***Limit:*** **Students attended for four or more semesters; attempted a second, more advanced course.**	
Mathematics (25,975 students)	Writing (22,183 students)
Net of other variables…	
Related to starting level	
• **Students who began at lower levels of remedial mathematics coursework** were **less likely to delay** a second, more advanced math course (if they took one) than student who began with Intermediate Algebra/Geometry.	• **Students who began at two or three levels below college composition** were **less likely to delay** a second, more advanced writing course (if they took one) than students who began only one level below college composition.
Related to delay of first remedial course	
• **Students who delayed their first remedial mathematics course until Spring 2003 or Spring 2004** were **more likely to delay** a second, more advanced math course (if they took one) because of the intrusion of the summer term.	• **Students who delayed their first remedial writing course until Spring 2003 or Spring 2004** were **more likely to delay** a second, more advanced writing course (if they took one) because of the intrusion of the summer term.
Related to passing courses	
• **Students who did not pass their first remedial mathematics course** were **more likely to delay** a second, more advanced math course (if they took one) because of the need to retake the initial course.	• **Students who did not pass their first remedial writing course** were **more likely to delay** a second, more advanced writing course (if they took one) because of the need to retake the initial course.
Related to full-time or part-time enrollment during the first year	
• **Students who enrolled full-time** (on average) during their first year were **less likely to delay** a second, more advanced math course (if they took one) than students who enrolled in fewer than 12 units per semester during their first year.	• **Students who enrolled full-time** (on average) during their first year were **less likely to delay** a second, more advanced writing course (if they took one) than students who enrolled in fewer than 12 units per semester during their first year.

See pages 51–53 of the main report for detailed discussion. See Appendix Seven, Tables 7 and 8, for corresponding regression tables. EdSource 6/10

5. Who tends to *complete successfully* a remedial math course *one level below* college algebra (or higher), or a remedial writing course *one level below* college composition (or higher)?

Limit: **Students attended for four or more semesters; attempted a second, more advanced course.**
Further limit: **For math, excludes students who began in Intermediate Algebra/Geometry. For writing, excludes students who began one level below college composition.**

Mathematics (19,134 students)	Writing (10,345 students)
Net of other variables…	
Related to starting level	
• **Students who began at the lowest levels of remedial mathematics coursework** were **much less likely to complete Intermediate Algebra/Geometry** than students who began in Beginning Algebra, even if they enrolled for many semesters.	• **Students who began at the lowest levels of remedial writing coursework** were **much less likely to complete the course one level below college composition** than students who began two levels below, even if they enrolled for many semesters.
Related to delay of first remedial course	
• **Students who delayed their first remedial mathematics course until after Spring 2004** were **less likely to complete Intermediate Algebra/Geometry** than students who began immediately in Fall 2002, even among those students who remained in the system for very long periods of time.	• **Students who delayed their first remedial writing course until Fall 2003 or later** were **less likely to complete the course one level below college composition** than students who began immediately in Fall 2002.
Related to passing courses	
• **Students who passed their first remedial mathematics course** were **more likely to complete Intermediate Algebra/Geometry** than students who did not pass their first remedial math course. • In addition, **students who passed fewer than 75% of their first-year courses** were **less likely to complete Intermediate Algebra/Geometry** than students who passed 75% or more of their first-year courses, although this relationship diminishes in magnitude as students remain in the system for progressively longer periods of time.	• **Students who passed fewer than 75% of their first-year courses** were **less likely to complete the course one level below college composition** than students who passed 75% or more of their first-year courses, although this relationship diminishes in magnitude as students remain in the system for progressively longer periods of time.
Related to delay of second, more advanced course	
• **Students who delayed a second, more advanced math course by more than one semester** were **less likely to complete Intermediate Algebra/Geometry** than students who did not delay.	• **Students who delayed a second, more advanced writing course by more than one semester** were **less likely to complete the course one level below college composition** than students who did not delay.
Related to student characteristics and incoming goals	
• **Students who were older than 25 years of age** when they entered community college were **less likely to complete Intermediate Algebra/Geometry** than "traditional college-age" students.	• **Black/African American students** were **less likely to complete the course one level below college composition** than white students.

See pages 53–54 of the main report for detailed discussion. See Appendix Seven, Tables 9 and 10, for corresponding regression tables. EdSource 6/10

6. Who tends to *complete successfully a college-level course* in math or writing?

Limit: **Students attended for four or more semesters; attempted a second, more advanced course.**

Mathematics (25,975 students)	Writing (22,183 students)
Net of other variables…	
Related to starting level	
• **Students who began at the three lower levels of remedial mathematics coursework** were **much less likely to complete a college-level math course** than students who began in Intermediate Algebra, even if they enrolled for many semesters.	• **Students who began at the four lower levels of remedial writing coursework** were **much less likely to complete college composition** than students who began only one level below, even if they enrolled for many semesters.
Related to delay of first remedial course	
• **Students who delayed their first remedial mathematics course until after Spring 2004 were less likely to complete a college-level math course** than students who began immediately in Fall 2002, even among those students who remained in the system for very long periods of time.	• Some evidence suggests that **students who delayed their first remedial writing course until Fall 2003 or later** were **less likely to complete college composition** than students who began immediately in Fall 2002—but this relationship is somewhat ambiguous compared with math.
Related to passing courses	
• **Students who passed fewer than 75% of their first-year courses** were generally **less likely to complete a college-level math course** than students who passed 75% or more of their first-year courses, although this relationship diminishes in magnitude as students remain in the system for progressively longer periods of time.	• **Students who passed their first remedial writing course** were **more likely to complete college composition** than students who did not pass their first remedial writing course. • In addition, **students who passed fewer than 75% of their first-year courses** were generally **less likely to complete college composition** than students who passed 75% or more of their first-year courses, although this relationship diminishes in magnitude as students remain in the system for progressively longer periods of time.
Related to delay of second, more advanced course	
• **Students who delayed a second, more advanced math course by more than one semester** were **less likely to complete a college-level math course** than students who did not delay, even if they enrolled for many semesters.	• **Students who delayed a second, more advanced writing course by more than one semester** were **less likely to complete college composition** than students who did not delay, even if they enrolled for many semesters.
Related to student characteristics and incoming goals	
• **Black/African American students** were **less likely to complete a college-level math course** than white students. • **Students residing in zip codes with the highest rates of bachelors-level (or higher) attainment** were **more likely complete a college-level math course**, compared with students residing in zip codes with the lowest rates of such attainment. • **Students who were older than 25 years of age** when they entered community college were **less likely to a college-level math course** than “traditional college-age” students.	• **Black/African American students** were **less likely to complete college composition** than white students. • **Students residing in zip codes with the highest rates of bachelors-level (or higher) attainment** were **more likely complete college composition**, compared with students residing in zip codes with the lowest rates of such attainment. In addition, **students who received a fee waiver** were **less likely to complete college composition** than students who did not receive a fee waiver. • **Students who were older than 25 years of age** when they entered community college were **less likely to complete college composition** than “traditional college-age” students. • **Students who entered intending to complete an academic associate degree, or with an “other job-related” goal,** were **less likely to complete college composition** than students who aspired to transfer with an associate degree.

See pages 54–55 of the main report for detailed discussion. See Appendix Seven, Tables 11 and 12, for corresponding regression tables. EdSource 6/10

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Considerin□ the Future□Trends in □istance □ducation

Posted on August 2□, 2□1□ by distance education

Future trends in distance education will be defined by advances in technology and the empowerment of students. In view of information technology so enhances distance learning, it would be safe to say that the technology to take care of the peculiar trend in the future. Today's students are technologically advanced and know what they and the media they want it "with time, these students begin, ask for a higher degree of customization of remote services learning.

The wind of technological change

While the world of information technology evolves, we become a very informed students basic research. These are intelligent students require services that enhance their learning and experience. It would also be intelligent software for learning and tutoring also global networking and automatic translation will be available to many more people, allowing students to work with people from different cultures, races and countries interact with. Future trends in distance education suggests that the world is actually a village, where his is now interact with a variety of people.

Economic restructuring affects education

Today, many economies are undergoing restructuring and rationalization, which has led to people made unemployed. To survive in this changing

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climate, it is necessary to consider the people, their skills and relevant developments. People's attitude to training and learning are changing. Today, many leaders are participating in higher education through online courses and distance learning. Research shows that by 2010 Infact 50% of students are adults, and that in America alone, more than 100 million people participate in programs of adult education. These facts are indicative of future trends in distance education.

Those who will benefit

Review the system of things in the field of distance education have increased, opportunities for learning and higher education will be available to a community far more people than ever before. These include people who are unemployed or less competent women who both work and housewives, the disabled and adults with low functional literacy among other things. public distance education will slowly grow more mature in terms of age, compared to now.

Future trends of distance education have shown that people must continually update their skills, making education a permanent experience and technology to be used user-centric and scalable.

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Education

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□CSD policy limits community college students

Raising GPA requirement to 3.5 will exclude many students from program

BY PAT FLYNN
ORIGINALLY PUBLISHED MARCH 18, 2011 AT 6:30 P.M., UPDATED MARCH 18, 2011 AT 7:16 P.M.

With transfer applications soaring and budget cuts looming, the University of California San Diego is raising the threshold on a guaranteed admission program for the state's community college students.

For years, community college students who took specific courses and obtained a 3.0 grade-point average could count on admission under the program called Transfer Admissions Guarantee, or TAG.

But faced with growing demand and limited capacity, UCSD officials in recent weeks have notified community college officials statewide that for guaranteed admission in 2012 and beyond TAG students will have to earn GPAs of 3.5 or better.

Transfer agreement applications to □CSD

Local community colleges for fall 2011

Cuyamaca: 61

Grossmont: 204

Imperial: 19

MiraCosta: 257

Palomar: 237

City: 105

Mesa: 363

Miramar: 128

Southwestern: 152

Explosion in applications at □CSD

Mae Brown, assistant vice chancellor and director of admissions at UCSD, said that TAG applications have grown from 443 five years ago to 8,715 for fall admission this year.

2008: 408

2009: 1,946

2010: 3,427

2011: 8,715

Guarnatee transfer requirements

UC San Diego: 3.5 GPA

UC Santa Barbara: 3.2

*Other UC campuses: 3.0

*UCLA and Berkeley do not have TAG programs

"We saw the exponential growth in TAG applications — this is a guarantee — and the obvious issue is we don't have the capacity," Brown said. "Given the severe budget situation, and the university (statewide) taking a $500 million or more budget reduction, if we are going to guarantee, we should be guaranteeing admissions to the best prepared."

UCSD's program started in the early 1980s and involved only two-year schools in San Diego and Imperial counties. Later, UCSD entered agreements with 33 colleges around the state. And since 2009 it has offered the program to all 112 California community colleges.

Brown said applications spiked dramatically for 2011 largely due to a new computer-based process that makes it easier for TAG students to apply to multiple campuses. Still, she said, the trend was already overtaxing the campus' capacity.

The university's decision has prompted a sharp response from officials of Southwestern College, which serves a predominantly minority population in the South Bay.

"We are very concerned," said Angelica Suarez, vice president for student affairs at the one-college district. "It's about access for our students. This is going to narrow and reduce the number of students who can go to UCSD."

Suarez and Jaime Salazar, Southwestern's transfer center coordinator, said UCSD's decision directly contradicts university policies calling for the removal of barriers for students from traditionally underrepresented groups.

"They're always giving us lip service," said Salazar. "They say they're committed to diversity, but it's all lip service. It's all about being the Ivy League of the West, serving the elite."

Brown, who has met recently on the issue with representatives of all six community college districts in San Diego and Imperial counties, dismissed the notion that the change runs counter to the university's diversity goals. She said that when the TAG program was implemented in the early 1980s — available then only to local two-year colleges — it was meant to boost then-low transfers from community colleges.

"It had nothing to do with underrepresented minorities," she said.

Brown noted that UCSD will continue to admit community college transfers through TAG and the non-guaranteed transfer process.

"Because community colleges are so racially diverse, you automatically pick up more diversity whenever you admit those transfers," she said.

Of the nine University of California undergraduate campuses, seven have TAG programs. Berkeley and UCLA do not offer guaranteed transfer admissions to community college students.

Nick Serrano, a Southwestern College student government officer, disagrees with Brown's contention that the decision is neutral in its effect on minorities.

"The change from a 3.0 to a 3.5 is huge," said Serrano. "To a lot of our students this is discriminating because minority students do tend to have lower GPAs."

He added that many UC-eligible Southwestern students can't really consider other campuses in the system because they can't afford the cost of living away from home.

"It's an access issue," Serrano said. "It will limit a lot of our students, who can only go local, from going to UCSD."

UCSD accepted 25 TAG students from Southwestern in 2008, 46 in 2009 and 66 in 2010. It has received 152 TAG applications for fall of this year.

Brown said that based on 2010 data, she estimates the 3.5 threshold would have reduced the applicant pool by about 50 percent.

Administrators at other local community colleges are not as distressed by UCSD's decision as their counterparts at Southwestern.

"I agree that it's a big jump (from 3.0 to 3.5,)" said Lynn Neault, vice chancellor of student services for the San Diego Community College District. "As the demand for higher education increases, they've got to manage budgets and manage enrollment just like we do.

"What we need to do is make clear to our students from the start that they need to get as high a GPA as they can."

Neault estimated that the higher GPA would disqualify about 45 percent of her district's TAG applicants.

Southwestern College officials and others have asked UCSD to modify its decision. They have suggested that students already in the program be grandfathered in at 3.0 for 2012 admission.

Other suggestions include keeping the threshold at 3.0 for San Diego and Imperial county students while raising it for others. Another is that the level be raised only to 3.2.

Brown said the decision has already been made by the faculty's admissions committee. But the question of those in the pipeline, at least, is open to discussion.

"We've met with the community college vice presidents," Brown said. "And we've talked about ways to accommodate students in that bind."

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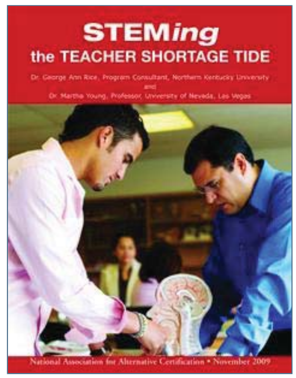
Posted November 01, 2009



□STEMing the Teacher Shortage Tide□addresses our nation□s need to redress the critical shortage of Science, Technology, Engineering and Math □STEM□candidates to pursue careers in these fields as well as candidates with STEM backgrounds to teach in our nation□s P□□2 schools.Without a □ualified pool of STEM teachers who have degrees in these fields, we continue the cycle of unprepared math and science students taught by underprepared teachers. STEM teachers whose background or preparation is weak simply do not promote passion and commitment in students to pursue STEM careers or to become STEM teachers. The premise of this document is to focus on these concerns by uniting business and education as partners. This partnership represents an innovative and mutually beneficial solution to meet the needs of business and the needs of education. The result of this union empowers our country so we can retain our role as a world economic and political leader.

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Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

Toward a New Understanding of Non-Academic Student Support: Four Mechanisms Encouraging Positive Student Outcomes in the Community College

Melinda Mechur Karp

February 2011

CCRC Working Paper No. 28

A WORKING PAPER IN THE CCRC ASSESSMENT OF EVIDENCE SERIES

Across the first year of a major grant from the Bill & Melinda Gates Foundation, with supplemental funding from Lumina Foundation for Education, CCRC has gathered and synthesized a large body of research evidence regarding strategies that may improve the success of students who attend community college. Working papers in the *Assessment of Evidence Series* use the research literature to draw conclusions and provide evidence-based recommendations in eight major topic areas: developmental assessment, developmental acceleration, developmental mathematics pedagogy, contextualization of basic skills instruction, online learning, non-academic support, institutional and program structure, and organizational improvement. All the papers in the series are made available on CCRC's website (http://ccrc.tc.columbia.edu) as they are released.

Address correspondence to:

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212-678-3091
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This research was funded by the Bill & Melinda Gates Foundation. The author gratefully acknowledges helpful comments provided by Regina Deil-Amen, Daniel Solorzano, and Kay McClenney on initial drafts. CCRC colleagues Nikki Edgecombe, David Blazar, and Madeline Weiss were instrumental in examining empirical studies considered in this review.

Abstract

This paper examines the ways in which academically vulnerable students benefit from non-academic support. By reviewing theories of student persistence as well as program evaluation literature, the author identifies four mechanisms by which non-academic supports can improve student outcomes, including persistence and degree attainment. Programs associated with positive student outcomes seem to involve one or more of the following mechanisms: (1) creating social relationships, (2) clarifying aspirations and enhancing commitment, (3) developing college know-how, and (4) making college life feasible. Identifying these mechanisms allows for a deeper understanding of both the functioning of promising interventions and the conditions that may lead students to become integrated into college life. Notably, each of these mechanisms can occur within a variety of programs, structures, or even informal interactions. The paper concludes by discussing avenues for further research and immediate implications for colleges.

Table of Contents

1. Introduction

Despite their best efforts, community colleges continue to see low rates of student persistence and degree attainment, particularly among academically vulnerable[1] students. Of the students who entered community colleges during the 2003–2004 school year, 45% left college within three years without earning a credential (Provasnik & Planty, 2008). Recent studies show mixed impacts from participation in developmental education (Bettinger & Long, 2005, 2009; Calcagno & Long, 2008), which indicates that such interventions do not appear to meaningfully increase the number of developmental education students obtaining degrees. While it is likely that academic interventions need to be reformed to increase their efficacy, another possible explanation for these low success rates is that students have other needs that are not being met. This paper examines programs and practices that appear to address these needs by providing non-academic support in order to encourage student success.

There is ample evidence that being successful in college requires more than the ability to master college-level academic skills. Postsecondary education constitutes a new space that students must learn to navigate, both physically and in terms of bureaucratic requirements (Attinasi, 1989; Rosenbaum, Person, & Deil-Amen, 2006). Students must meet new expectations (Shields, 2002) and engage in new types of interpersonal relationships (Dickie & Farrell, 1991). If students are unable to meet all of these new demands, they are unlikely to successfully obtain a college credential.

Students in all types of postsecondary institutions are likely to encounter difficulties in understanding and enacting college expectations. However, these difficulties are most commonly experienced by students in two-year colleges and open-access, four-year commuter colleges, as these institutions are most likely to enroll academically vulnerable students. I therefore focus this paper on the processes and

[1] I use the term "academically vulnerable" to refer to students from backgrounds that are correlated with low levels of postsecondary success, including those who are academically underprepared, from underrepresented minority groups, students with low socioeconomic status, and students who have low levels of parental education. I use this term to emphasize the fact that while most efforts to increase rates of student persistence focus on students enrolled in developmental education, many students—even those possessing the requisite academic skills—are at risk of postsecondary failure and in need of non-academic support.

supports that appear to help students in these two types of institutions acclimate to and be successful in college.

Non-academic support activities are presumed to encourage academic success but are not overtly academic. They can occur within formally structured programs or informally, through in-class interactions. Often, structured programs that encourage non-academic support also have an academic component; learning communities, for example, restructure instruction and pedagogy in addition to providing social support. In this way, there is a symbiotic and multiplicative relationship between academic interventions, such as tutoring and developmental education, and non-academic supports. Nonetheless, non-academic supports are distinct from academic ones in that they address different skills and knowledge and encourage student success via different processes.

The goal of this paper is to use current theories of student persistence, coupled with program evaluation literature, to identify the processes by which non-academic supports can help students remain enrolled in college, earn good grades, and earn a credential. Identifying these processes allows us to move our theoretical conception of student persistence toward a deeper understanding of *how*—how do common interventions create competent and successful college students, and what are the conditions that lead students to become "integrated" or "committed"? By articulating the processes by which non-academic supports help students succeed, this paper also provides practitioners with a better understanding of the elements necessary for successful non-academic support efforts.

The major theories of student persistence (Tinto, 1993; Pascarella & Terenzini, 2005; Braxton, Sullivan, & Johnson, 1997; Braxton, Hirschy, & McClendon, 2004; Bean & Metzner, 1985) argue, in various ways, that student persistence in postsecondary education is influenced by a combination of pre-existing characteristics, external forces, and institutional factors. These theories also purport that students need to feel that higher education is an important part of their lives and that it is worthwhile to stay enrolled. The authors note that this belief in the usefulness of postsecondary education (variously called integration, commitment, and positive psychology) is harder to develop for commuters and nontraditional students but is essential nonetheless.

These theories—particularly Tinto's—are the dominant frame through which researchers and practitioners view student success within community and commuter colleges. However, they are hard-pressed to provide practical guidance to community colleges who wish to improve the success of their students, for two reasons. First, the key theories (Tinto, 1993; Pascarella & Terenzini, 2005; Braxton et al., 1997) are based on the experiences of four-year, residential students. They present an image of college attendance in which the four-year, residential model—replete with its many opportunities for integration and connectedness—is the norm. Similarly, these theories do not address the unique experiences of underrepresented minority students and those entering college with low levels of academic skill. As a result, the dominant paradigm for understanding postsecondary persistence does little to account for the experiences and outcomes of the many part-time, commuter, and underrepresented minority students attending two-year institutions. If the dominant theories of postsecondary success do not apply, then we need to develop an alternative—or at least supplemental—theoretical perspective.

Second, many of the dominant student persistence theories also lack a clear understanding of how student persistence occurs. Empirical tests of theories rooted in Tinto's integration framework (Tinto, 1993; see also Pascarella & Terenzini, 2005; Braxton et al., 1997; Braxton et al., 2004) demonstrate that integration and commitment are related to student success, but they do not explain how students become integrated. For practitioners, the result has been challenging—the many efforts to put these theories into practice have often floundered due to an incomplete understanding of what contexts, structures, and experiences lead to students' postsecondary integration.

To better understand student persistence among academically vulnerable students in commuter and two-year institutions, several CCRC colleagues and I engaged in an extensive review of the literature.[2] This review focused on non-academic support provided to students, defined as services, interventions, and informal activities that help students address the social, cultural, and otherwise implicit demands of college. These activities are not explicitly academic (in that they do not provide basic skills) but instead are intended to help students navigate the academic world of higher education.

[2] Additional members of the research team were Nikki Edgecombe, David Blazar, and Madeline Weiss.

We read and reviewed 128 books, journal articles, and reports. These included evaluations of common interventions and the most commonly cited theoretical works. In our review of the empirical studies (see Appendix, Table 1), we first attempted to establish the strength of the evidence supporting specific types of intervention programs. However, we encountered two primary challenges to this effort.

First, the myriad approaches to providing non-academic support result in the inclusion of many different programs in this body of literature. (The text box below describes common non-academic support programs.) Moreover, evaluations of non-academic supports tend to group different interventions under the same category. For example, the "learning community" literature incorporates a range of programs that include multiple and widely varying components. As a result, it is not always possible to isolate the effects of a specific program element. Second, studies varied in their methodological approach as well as their rigor. Studies in this area, with a small number of important exceptions, contained a number of methodological challenges, including poorly constructed (or absent) comparison groups, small sample sizes, low levels of statistical control, and a focus on short-term outcomes.

Common Non-Academic Support Programs

Learning community: A pair or group of courses taken by a cohort of students, often linked by a theme and team-taught. Learning communities vary in their structure, from a pair of linked courses to blocks of courses that encompass students' entire course schedules for a semester or year. Some learning communities include a student success course or targeted support services.

Student success course: Also called "College 101" or "Introduction to College," this course helps students acclimate to college by providing them with information about resources and services, help in selecting majors and courses, and instruction in study skills. Some student success courses have a career theme or are linked to a specific major.

Enhanced or intrusive advising: Traditional advising supplemented in various ways, such as required meetings, lower counselor-student ratios, assigned counselors or mentors, or longer, more intensive counseling sessions.

Given these two challenges, we concluded that while the literature generally supports the notion that non-academic support can improve student outcomes, it does not provide us with definitive answers about which program elements or practices lead to student success. Rather than discuss in detail the rather weak evidence for specific non-academic support programs, then, this paper takes a different approach, using the evaluation literature to interrogate our current understanding of student persistence and to propose a more process-oriented framework of non-academic support.

To use the evaluation literature as part of a revised persistence framework, the research team and I carefully analyzed the program description included in each study to inductively identify the main components of the intervention under investigation. Studies were grouped based on their common components, rather than the stated title of the intervention. For example, in studies of student success courses, we examined the description offered by the authors in order to understand why any positive outcomes might have occurred. Courses focused on improving study skills were categorized one way, while courses focused on creating community were categorized another way.[3] Table 1 summarizes the empirical studies included in the review.

Examining the literature for program components underscores the fact that the specific service or program by which a support is delivered is less important than the processes that encourage positive outcomes to occur. Mediating variables within programs provide the "action" that allows them to encourage positive outcomes; in the absence of such variables, program participation is irrelevant. In addition, different programs or support delivery systems may contain the same types of supports.

The remainder of this paper is organized around the specific processes, or mechanisms, that seem to most strongly encourage positive student outcomes. Mechanisms are the "things that happen" within programs or activities that support students and help them succeed in and graduate from postsecondary education. Each mechanism has both theoretical and empirical support, as well as immediately practical implications.

[3] In some studies, we identified more than one mechanism.

The four mechanisms that appear to encourage student success are:

1. *Creating social relationships:* These activities help students interact with professors and classmates in meaningful ways so that they develop strong relationships with each other. Such activities make students feel that they belong in higher education and provide students with access to information and resources that they can use to be successful in school and after graduation.
2. *Clarifying aspirations and enhancing commitment:* These activities help students develop clear goals and become or remain committed to achieving those goals via higher education.
3. *Developing college know-how:* These activities help students learn about the procedural and cultural demands of college. This includes basic information, such as how to navigate the physical space of college, as well as valuable cultural knowledge. Finally, college know-how includes strategies for attaining success in postsecondary education, such as study skills, resume-writing, and how to use student services.
4. *Making college life feasible:* These activities meet students' needs as they arise. They are the "little things" that help students overcome the various challenges they face outside of the classroom.

2. Four Non-Academic Support Mechanisms

2.1 Creating Social Relationships

Meaningful social relationships play an important role in promoting persistence because they help students feel comfortable in college and provide them with access to information that can ease their path toward a degree. Finding ways to promote social relationships for non-traditional students is particularly important because they often have fewer opportunities to create them on their own, due to competing demands on their time.

Supporting theory. The theoretical literature provides strong support for the notion that part-time, commuter, and two-year college students need assistance in developing strong social connections to postsecondary education. Tinto (1993) emphasizes the difficulty that students who do not become socially connected to postsecondary education have in remaining enrolled. Moreover, he argues that nonresidential students have particular challenges developing and maintaining such connections because their "external communities" may work against membership in college communities, either by providing competing demands on time and energy or by emphasizing norms that contrast with the norms of higher education (p. 128). Pascarella and Terenzini (2005) and Braxton and colleagues (Braxton et al., 1997; Braxton et al., 2004) make similar arguments.

Even critics of Tinto argue that social relationships are important for creating student success, particularly for academically vulnerable students. Bensimon (2007), for example, discusses the ways that "institutional agents" can encourage student success by providing interpersonal connections, advice, motivation, and information. She notes that these individuals do not need to be part of a formal program or have a formal advising role in order to play a significant part in creating student success. Rendon (1994) makes a similar point—that nontraditional students commonly expect to fail in college but can overcome this expectation with the help of external agents who actively help them navigate college and validate that they belong in postsecondary education.

Finally, theoretical support for the importance of social relationships comes from the sociological literature on social networks and social capital. Authors such as Coleman (1988) and Granovetter (1974) argue that social relationships can be used as a form of currency to help individuals obtain valued goods. Relationships can be used to access information that can, in turn, be used to succeed in educational endeavors and obtain desired credentials. In this way, social relationships promote student success by themselves and can also serve as a conduit for developing other important mechanisms, such as college know-how.

Empirical evidence. The evaluation literature provides evidence that creating social relationships is an important way to increase students' integration and access to information. There is suggestive—though not terribly strong—evidence that relationships can improve student success as well.

Increased integration. With regard to the creation of relationships being associated with increased integration, Tinto and his colleague (Engstrom & Tinto, 2008; Tinto, 1993, 1997) conducted a number of mixed-methods studies and found that students in learning communities reported higher participation in college activities. Participants also reported that learning communities helped them develop relationships with their peers that helped them weather the transition into college. Similarly, a random assignment study of learning communities (Scrivener et al., 2008) found that participants reported a greater sense of integration and belonging on campus than did non-participants. Using structural equation modeling, Crisp (2010) found that strong interpersonal support predicted academic and social integration.

Lichtenstein (2005) found that students in learning communities characterized by supportive classrooms and strong interpersonal relationships had higher grades and retention rates than both students in learning communities that did not promote such connections and students who did not participate in learning communities. She used a mixed-method study including surveys, focus groups, and analysis of academic transcripts to do so. The study is particularly useful because it demonstrates that it is not learning community participation per se that encourages positive outcomes, but rather participation in those learning communities that help students become integrated that does so.

Qualitative research also shows that social relationships are important in encouraging integration and may be related to improved student outcomes. Using in-depth interviews with beginning community college students, Karp, O’Gara, and Hughes (2008) found that students who had strong networks of social relations were more likely to report being integrated into their college environment. Integrated students, in turn, were more likely to make progress toward a degree (Karp, Hughes, & O’Gara, 2010). Rendon (1994) emphasizes the importance that strong, positive, informal relationships can have on student success. Using qualitative data, Rendon illustrated that when external agents validate students’ educational experiences, the students are more likely to be successful. Bensimon (2007) offers additional anecdotal evidence that such relationships are particularly important for underrepresented minority students.

Increased information access. Social relationships provide access to information that students can use to help them succeed in college. Two studies, one using mixed-method studies including regression analyses (Engstrom & Tinto, 2008) and the other using ANOVA (Waldron & Yungbluth, 2007), found that students in learning communities reported more opportunities to communicate with and access information from faculty and peers. Both studies found that learning community participants had more positive outcomes than similar non-participants.

In a study of enhanced advising for lower-level math students, participants were assigned mentors who provided them with information and served as "go-to" individuals for any problems that arose during the semester (Visher, Butcher, & Cerna, 2010). Though such relationships did not translate into improved rates of passing math or persistence for the full sample, two subsamples—part-time students and developmental math students—did see improved outcomes as a result of the intervention. Importantly, these two subsamples represent the type of academically vulnerable student this paper is most interested in.

Practical implications. Non-academic support activities that help students cultivate meaningful relationships help them remain enrolled in and complete college. It's important to note that these relationships must be meaningful in order to be useful—they have to be substantial enough that they help students feel connected to school or feel comfortable enough to leverage them to gain information. Karp et al. (2010) make this point, stating,

> Most students in our sample, for example, differentiated between those students whom they knew in passing and those who were real friends. Typically, real friends provided information about course assignments, professors, and graduation requirements, while acquaintances were good for just chitchat. (p. 78)

Though they used qualitative data and a small sample, these authors found an association between having "real friends" and making progress toward a degree.

Activities that help students interact with one another or with professors over a prolonged period of time seem to encourage this mechanism best. Well-implemented learning communities, for example, help students create relationships because students spend a significant amount of time with one another and often have shared interests. In many learning communities, students also have multiple opportunities to get to know their professors, since courses are team-taught and often include interactive pedagogies. It is important to note that not all learning communities are well-implemented, and those that are not are unlikely to encourage this mechanism (Lichtenstein, 2005).

Any intervention structured around a peer cohort or group pedagogy is likely to encourage the development of social relationships. Student success courses, which explicitly aim to help students acclimate to college, gain access to information, and get to know faculty and peers, may do so. There is a growing body of evidence associating these courses with strengthening connections between students, faculty, and staff (O'Gara, Karp, & Hughes, 2009; Tinto, 1993) and positive student outcomes (Strumpf & Hunt, 1993; Zeidenberg, Jenkins, & Calcagno, 2007). These courses vary greatly in content and structure, however, and, as with learning communities, it is likely that not all student success courses encourage social relationships to the same extent.

Outside of specific interventions and courses, other non-academic support strategies can also encourage this mechanism. Merely promoting interaction in and outside of class, via interactive pedagogy, required study groups, or mandatory meetings and communication with professors, can help students develop meaningful social connections. Likewise, helping faculty and staff learn how to become institutional or external agents for students—such that they help students feel welcome, supported, and validated—may encourage students' sense of belonging and their persistence.

2.2 Clarifying Aspirations and Enhancing Commitment

Most young people today understand that a postsecondary credential is important and intend to earn a degree (U.S. Department of Education, 2006). However, many students, particularly those vulnerable to academic failure or from backgrounds without a strong tradition of college-going, have only a loose sense of why college is important and how it can help them achieve their goals. Those who do not have clear goals and genuine understanding of why college is worth it even when it is difficult are likely to be derailed by relatively minor challenges and setbacks (Grubb, 2006). Thus, non-academic supports that help students crystallize their educational and occupational goals, understand how college can help them achieve those goals, and develop commitment to college even in the face of obstacles can increase the likelihood that they will persist.

Supporting theory. Tinto (1993) and Bean and Metzner (1985) argue that students must become committed to an institution and postsecondary education in order to remain enrolled in it. Tinto argues that commitment develops when students have positive interactions with their college environments, as this allows them to view postsecondary education as a positive endeavor. Bean and Metzner (1985) argue that for non-traditional students, psychological variables have a large influence on intent to leave. These variables include, among others, utility (perceiving college as useful for employment), satisfaction (enjoying being a student), and goal commitment (feeling that a college education is important). Bean and Metzner also argue that these psychological variables are so important that they can counteract other influences on persistence, such that students who have low grade point averages may still remain enrolled if they have high levels of commitment and see utility in remaining in college.

The socio-psychological concept of "possible selves" (Markus & Nurius, 1986) provides another lens through which to view this mechanism. Possible selves refer to the various images of the person one might become in the future. These selves provide context for future goals, as well as motivation to achieve them. Since possible selves are rooted in reality (you cannot conceive of a role you do not know exists), helping students develop ambitious but realistic possible selves can help them understand why college is important and become more committed to remaining enrolled.

Possible selves also serve as motivators because individuals seek to bring their behavior and achievements in line with their idealized selves. By helping students clarify their plans and develop concrete steps for reaching them, non-academic supports capitalize on this aspect of the possible self. They take students' idealized visions of the future and turn them into concrete, actionable goals that require a college degree. And because students seek to make their possible selves real, they are likely to remain committed to college even when it is challenging.

Viewing college as ancillary or loosely related to their goals decreases students' commitment to higher education; they are less likely to want to remain enrolled when confronted with academic or logistical challenges because they find that the trade-offs are not worth it. The corollary of this is that activities that help students understand why they are learning what they are learning can improve their commitment. Helping students recognize the usefulness of curricular activities or pedagogical approaches can improve their desire to remain enrolled and therefore increase their likelihood of postsecondary persistence and credential attainment.

Empirical evidence. There is promising, but weak, evidence that clarifying aspirations and enhancing commitment can improve student outcomes. In particular, helping students to clarify the utility of college and to increase their use of concrete planning and goal-setting has been shown in some instances to be related to improved persistence and transfer rates.

Clarifying utility. There is a body of qualitative work indicating that college students, particularly those attending community colleges, are strongly oriented toward the utility of postsecondary education (Grubb, 2006; Cox, 2009a, 2009c). They need to understand why they are expected to learn the content of their courses and how it relates to their future goals. Students who do not see the value in their coursework often behave in counterproductive ways, for example, by failing to complete assignments or dropping required courses.

Advising activities that meet this need can improve student outcomes. Bahr (2008) and Metzner (1989) both found that advising—particularly advising reported by students to be useful—positively influenced completion of remedial courses, persistence rates, and transfer rates after controlling for preexisting characteristics. Metzner (1989) also found that some of the effect of good advising was due to its influence on students' perceptions of the utility of college and student satisfaction.

Increasing planfulness. Giving students the tools to develop a concrete set of steps for attaining their goals may also encourage commitment to college and positive outcomes. This is particularly important at community colleges, where students struggle to select a major or career pathway, but colleges often do not devote significant resources to helping them develop realistic programs of study (Grubb, 2006). In a random assignment study Visher et al. (2010) found modestly positive results from enhanced advising activities, which provide students with more intensive and personalized guidance than is typical in the community college, particularly for part-time and developmental education students. Another random assignment study of enhanced advising (Scrivener & Weiss, 2009) found that such advising increased registration rates in the following semester but did not improve academic outcomes. Keenan and Gabovitch (1995) found that students in a student success course increased their "career maturity," or ability to effectively set career goals, over the course of a semester, as compared to non-participants.

Practical implications. There is strong theoretical reason to believe that helping students clarify their aspirations and increase their commitment to college will improve their outcomes. The rather weak empirical support for this mechanism appears to stem from the challenges that colleges face in implementing activities that actually help students see the utility in college and create realistic and actionable plans for achieving their goals. The most obvious type of activity to help do this is advising, but advising in the community college is a "mixed bag," conducted by counselors, advisors, or faculty members in a range of settings (for example, in quick meetings, during office hours, or through enhanced services). Community college advising is often underfunded, and students report dissatisfaction (Grubb, 2006; O'Gara et al., 2009). It is therefore not surprising that advising has not encouraged this mechanism or positive student outcomes very well.

We would expect that enhanced advising, with its intensive, prolonged and one-on-one format might improve student planfulness and outcomes to a greater extent than traditional advising. But the evidence is not overwhelmingly supportive of this contention (Scrivener & Weiss, 2009; Visher et al., 2010). This is perhaps because such interventions need to extend beyond a semester or two to have real impact, or because colleges are so strapped for counseling resources that they are unable to provide truly intensive advising services.

In light of the difficulty colleges have in implementing enhanced advising, alternative methods to help students clarify their goals and identify steps for achieving them via postsecondary education are needed. Student success courses are a promising vehicle for this, as they allow students to engage in major and career exploration, program planning, and course advising over multiple weeks with an instructor who has the opportunity to know them well. Moreover, delivering services to 30 students at one time in a classroom setting is likely to be more resource-efficient than providing 30 students with multiple, individual advising sessions. We have already seen that research indicates that student success courses are positively related to student outcomes (O'Gara et al., 2009; Tinto, 1993; Strumpf & Hunt, 1993; Zeidenberg et al., 2007). It is important to remember, however, that these courses do vary significantly in their content, and not all student success courses are likely to emphasize planning and commitment to college to the same extent.

Colleges may want to leverage new technologies to help students clarify aspirations and increase commitment to college. For example, they could help students explore possible selves by providing video vignettes, available online, of students pursuing various career paths, their decision-making processes, and their own descriptions of how they are planning to achieve their goals. On the opposite end of the spectrum—and keeping in mind how important social relationships are in encouraging persistence—colleges might want to find ways to integrate program planning and descriptions of utility into academic coursework. For example, professors might be encouraged to help students understand why course content is relevant to their future coursework and occupational goals. Professors could also be encouraged to help students develop realistic program and career plans as part of their coursework. The key is to find ways to help students understand what their future might look like, and then give them the tools to get there—all within the confines of a resource-constrained environment.

2.3 Developing College Know-How

An important way to encourage positive student outcomes is to explicitly help students understand what they are expected to know and do in college, which includes not only academic knowledge (math, writing, or research skills, for example) but also the unwritten "rules" of the postsecondary environment. Students who do not understand these expectations are unlikely to navigate college successfully. Conley (2007) refers to this broad type of knowledge as "contextual skills and awareness."

Supporting theory. Tinto (1993) argues that students must learn and internalize the unwritten rules of college in order to persist. If students do not come to understand the norms and expectations of postsecondary education, they will experience incongruence and find it difficult to remain enrolled. Membership in social and academic communities on campus requires that one know how to be a part of the group, learning how to navigate the social and physical space that such a group inhabits. Tinto even implies that failure to persist is more often a function of poor understanding and internalization of the culture of postsecondary education than it is of poor academic performance.

Critics of Tinto's model contend that students should not have to choose between their home cultures and the majority college culture and note that many underrepresented minorities benefit from maintaining ties to their home cultures (Guiffrida, 2006; Rendon, Jalomo, & Nora, 2000; Tierney, 1999). However, they also recognize that the culture of higher education privileges certain skills and cultural knowledge, and that students must be assisted in learning "how to do" college if they are to be successful. Rendon et al. (2000), for example, argue that underrepresented minority students need to be actively invited to take advantage of college services. These students would benefit from being given information or shown how to approach a student support center. Tierney (1999) also argues that teaching these students the cultural expectations of postsecondary education can improve their college outcomes.

The sociological construct of cultural capital (Bourdieu, 1973) is another lens through which to view this type of knowledge and support. Cultural capital involves the accumulation of the types of knowledge that are most valued and therefore most useful in a given cultural context. In postsecondary education, this includes knowing how to ask for help (and when and where to ask for it), how to participate in class appropriately, and even how to "work" bureaucratic systems to access resources, such as financial aid.

Cultural capital is generally defined and possessed by dominant groups; in postsecondary education this means that upper-class and well-educated elites define "acceptable" behavior and the rules of the game. Because many nontraditional students come from other class backgrounds, they may not be aware of these expectations or may not possess the skills and knowledge to navigate the culture of postsecondary education. Students who do not possess cultural capital are often unable to access resources on campus. This might negatively impact their academic outcomes or make them feel uncomfortable enough to exit postsecondary education.

Empirical evidence. Developing college know-how is a particularly useful mechanism for students from backgrounds with little college-going experience. As the culture of higher education generally reflects majority, upper-middle-class culture, underrepresented minority students and those from lower-class backgrounds may need particular assistance in developing this knowledge. Even information that seems obvious to those familiar with college may not be so evident to academically vulnerable students. Although there is little research in this area and existing studies are primarily correlative, their results are consistent with the theoretical support described above.

Giving basic college information. In a companion working paper in CCRC's Assessment of Evidence Series, Scott-Clayton (2011) describes the complicated landscape that students must navigate on the way to earning a degree. Students struggle to figure out which courses to take, understand the progress they have made (or not) toward graduation, and learn which courses will count toward their major or transfer. Giving them better information can help students make good choices and progress toward a degree while minimizing frustration that might discourage them from persisting in college.

Giving students information about college increases the likelihood that they will access college services (Engstrom & Tinto, 2008; Keenan & Gabovitch, 1995). Students in one study of a learning community coupled with a student success course reported learning the "basics" of college, such as how to access financial aid and what various grades and credits mean (Engstrom & Tinto, 2008). The authors quote one student as saying that student success seminars "tell you what you need to know, step-by-step, and that's a good thing" (p. 17).

Teaching strategies for success. Explicitly teaching students study and time management skills has been linked to improved use of support services (Visher et al., 2010) and, indirectly, to improved academic outcomes (Boudreau & Kromrey, 1994; Engstrom & Tinto, 2008; Visher et al., 2010). In some cases, these skills are taught as part of a student success course, while in others, they are taught as part of guidance and advising activities. Regardless of delivery method, it is not terribly surprising that students who know how to balance their time and make use of services such as tutoring perform better than those who do not.

Developing cultural capital. Though it theoretically and logically makes sense that explicitly teaching students the cultural demands of postsecondary education can improve their outcomes, this has not been closely examined. Most of the research on cultural capital focuses on preparing students for the workplace, not college itself—though it should be noted that the unspoken cultural expectations of both institutions are similarly upper-middle class. Two case studies of workforce preparation programs found that employers value soft-skills training more than training in technical skills (Houghton & Proscio, 2001; Nitschke, 2001). Using qualitative methods, Rosenbaum et al. (2006) found that private two-year occupational colleges explicitly teach cultural knowledge as part of the curriculum. They did not examine the impact of teaching these skills on academic outcomes but did find that private occupational colleges have stronger employment outcomes than do community colleges, which do not teach these skills explicitly. One study that did examine the role of cultural capital in students' academic success found that students' possession of cultural capital was positively correlated with use of student services and progress toward a degree (Karp et al., 2008).

Practical implications. Providing students with college know-how may be an important mechanism for improving outcomes, but it is not done on college campuses as frequently as we might expect. Giving students even basic information that is accurate and clear is a challenge. As we have already seen, the guidance and counseling function in colleges are overburdened and underfunded. Colleges often provide an array of information sources as an alternative—flyers, booklets, websites, workshops, and orientations, to name a few—but these efforts are not well-coordinated and sometimes even contradict themselves. Streamlining students' options and better structuring their choices is one possible solution to this problem, as it eliminates some decision points and creates clear guideposts for others (Scott-Clayton, 2010). Student success courses are another vehicle for providing basic information in a timely, efficient manner.

Teaching strategies for success is another approach that, while compelling, does not seem to be carried out frequently, outside of student success courses. One problem is that there might not be clear consensus as to which strategies need to be taught. This is evident in the fact that many student success courses vary in which skills they emphasize. In addition, many faculty members are reluctant to infuse such skills into their courses because they assume that students should come to them already prepared to meet college-level expectations. And students themselves are often reluctant to admit that they need assistance in developing college success strategies, as evidenced by their reluctance to take college success courses (O'Gara et al., 2009; Cho, Jaggars, Karp, Jenkins, & Edgecombe, 2010). Colleges therefore should consider both making such courses mandatory and developing clear and consistent course goals for them.

Teaching cultural capital is rarely explicitly done. Infusing the curriculum with "soft skills" in order to explicitly teach students how to enact upper-middle-class expectations in the classroom could greatly enhance student outcomes. But this strategy must be done with caution. Helping students understand postsecondary culture and teaching them the skills to be successful must not the same as erasing students' home cultures or diminishing their import. Asking—even implicitly or unintentionally—students to give up their identities and cultures is likely to be counterproductive. Tierney (1999), for example, points out that students who retain their culture are more successful in school than those who assimilate into majority culture or reject their culture of origin. Teaching students about the cultures and norms of postsecondary education does not mean reinforcing the notion that upper-middle-class culture is preferable or better; rather, it means providing students with the opportunity to understand that postsecondary education is a distinct culture with a set of expectations and norms that can be learned and enacted in order to further their educational goals.

2.4 Making College Life Feasible

Community college students face an array of challenges, many of which cannot be anticipated or are short-term in nature. They nonetheless serve as barriers to success, as students become concerned with solving these day-to-day issues and cannot focus on school to the extent they would like to or should. The majority of community college students, for example, are now female, and more than one third are over the age of 30 (Provasnik & Planty, 2008). According to the American Association of Community Colleges (2010), 16% of community college students are single parents. These students are likely to confront conflicts between the demands of work, family, and school.

Services that make life feasible, then, serve to help students overcome these barriers so that their educational pursuits are not compromised. This mechanism encourages positive student outcomes by making daily life easier and more manageable, providing a little “nudge” that can help students deal with small obstacles which, left unaddressed, might become large enough to stymie their progress toward a degree.

Supporting theory. Bean and Metzner (1985) argue that external variables, including hours of employment, family responsibilities, and outside encouragement, have direct and important effects on student dropout, academic outcomes, and intent to leave. In fact, they argue that for nontraditional students, environmental variables are as important as academic variables in influencing persistence decisions. Braxton et al. (2004) extend this argument and apply it to commuter students. They argue that for this population, external forces such as work and family exert a strong influence on persistence, but the organizational context of college makes a difference—students who feel that their institution cares about their welfare are more likely to persist. It logically follows that helping to ensure that external influences remain positive and that the college environment supports work–school–family demands will help students have better outcomes.

Empirical evidence. There is less empirical support for this mechanism than for the other three. This is largely because programs tend to be targeted at very specific populations and needs and are therefore small-scale and institution-specific. Research is consequently conducted on such activities infrequently, and much of it is not rigorous.

Nonetheless, a number of studies provide empirical support for the notion that helping make life more manageable can improve student outcomes. In an ethnographic study of single mothers attending community college, Duquaine-Watson (2007) found that the need for childcare was a highly salient issue for her subjects. Women whose children were in care off-campus had increased transportation expenses and more difficulty juggling work, school, and family demands. They had less time to spend on campus and for studying.

A recent survey of young adults aged 22 to 30 with at least some college coursework, conducted by Public Agenda, gives additional evidence that helping students confront the daily challenges they face could improve their educational outcomes

(Johnson & Rochkind, 2009). Survey respondents who did not complete college felt the pressure of work and family acutely: Though 31% of respondents said that paying their tuition was a challenge, nearly twice as many (54%) said that their main obstacle to attaining a credential was the difficulty they had balancing work and school. Fifty-three percent of these students said that family commitments were a major reason why they could not return to college even if they wanted to.

Survey respondents agreed that assistance in making life more feasible would improve college completion rates. In particular, nearly 80% of respondents (both completers and non-completers) agreed that offering more evening and weekend courses and more flexible scheduling would help. Seventy-six percent of non-completers and 59% of completers thought that providing day care would help. And 69% of non-completers and 55% of completers thought that providing health insurance to all students, including part-time students, would improve college graduation rates.

In a random assignment study of enhanced advising at one college, Scrivener and Au (2007) found that such advising helped students confronting problems, such as an emergency hospitalization, by giving them individualized strategies and personalized support. This study found very modest gains in short-term academic outcomes for participants, as compared to a randomly assigned control group.

Practical implications. Because student needs in this area tend to be diverse, short-term, and small-scale, a wide array of non-academic supports can help make life feasible. Many of these are likely to occur outside of formal programs, as when a counselor or instructor helps students identify resources to overcome an individual challenge. Some interventions, however, could promote this mechanism in more systemic ways. For example, offering on-site daycare would help minimize the conflict between family and school, particularly for female students. Braxton et al. (2004) argue that commuter institutions seeking to improve student retention should offer courses at a variety of times in order to accommodate students' work and family demands and should provide on-campus work opportunities for students.

By some estimates, students spend more on transportation than they do on books; providing transportation assistance therefore may improve attendance while alleviating a significant financial burden (Martinez & Castañeda-Calleros, 2009). Hungry students are unlikely to be effective students. To help the increasing number of students unable to feed their families and coming to class hungry, Macomb Community College in Michigan created a food bank, stocked with donations from members of the college community.

3. A Caveat: Recognizing the Student Perspective

The literature offers compelling evidence that the above four non-academic support mechanisms work to encourage student success. However, all of these mechanisms and subsequent efforts to implement them may be moot if we do not understand how students themselves experience these efforts. How do students view their relatively vulnerable college student status? How do they interpret efforts to increase their social connections, develop college know-how, clarify aspirations and enhance commitment, or improve school–life balance?

We know that student situational interpretations and identities matter. Students create their own understandings of college, and these understandings influence their learning and the ways that they experience attempts to improve their outcomes. If students do not view the information they are given as useful, for example, or if they do not find their social interactions to be meaningful, they are unlikely to capitalize on these mechanisms. Efforts to encourage positive outcomes will therefore be unsuccessful.

The ethnographic studies conducted by Cox (2009a, 2009b, 2009c) illustrate the many ways that community college students perceive college interactions differently than do faculty and staff. Students interpret classroom activities according to their own definitions of what “college” should be, and they rebel or act in ways that hurt their academic progress if they feel that they are not getting what they need or expect. Students and faculty often seem to be at cross-purposes, with faculty trying to help students and students perceiving such efforts as contrary to their own goals and visions of what they want or need. Students in turn fail to utilize good academic practices, but their behaviors may be the result of logical defense mechanisms or attempts to maximize utility. Both groups of individuals share the same ultimate goal, promoting student success, but because they perceive efforts to achieve this goal so differently, student progress is thwarted.

Hurtado and Carter (1997) found that student perceptions of the campus environment affected their sense of belonging. For example, students who reported that there were racial or ethnic tensions on campus were less likely to feel that they belonged than those who did not report such tensions. Though this study was conducted with high-achieving Hispanic students at a four-year institution and does not link belonging to academic outcomes, it underscores the fact that student perceptions influence their experiences in school. Similarly, we can conceive of how advising and mentoring that is not sensitive to student perceptions will fall on deaf ears and be ineffective.

Rendon (1994) demonstrates that students need to feel validated by staff and faculty, and that when they do so, they begin to feel capable and worthy of being in college. She theorizes that validating students can improve outcomes. This work also illustrates that students' perceptions of the value of social connections created as part of non-academic support activities matter.

Despite this evidence, research has not carefully explored the influence of student perceptions of support services on outcomes. Rendon (1994) does not provide evidence that validation, sense of competence, or feelings of college-worthiness are related to outcomes. Cox (2009b) is unable to decisively link students' strategies for failure avoidance to outcomes, though she provides compelling qualitative evidence that such strategies hurt students' academic progress. Nora, Barlow, and Crisp (2005) point out that there is not much research on students' own understanding of their experiences, which they call "perceptual research."

A better understanding of student reactions to non-academic support activities and research linking student perceptions to their academic outcomes is therefore an area that is ripe for research. What do academically underprepared students think and feel about efforts to improve their outcomes? How do these feelings affect their reactions to formal and informal non-academic support activities? If such research were to find that the mechanisms discussed in this paper are not perceived by students as useful or meaningful, then we would be required to rethink our approach in using them to encourage student success.

4. Moving Forward: Theoretical and Practice Implications of a Mechanism-Based View of Non-Academic Support

Supporting students in their postsecondary pursuits requires that institutions address their non-academic needs. Though current theories of persistence examine the role non-academic support plays in the persistence process, they leave the precise ways by which such support is generated unexamined. This paper extends these theories by shifting attention toward the mechanisms by which student success occurs. Using theories of student persistence and the extant evaluation literature, this paper has identified four mechanisms by which non-academic supports can improve student outcomes: creating social relationships, clarifying aspirations and enhancing commitment, developing college know-how, and making college life feasible.

Interrogating the processes by which students persist is an important theoretical step forward. It begins to provide the context for integration and commitment that has been largely missing, illuminating the conditions under which these processes might occur. By rooting the four mechanisms in research conducted with academically vulnerable students at commuter and two-year institutions, I have aimed to extend our knowledge about persistence processes so that students usually excluded from theories of persistence are better accounted for.

Further research is needed to confirm the mechanisms and their relationship to positive student outcomes. In addition, the precise way in which non-academic supports influence academic outcomes remains under-investigated. Non-academic support activities are frequently coupled with academic interventions, as in learning communities that combine a cohort model with interdisciplinary learning. Presumably, there is a magnifying effect in which non-academic assistance supports and amplifies academic interventions. But what is this effect, and how do we best capitalize on it?

We also need to develop a better understanding of how student perceptions of non-academic support influence their outcomes. As noted, little is understood about how students perceive efforts to improve their college outcomes, and even less is known about the relationship between these perceptions and the effectiveness of non-academic support activities. It is also unclear if the mechanisms work the same way for all students or if the non-academic supports needed varies for different types of students.

Even absent the answers to these questions, using a mechanism-based understanding of student persistence has immediate implications for practice. Current community college reforms intended to improve student outcomes are usually limited to implementing new programs, but these efforts have had little impact. A shift is needed. *Efforts to improve persistence should focus on processes, not programs*. As has been emphasized in this paper, merely participating in a program, no matter how well-intended, is irrelevant if the program itself is not well-implemented. Exposing students to the mechanisms is the key. The vehicle by which this is done is less important than that it occurs at all. In examining reform efforts, it is necessary that colleges look beyond programs to deeply interrogate their practices and determine whether or not students have the opportunity to engage in these four non-academic support mechanisms.

The need to shift our conception of non-academic support away from specific programs becomes clear when we look at some of the current popular community college reform efforts, which include interventions such as learning communities and enhanced advising. The research on these is in the balance positive or mixed, but at most the positive effects have been modest.

Why might programs aimed at encouraging persistence fail to promote positive student outcomes? Shifting our lens to look at mechanisms rather than programs, we can see how these reforms might result merely in "tinkering around the edges" rather than the establishment of environments that truly help students create relationships or gain essential information. Learning communities, for example, might put students into cohorts but fail to provide them with the opportunity to engage with one another in *meaningful* ways (Lichtenstein, 2005, for example, demonstrates that not all learning communities are created equal in either implementation or in outcomes). Enhanced advising might falter when advisors do not have the time or are not given the training to help students create clear, step-by-step plans for success or to help students develop their cultural capital. Student success courses are only as good as the curriculum they use—and much is not known about the content of these courses.

It is clear that creating the conditions that promote non-academic support mechanisms is challenging. A number of new practices, however, might be useful in doing so. All of these, it should be noted, are not program-specific. Instead, they shift the delivery of information and the locus of relationship-building within a college through a variety of formal and informal activities, and in doing so help ensure that all students gain the opportunity to encounter non-academic supports.

The first is to *redesign advising and counseling so that it is both streamlined and personalized.* Students clearly need access to good information, and, as we have seen, current counseling structures and college budgets cannot support frequent individual advising sessions. But it is also clear that providing information to students en masse, through flyers or large orientation sessions, is ineffective, as students crave a "personal touch."

Streamlining advising via expanded student success courses is one possible way to create information efficiencies while still promoting relationships. These courses can be used to give students information, such as program planning procedures and financial aid information, usually provided during advising sessions. Delivering this basic information to an entire classroom of students at once means that advisors should be freed up to address more individual and vexing issues in one-on-one sessions. At the same time, the fact that the courses meet over multiple weeks allow students to develop relationships with each other and their professors.

Technology might also be used to create efficient yet personal information sources. A well-developed and truly interactive website, for example, could relieve college counselors of many course-scheduling activities, freeing them to work more in depth with students in need. A word of caution is required here, however. Research is clear that students need a "human touch," and students themselves tell us that they do not want more technology, they want human contact (Venezia, Bracco, & Nodine, 2010; CCSSE, 2009). Too much reliance on technology in this area may therefore be counterproductive, so such innovations should be implemented very carefully and thoughtfully.

A second promising approach is to *make non-academic supports intrusive so that students are forced to encounter them.* Students are often unaware of the non-academic help in which they are of need, particularly with regard to college know-how and clarifying their aspirations. Moreover, they may view the use of such support services as an admission that they "do not belong in college" or that they are somehow deficient.

Making non-academic support an integral part of every student's experience means that all students will receive help, even if they think they do not need it. Moreover, it moves support services away from a deficit model and toward one that views all students as in need of some assistance.

Intrusive supports can come in a number of forms. Making participation in traditional non-academic support activities such as advising or student success courses mandatory is one way.[4] Early warning systems, in which any student missing a certain number of class sessions or failing to receive certain grades is called by a counselor and offered assistance, is another. The key is to find ways to reach out to students before they are in dire need of help—before they even realize they need help themselves—and offer proactive assistance.

Another way to offer intrusive non-academic supports is to integrate them into the regular curriculum of academic subjects. College faculty can be "deputized" to be support personnel even as they teach, by being trained in pedagogies that encourage relationship-building and help students develop their cultural capital or college skills. For example, English faculty might be taught how to bring in lessons about cultural capital into their courses. Math faculty might find ways to use the FAFSA in their courses to help students learn math skills while also being exposed to the financial aid process. By integrating non-academic supports into the "regular" curriculum, students will not need to seek out such supports and are more likely to encounter them on a regular basis. Contextualizing non-academic skills, particularly those such as study skills that are immediately applicable to the classroom, might also make them more relevant and useful.

Finally, as Judith Scott-Clayton (2010) argues, *creating more structure within the community college* could also encourage student persistence and success. Greater structure may reduce the need for intensive support by simplifying students' choices and minimizing how many decision-points they encounter. Including the provision of non-academic supports as part of such a strategy—by organizing programs in ways that create cohorts or faculty-student relationships spanning multiple semesters—could also help ensure that such supports are widespread and easily accessed.

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[4] Of course, ensuring that these mandatory activities remain well-implemented even as they reach larger numbers of students is a key challenge.

This paper has sought to extend our understanding of the student persistence problem and fill in the gaps in the theoretical literature. The identification of four non-academic support mechanisms generates a picture of the conditions under which colleges can help students achieve their educational goals. Students—even those ostensibly academically prepared—need help in navigating the world of postsecondary education. Institutions can improve student outcomes by ensuring that non-academic supports promote these four mechanisms. The mechanisms can be implemented through a variety of formal support services as well as through informal systems. But it is essential that students be exposed to them—ideally through a broad strategy that structures such support into their daily lives as college students.

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Appendix

Table 1
Review of Empirical Studies

First Author (Year)	Intervention and Sample Size[a]	Study Design	Control[b]	Outcomes Examined[c]	Mechanisms Identified[d]	Summary of Findings/Conclusions
Bahr (2008)	Advising for remedial math students (N = 34,217) and transfer-seeking students (N = 68, 241)	Comparison using controls (event history using HLM)	Race/ethnicity, math competency, English competency, age, SES, academic goal	Successful math remediation, transfer to a four-year institution	Clarifying aspirations and enhancing commitment	Advising associated with successful remediation and transfer. Effects significantly greater for students at the lowest levels of remediation.
Bensimon (2007)	College experiences of successful minority students (N = 10)	Life history interviews	N/A	Transfer to four-year institution	Creating social relationships	Minority students benefit from social relationships.
Boudreau (1994)	Student success course (N = 643)	Matched comparison (ANOVA)	Race, sex, high school grade point average, high school test scores, admissions status, major	Persistence, college grade point average, credits earned, academic standing	Developing college know-how	Participation in student success course related to improved retention.
Cox (2009a)	English Composition (N = 33)	Interviews and observations	N/A	Success in English Composition	Clarifying aspirations and enhancing commitment	Students view school through a utilitarian lens, but what they view as useful often differs from what professors view as useful.
Cox (2009c)	English Composition	Case studies, interviews, and observations	N/A	Success in English Composition	Clarifying aspirations and enhancing commitment	Students view school through a utilitarian lens and have an acute fear of failure. They respond to these fears with a variety of coping mechanisms that seem counter-productive to their academic success.

First Author (Year)	Intervention and Sample Size[a]	Study Design	Control[b]	Outcomes Examined[c]	Mechanisms Identified[d]	Summary of Findings/Conclusions
Crisp (2010)	Mentoring (*N* = 320)	Structural equation modeling (MIMIC)	Gender, ethnicity, enrollment status	Integration, commitment, intent to persist, persistence	Creating social relationships	Mentoring predicts social and academic integration and institutional and goal commitment. Goal commitment predicts intent to persist. None of the variables in the model, including mentoring or integration, predict actual persistence, however.
Duquaine-Watson (2007)	College experiences of single mothers (*N* = 13)	Semi-structured interviews	N/A	N/A	Making college life feasible	Community college policies and practices can be unwelcoming to single mothers.
Engstrom (2008)	Learning community participation (*N* = 1,626)	Comparison using controls (regression), supplemented with site visits and student interviews	Age, gender, highest level of parental education, highest credential earned, US citizen, English as native language, ethnicity, engagement	Persistence to second year of college	Creating social relationships; Developing college know-how	Learning community students report having the opportunity to interact with peers and faculty members, and access to good information. Learning community students more likely to persist to their second year of college.
Grubb (2006)	Guidance and counseling in 15 community colleges	Case studies	N/A	N/A	Clarifying aspirations and enhancing commitment	Guidance and counseling practices in the community college are inadequate to meet the needs of underprepared students and inhibit student progress toward a degree.
Houghton (2001)	Workforce development programs (*N* = 4)	Case studies	N/A	Workplace cultural demands	Developing college know-how	Employers demand soft skills, but teaching them in a culturally-sensitive and effective manner is challenging.
Karp (2008)	Initial experience in community college (*N* = 36)	Interviews	N/A	Progress toward a degree	Creating social relationships; Developing college know-how	Networks of social relations are related to integration. Possession of cultural capital positively related to of student services and progress toward a degree.
Karp (2010)	Initial experience in community college (*N* = 36)	Interviews	N/A	Progress toward a degree	Creating social relationships	Access to information networks is correlated with integration. Integration is correlated with persistence to a second year of enrollment.

First Author (Year)	Intervention and Sample Size[a]	Study Design	Control[b]	Outcomes Examined[c]	Mechanisms Identified[d]	Summary of Findings/Conclusions
Keenan (1995)	Student success course (four cohorts, *N* unstated)	Comparison of gain scores (ANOVA)	None	Career maturity, academic confidence, use of campus resources, grade point average, credits attempted/earned, retention	Clarifying aspirations and enhancing commitment, developing college know-how	Students in a student success course increase their career maturity, have greater knowledge of campus resources, and use resources more frequently than non-participants; no difference in academic outcomes.
Johnson (2009)	Adults with some college experience (*N* = 614)	Interviews	N/A	N/A	Making college life feasible	Students face a variety of daily challenges that inhibit their ability to earn a college degree.
Lichtenstein (2005)	Learning community (*N* = 320)	Non-equivalent comparison, supplemented with focus groups and surveys	None	Retention; grade point average	Creating social relationships	Students in learning communities characterized by supportive classrooms and strong interpersonal relationships have higher grades and retention rates than both students in learning communities that do not promote such connections and non-participants.
Metzner (1989)	Academic advising (*N* = 1,033)	Comparison using controls (regression)	Age; gender; ethnicity; high school performance	Dropout	Clarifying aspirations and enhancing commitment	Good advising, as rated by students, is negatively associated with dropout, through its ability to increase student satisfaction, grades, and sense of utility.
Nitschke (2001)	Job training in a community college	Case study	N/A	N/A	Developing college know-how	Employers demand soft skills and these need to be included in job training programs.
Rendon (1994)	Student experiences in college (*N* = 136)	Interviews	N/A	N/A	Creating social relationships	Positive, informal relationships with external agents encourage student success.

First Author (Year)	Intervention and Sample Size[a]	Study Design	Control[b]	Outcomes Examined[c]	Mechanisms Identified[d]	Summary of Findings/Conclusions
Rosenbaum (2006)	Structural differences between private two-year (7) and community colleges (7), including interviews with faculty (*N* = 46) and students (*N* = 125)	Case study, faculty and student interviews	N/A	Teaching and learning of soft skills	Developing college know-how	Private two-year colleges are more likely to teach soft skills and cultural capital than community colleges.
Scott-Clayton (2011)	Structuring students' college experiences	Literature review	N/A	N/A	Developing college know-how	Students must navigate a complex environment and make myriad decisions in order to successfully earn a college degree.
Scrivener (2007)	Enhanced advising (*N* = 237)	Randomized	None	Credits attempted, credits earned, retention	Making college life feasible	Enhanced advising gives students individualized support; enhanced advising is related to some positive short-term outcomes.
Scrivener (2008)	Learning community (*N* = 1,534 for both comparison and treatment)	Randomized	None	College experiences	Creating social relationships	Learning community participants report a greater sense of integration and belonging on campus than do non-participants.
Scrivener (2009)	Enhanced advising (*N* = 1,073)	Randomized	None	Course registration; credits attempted and earned; course withdrawal; grade point average for program duration and four subsequent semesters	Clarifying aspirations and enhancing commitment	Enhanced advising is related to higher registration rates and number of developmental courses passed, but impacts do not persist over time.

First Author (Year)	Intervention and Sample Size[a]	Study Design	Control[b]	Outcomes Examined[c]	Mechanisms Identified[d]	Summary of Findings/Conclusions
Tinto (1997)	Learning community participation (*N* = 121)	Comparison using controls (regression), supplemented with student surveys (simple comparison analysis with no controls) and site visits including student interviews	Age, marital status, high school grades, working while in college, receiving financial aid, parental education, degree aspiration, hours per week studying, perceptions of college environment, college involvement, college grades	Persistence to the second year of college, use of college resources	Creating social relationships	Learning community students access college resources to a greater extent than comparison students and report having supportive peer and faculty relationships. Learning community students are more likely to persist to a second year of college.
Visher (2010)	Enhanced advising (*N* = 1,067)	Randomized	Class characteristics, math placement exam score, age, gender, full/part-time enrollment, instructor	Math course pass rates, math course withdrawal rates, developmental credit earning, use of support services	Creating social relationships, clarifying aspirations and creating commitment	Program participants more likely to access support services; part-time and developmental math students have better short-term academic outcomes than comparison students.
Waldron (2007)	Learning community (*N* = 184)	Comparison using controls (ANOVA)	High school grade point average, high school class rank, SAT/ACT scores, gender, ethnicity, financial aid	Grade point average, first-year retention, credit earning	Creating social relationships	Students in learning communities report more opportunities to communicate with and access information from faculty and peers; learning community participants have higher grade point averages and retention rates than non-participants.

[a]Size of the treatment group.
[b]Controls used when analyzing the results reported in this paper.
[c]Includes only outcomes reported in this paper.
[d]Mechanisms identified through inductive analysis for the purposes of this paper, not as part of the original research study.

PRINT FORM SUBMIT

GROSSMONT-CUYAMACA
COMMUNITY COLLEGE DISTRICT

Education Master Plan
Information Submission Form

The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resources allocation.

As the first step in this planning process, everyone in the GCCCD community (faculty, staff, students and community members) are invited to identify and submit information sources to be reviewed for the trend analysis in one of six areas – society, technology, economy, environment, politics, and education. We are not asking you to do research, only to identify information you already have or that you encounter during the search period (March 21- April 25) and bring it to our attention for review.

Please answer the following questions for each document you submit:

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2) Author: Christopher M. Mullin

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5) Relevance: current issues affecting community college completion rates

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Rebalancing the Mission:

The Community College Completion Challenge

Christopher M. Mullin

AACC Policy Brief 2010-02PBL
June 2010

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EXECUTIVE SUMMARY

President Barack Obama has set forth an ambitious agenda for U.S. postsecondary education: by 2020, to once again have the highest proportion of college graduates in the world. In April 2010, the American Association of Community Colleges and five other community college organizations responded by reaffirming their commitment to completion while maintaining their commitment to increasing access and quality. With this commitment to completion articulated, *Rebalancing the Mission: The Community College Completion Challenge* addresses what it means for community colleges to embrace completion in the same way that they have historically embraced access. Because community colleges are, first and foremost, oriented toward their communities, they may need to modify their traditional ways of fulfilling their individual missions, specifically in three areas: course enrollment, course completion, and certificate and degree completion.

In terms of the enrollment mission, community colleges provide access to, and opportunity for, education through courses that serve as the foundation for a career, a new life, or a new perspective. The belief in democratizing education by maintaining opportunity is paramount to the continuance of an educated citizenry. Support of the open-access philosophy by policymakers has resulted in strong student demand at community colleges, where enrollment has been increasing dramatically. Meeting increased demand for more noncredit and online courses is one challenge facing community colleges.

Another challenge for community colleges is to help some kinds of students to successfully complete courses, especially high school students, swirlers, and retoolers. For high school students, community colleges provide opportunities not only for the academically advanced but also for those who need to further develop their potential. Earning college credit while in high school has been shown to increase the likelihood that a student will enroll and persist in a postsecondary education institution. The demand for community college courses is apparent in the substantial growth of dual-credit programs in high schools. Community colleges also assist students in completing high school or its equivalent, which is essential to increasing earnings and future workplace, postsecondary, and military opportunities.

Swirlers—students who attend 4-year institutions and enroll at a community college for just one course—also reap economic benefits by earning credit that transfers at a much lower cost. The ability to take courses while enrolled concurrently in a 4-year institution can also decrease time-to-degree. Community colleges also represent a means of increasing workplace productivity for retoolers—students who enroll in courses to expand their knowledge or skills. Examples include learning a new welding technique, a new computer program, or the most recent changes in the Internal Revenue Code. Retoolers can also earn continuing education units, which may be essential to maintaining licensure in a profession.

The credentials primarily awarded by community colleges—certificates and associate degrees—play a unique role in advancing college completion rates. Given the current economic climate and high unemployment rates, there exists a clear demand for, and focus on, quickly returning people to a changing work environment through education and training. In community colleges, this demand manifests itself in heightened interest in short-term, work-related certificates in specific programs. Community college leaders are faced with focusing either on (a) increasing completion rates using the traditional measures (i.e., attainment of associate and bachelor's degrees) used in international comparisons or (b) getting people back to work with certificates and industry credentials that are not counted as a success measure in those comparisons. Focusing solely on the former narrowly defines success while overlooking the needs and achievements of a significant number of people, whereas focusing solely on the latter will not increase the international ranking of the United States. Community colleges are therefore in the difficult position of balancing two completion agendas: the person's need to return to work and the nation's desire to be a world leader in terms of a narrowly defined set of outcomes.

Aligning student success with future opportunities for continued career success should be part of any completion agenda. Within the community college, courses generally relate well to each other, but when graduates look to study at other institutions, they often face unanticipated difficulties. Thus, one challenge is to more clearly define and facilitate future education paths for students. Stackable credentials, career pathways, and applied associate and bachelor's degrees have emerged as ways to provide opportunity for continued academic progression for those who might otherwise have enrolled in terminal training programs.

Community colleges are committed to improving completion rates while maintaining their commitment to access and quality. This brief highlights some of the issues that community college leaders, working with their community partners, will have to navigate as they focus more squarely on improving completion rates, however they are defined. How each college addresses these issues will vary, but a consistent factor is that fiscal conditions will undoubtedly continue to influence policy and administrative decisions. Community colleges will have difficulty embracing the practices and perspectives needed to increase completion rates without additional fiscal resources, especially at a time when they are facing double-digit enrollment growth.

REBALANCING THE MISSION: THE COMMUNITY COLLEGE COMPLETION CHALLENGE

We believe education is essential for realizing the fullest potential of each member of our society and that appropriate higher education should be available to all who can benefit from it.

— From the *AACC Constitution*

Introduction

On February 24, 2009, President Barack Obama set forth an ambitious agenda for U.S. postsecondary education: by 2020, to once again have the highest proportion of college graduates in the world.[1] Five months later, at Macomb Community College in Michigan, the president placed the spotlight on community colleges to meet this ambitious goal. Of the estimated 8.2 million additional graduates needed for the United States to become the world leader in education,[2] five million additional students would graduate from community colleges.[3] The president's announcement in July 2009 of the American Graduation Initiative, which was aimed at providing the resources needed to meet the target, positioned community colleges front and center in the plan for the United States to become the world's most highly educated nation.[4]

Nine months later, however, the proposed program and accompanying $12 billion in funding that energized the largest sector of postsecondary education was not enacted. In the aftermath, community colleges continue to focus on how to move more students toward the achievement of their goals, with a new emphasis on graduation. In April 2010, the American Association of Community Colleges and five other community college organizations responded by reaffirming their commitment to completion while maintaining their commitment to increasing access and quality.[5] With this commitment to completion clearly and broadly articulated, this policy brief addresses what it means for community colleges to embrace completion in the same way that they have historically embraced access.[6]

Rebalancing the Mission

In a remarkable confluence, federal[7] and state governments[8] and foundations[9] are urging a paradigm shift for community colleges and similar institutions, from one emphasizing access to one emphasizing completion. Because of the egalitarian philosophy guiding community colleges, this shift has complex and challenging implications.

A galvanizing principle driving the focus on completion is that education contributes to the development of human capital. Although building human capital unquestionably benefits the broader community, it is most commonly expressed in terms of its labor market benefits to the individual person: Decreased unemployment and increased earnings accrue for each successive level of education a person attains.[10] Not surprisingly, research has shown that earnings increase not only by level of education attainment but also by program of study and standard industry wages.[11] For example, 25% of those with a bachelor's degree earn less than those with an associate's degree.[12]

Because community colleges are, first and foremost, oriented toward their communities, they may need to modify their traditional ways of fulfilling their individual missions in light of the completion imperative. In this brief, I examine the rebalancing of the community college mission that needs to occur; emphasizing less the curriculum that is offered (academic transfer, workforce development, developmental education, etc.)[13] and more the objectives students seek to complete (course enrollment, course completion, and certificate and degree completion).

Course Enrollment

On one level, the act of enrolling in a course is success for all those who desire education beyond high school,[14] for those new to the country who need a place to develop career-related skills, and for those who simply want to enrich their lives. As democratically oriented, egalitarian institutions, community colleges do not limit availability of courses to, nor design them exclusively for, those populations who need it most. Indeed, community colleges were initially conceptualized to serve as the first two years of a liberal arts higher education over 100 years ago.[15] In the century since, a substantial number of academically strong students have started at community colleges and transferred to continue and complete upper-division course work and degrees. In addition to their role as a starting point for higher education, community colleges serve a large number of students from 4-year institutions who wish to take classes at their local colleges during times when they are home with family.

Support of the open-access philosophy by policymakers is one reason for stronger demand for community colleges, where fall enrollment increased almost eightfold from 1963 to 2008.[16]

Federal actions to support access include continued funding for the Pell Grant and other Title IV student aid programs,[17] aid to institutions serving underrepresented populations,[18] various tax provisions,[19] and judicial decisions that support diversity on campus.[20] States have improved access by including in master plans community colleges located within commuting distance of potential students, by granting fiscal support for institutions and students,[21] and by implementing policies and actions to assist in preparing K–12 students for college and careers. Support for access continues to come from private foundations such as the Atlantic Philanthropies, Bill & Melinda Gates Foundation, Charles Stewart Mott Foundation, the Ford Foundation, the Joyce Foundation, the Walmart Foundation, the W.K. Kellogg Foundation, the Kresge Foundation, Lumina Foundation for Education, and numerous local, regional, and national foundations dedicated to providing opportunity for education. Most importantly, access to courses is the result of institutional admission policies.

The belief in democratizing education by maintaining opportunity is paramount to the continuance of an educated citizenry. The importance of open-access to course content is currently evident in the push for more online courses and those offered for non-credit.[22] While each institution will determine the degree to which it continues the practice of open access and the way it is provided, time has shown the need for and benefits of open access to postsecondary education.

Course Completion

While it takes an act of courage for many people to enroll in courses, it takes institutional effort as well to help students successfully complete them. People of all academic abilities enroll in community colleges for a multitude of reasons. Three primary groups are high school students, swirlers, and retoolers.

High School Students

Community colleges straddle two historically distinct silos of education: secondary and postsecondary. This creates unique opportunities and responsibilities for the colleges. Earning college credit while in high school has been shown to increase the likelihood that a student will enroll and persist in a postsecondary education institution.[23] Furthermore, the demand for college courses is apparent in the substantial growth of dual-credit programs in high schools.[24]

Taking courses while in high school can also help students in obtaining a high school diploma or its equivalent. Attaining a high school diploma is necessary, if by no means sufficient, to attain a middle-class lifestyle, with strong returns to students and their families in terms of further workplace, postsecondary, and military opportunities. Over the last decade, high school completers consistently earned nearly 50% more than those who did not complete high school.[25] As with all levels of postsecondary attainment, these increased earnings result in greater tax revenues for government and societal benefits.[26]

To be successful in college-level courses, students must have acquired the knowledge and skills provided by a rigorous K–12 learning experience. Yet many students lack the academic preparation to be successful in college, as is evidenced by the fact that, in 2004, approximately 60% of community college students need academic remediation.[27] The Developmental Education Initiative, funded by the Bill & Melinda Gates Foundation and Lumina Foundation, was created in 2009 to address this problem by working with community colleges and state policymakers to increase necessary academic support through course redesign.[28]

Swirlers

Swirlers—students who attend 4-year institutions and enroll at a community college for even just one course—reap economic benefits. Not only do these students receive a quality learning experience that is portable to their native institutions, but students who take the same course at a local community college pay, on average, $447 less in tuition than at their public 4-year institution.[29] The taxpayer benefits in that total federal, state, and local operating fund revenue provided for community colleges is just 19% that of public 4-year institutions.[30] Finally, the ability of students to take courses while either enrolled concurrently in a 4-year institution or during the summer also contributes to decreasing time-to-degree by providing the courses students need, where they need them, when they need them.

Retoolers

A lesser-known category of community college students consists of working adults who enroll for a course to retool their knowledge or skills.[31] As a result, workplace productivity increases for those who learn a new welding technique, a new computer program, or the most recent changes in the Internal Revenue Code. A corollary to courses taken by retooling students is continuing education units (CEUs) in the professional community.[32] In many professions,[33] maintaining licensure is contingent on expanding one's knowledge via CEUs earned in courses or at seminars.

Thus, classifying success solely in terms of course completion is incongruent with synoptic views of educational attainment. A way to broaden one's viewpoint is to examine the counterfactual: What if educational opportunity were not available at the course level? Under such conditions, a computer programmer would have to earn another degree to stay current in the field. Or a sole proprietor would have to earn a business degree to learn the accounting skills to manage business more effectively.

Many other examples could be given, but the point remains the same: There is value to completing a course. As community colleges focus on improving completion rates, they may need to reconsider the impact of packaging learning opportunities one course at a time.

Certificate and Degree Completion

Completing course work to obtain a credential, whether it is a certificate, work-related certification, or a degree, signifies an acquisition of knowledge and skills in a given discipline, but the world of credentials is mesmerizing in its scope and complexity. The credentials primarily awarded by community colleges—certifications and associate degrees—play a unique role in advancing college completion rates.

Certificate Programs

Given the current economic climate and high unemployment rates, there exists a clear demand for, and focus on, quickly returning people to a changing work environment through education and training. In community colleges, this demand manifests itself in heightened interest in short-term, work-related education certificates in a specific program. The trend toward short-term training predates current economic conditions, however: From 1997 to 2007 there was a 58.4% increase in short-term certificates awarded at community colleges as compared to an 18.7% increase in associate degrees, a 28.5% increase in moderate-term certificates, and a 9.8% decrease in long-term certificates.[34] It appears that this trend will continue: The Bureau of Labor Statistics projects that eight of the top 10 occupations with the largest employment growth by 2018 will require less than a bachelor's degree,[35] with six requiring less than an associate degree.

The focus on putting people back to work with short- and moderate-term certificates and associate degrees does pose a problem for the workhorse of higher education: community colleges. Community college leaders are faced with focusing either on (a) increasing completion rates using the traditional measures (i.e., attainment of associate and bachelor's degrees) established by the Organisation for Economic Cooperation and Development in international comparisons or (b) getting people back to work with certificates and industry credentials that are not counted as a success measure in international comparisons.[36] Focusing solely on the former narrowly defines success while overlooking the needs and achievements of a significant number of people, whereas focusing solely on the latter will not increase the international ranking of the United States. Community colleges are therefore in the difficult position of balancing two completion agendas: the person's need to return to work and the nation's desire to be a world leader in terms of a narrowly defined set of outcomes.

Community colleges have been addressing this completion disconnect by, for example, developing stackable credentials, defined as a "series of certificates, licenses, diplomas or other credentials that 'stack' on top of one another and designate advancement along career pathways."[37] For example, the Shifting Gears Initiative, funded by the Joyce Foundation, has begun the difficult work of merging training in workplace skills with the academic foundation needed to progress along a college and career pathway.[38]

Associate Degrees

Aligning student success with future opportunities for continued career success should be part of any completion agenda: It is estimated that a person will hold, on average, 10.8 jobs between the ages of 18 and 42 and will therefore need the requisite skills to be productive during these transitions.[39] Within the community college, courses generally relate well to each other, but when community college graduates look to study at other institutions, they often face unanticipated difficulties.[40]

One challenge is to more clearly define and facilitate future education paths for students. As is evidenced in Florida and most recently applied in Tennessee,[41] common course numbering across all postsecondary sectors, a clear statement of transferability, and a higher education system that guarantees acceptance to public 4-year institutions for associate degree completers are ways to encourage degree completion and better align state systems. Highly structured, accelerated learning experiences, such as short-term certificate and 1-year associate degree programs, have been embraced by some as a way to increase program completion. These accelerated programs can help young and adult learners meet President Obama's ambitious 2020 goal;[42] however, these learners have to juggle work and family responsibilities that limit their ability to forego earnings as may be required to complete accelerated programs.

A challenge for community colleges in accepting highly structured programs is the contentious issue of diminishing student aspirations—especially of traditionally disadvantaged populations. The process, known as "cooling-out,"[43] occurs when advisors encourage students to matriculate in less rigorous programs that they may believe the students would be more successful at completing. This issue has yet to be resolved conclusively, but recent research has shown that advising has a positive impact on completion, especially for those with academic deficiencies.[44] Furthermore, stackable credentials, career pathways, and applied associate and bachelor's degrees have emerged as ways to provide opportunity for continued academic progression for those who might otherwise have enrolled in terminal training programs.

Conclusion

Community colleges are committed to improving completion rates while maintaining their commitment to access and quality. This brief highlights some of the issues that community college leaders, working with their community partners, will have to navigate as they focus more squarely on improving completion rates, however difficult that may be to define. How each college addresses these issues will vary, but a consistent factor across all community colleges is that current fiscal conditions will undoubtedly continue to influence policy and administrative decisions.

Any conversation about national education attainment goals is also a conversation about national priorities. As such, it warrants an examination of the types of public investment necessary to produce the desired public good. Community colleges will have difficulty embracing the practices and perspectives needed to increase completion rates without additional fiscal resources, especially at a time when they are facing double-digit enrollment growth.[45] Funding community colleges at one fifth the amount that public 4-year institutions receive and expecting community colleges to provide the services and opportunities needed to reach an ambitious national completion goal is a problematic proposition.

NOTES

[1] *Remarks of President Barack Obama – As Prepared for Delivery Address to Joint Session of Congress*, February 24, 2009, para. 66.

[2] Martha Kanter, "What You Need to Know About President Obama's Graduation Initiative" (plenary session presentation at the annual convention of the American Association of Community Colleges, Seattle, WA, April 17-20, 2010).

[3] *Remarks by the President on the American Graduation Initiative*, July 14, 2009, para. 25.

[4] Student Aid and Fiscal Responsibility Act of 2009, H.R. 3221, 111th Cong., 1st Sess. (2009).

[5] American Association of Community Colleges, the Association of Community College Trustees, the Center for Community College Student Engagement, the League for Innovation in the Community College, the National Institute for Staff & Organizational Development, and Phi Theta Kappa Honor Society, *Democracy's Colleges: Call to Action* (Washington, DC: American Association of Community Colleges, April 20, 2010).

[6] What constitutes success is being defined for community colleges, by community colleges in a way that will allow them to be judged by the merit of their mission through the Voluntary Framework of Accountability. As such, this brief was not developed to define what constitutes completion.

[7] Student Aid and Fiscal Responsibility Act of 2009, H.R. 3221, 111th Cong., 1st Sess. (2009).

[8] See for example, Texas' *Closing the Gaps by 2015* (http://www.thecb.state.tx.us/index.cfm?objectid=858D2E7C-F5C8-97E9-0CDEB3037C1C2CA3) or Tennessee's *Complete College Act of 2010* (http://www.tbr.state.tn.us/news/default.aspx?id=6290).

[9] See, for example, Lumina Foundation for Education's "Big Goal" of increasing the percentage of Americans with high-quality degrees and credentials to 60 percent by the year 2025 (www.luminafoundation.org/goal_2025/index.html); The Bill & Melinda Gates Foundation's goal is to help double the number of low-income adults who earn a college degree or credential with genuine marketplace value by age 26 (www.gatesfoundation.org/postsecondaryeducation/Pages/default.aspx).

[10] I refer here to Walter McMahon's concept of modern human capital which includes "…not just narrowly defined economics of job markets and earnings…. [but] the use of human capital at home and in the community during leisure-time hours…" See, Walter W. McMahon, *Higher Learning, Greater Good: The Private and Social Benefits of Higher Education* (Baltimore, MD: The Johns Hopkins University Press, 2009): 5-10.

[11] For discussion of programs of study on earnings, see Louis Jacobson and Christine Mohker, *Pathways to Boosting the Earnings of Low-Income Students by Increasing Their Educational Attainment* (Washington, DC: The Hudson Institute and CNA, January 2009). As it relates to what herein is referred to as standard industry wages or– the "firm effect" – is informative to note that researchers have found "[t]here are three distinct components of wages: human capital, a firm effect and an unexplained residual. Because the human capital measure and the firm effect are virtually uncorrelated, when measured at the level of an individual job, an individual's earnings may be due to who they are or where they work… demographic characteristics - such as education, occupation, age, sex, marital status and even include some firm characteristics such as firm size and industry – are typically able to explain some 30% of earnings variation. Longitudinal data on workers and firms explain closer to 90% of earnings variation" from U.S. Census Bureau, Longitudinal Employer – Household Dynamics Program, *A Layman's Guide to the LEHD Human Capital Measures* (Informational Document No. ID-2003-04) (Suitland, MD: Author, January 2003).

[12] Anthony P. Carnevale, Jeff Strohl, and Nicole Smith, "Help Wanted: Postsecondary Education and Training Required" *New Directions for Community Colleges*, No. 146 (Summer2009): 21-31.

[13] Arthur M. Cohen and Florence B. Brawer, *The American Community College, 5th ed.* (San Francisco, CA: Jossey-Bass, 2008).

[14] K-12 education in 27 states has been determined to be inequitable and/or inadequate, see *"Equity" and "Adequacy" School Funding Liability Court Decisions, March 2010* (New York: National Access Network, 2010). www.schoolfunding.info.

[15] Allen A. Witt, James L. Wattenbarger, James F. Gollattscheck, and Joseph E. Suppinger, *America's Community Colleges: The First Century* (Washington, DC: American Association of Community Colleges, 1994).

[16] Tom D. Snyder and S. A. Dillow, *Digest of Education Statistics 2009* (NCES 2010-013) (Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U. S. Department of Education, 2010): Figure 11.

[17] Higher Education Opportunity Act of 2008 (Pub. L. No. 110-315 § 401 to 498).

[18] Public Law 110-315, Title III – Institutional Aid and Title V – Developing Institutions.

[19] For more information see, for example, Department of the Treasury, Internal Revenue Service, *Tax Benefits for Education: For Use in Preparing 2009 Returns* (Pub. No. 970) (Washington, DC: Author, January 25, 2010).

[20] Grutter v. Bollinger, 539 US 306 (2003); Gratz v. Bollinger 539 U.S. 244 (2003).

[21]Public fiscal support for community colleges has been recorded since 1966 in the Grapevine Database, http://www.grapevine.ilstu.edu/historical/index.htm. Data collection by sector of postsecondary education ended in 2009 with the merger of the Grapevine and the State Higher Education Finance survey of the State Higher Education Executive Officers.

[22] Open courses were given priority in the *American Graduation Initiative*. The Bill & Melinda Gates Foundation has a continued interest in open-courses for the 20 to 25 highest demand developmental and/or general education courses.

[23] Melinda Mechur Karp, Juan Carlos Calcagno, Katherine L. Hughes, Dong Wook Jeong and Tom Bailey, *The Postsecondary Achievement of Participants in Dual Enrollment: An Analysis of Student Outcomes in Two States* (St. Paul, Minnesota: National Research Center for Career and Technical Education, University of Minnesota, October 2007).

[24] Southern Regional Education Board, New *Data Reveal Percent of College Credits Taken by High School Students* (Fact Book Bulletin 10E01) (Atlanta, GA: Author, March 2010); T. Waits, J. C. Setzer, and L. Lewis, *Dual Credit and Exam-based Courses in U.S. Public High Schools: 2002–2003* (NCES Report No. 2005-009) (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2005).

[25] From 1998 to 2008 the percent increased range was from 43 to 52%. See, U.S. Census Bureau, Current Population Survey, Educational Attainment in the United States: 2009 (Washington, DC: Author, April 2010): Table A-3.

[26] See, for example, Walter W. McMahon, *Higher Learning, Greater Good: The Private and Social Benefits of Higher Education* (Baltimore, MD: The Johns Hopkins University Press, 2009); Howard R. Bowen, *Investment in Learning: The Individual and Social Value of American Higher Education* (San Francisco: CA, Jossey-Bass, 1977).

[27] John Wirt, Susan Choy, Patrick Rooney, Stephen Prevasnik, Anindita Sen, and Richard Tobin, *The Condition of Education 2004* (NCES 2004-077) (Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2004): Table 18-1.

[28] For more information see, http://www.deionline.org/.

[29] This value reflects the difference of reported tuition and fees per 3 credit course. Tuition and fees per 3 credit course was derived by first dividing tuition and fees by 30 [number of credits for full-time equivalent student], then multiplying by 3 [number of credits per course]. Data from Tom D. Snyder and S. A. Dillow, *Digest of Education Statistics 2009* (NCES 2010-013) (Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U. S. Department of Education, 2010): Table 335. A difference of $448 was observed when conducting the same analysis on data presented in, College Board, *Trends in College Pricing 2009* (Washington, DC: Author, October 2009).

[30] Author analysis 2006-07 data from column 4 of Tom D. Snyder and S. A. Dillow, *Digest of Education Statistics 2009* (NCES 2010-013) (Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U. S. Department of Education, 2010): Table 352.

[31] Christopher M. Mullin and Kent Phillippe, *Community College Enrollment Surge: An Analysis of Estimated Fall 2009 Headcount Enrollments at Community Colleges* (2009-01PBL) (Washington, DC: American Association of Community Colleges).

[32] Continuing Education Units are defined by the International Association for Continuing Education and Training (IACET) as "ten contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction." (http://www.iacet.org/content/continuing-education-units.html). The American Council on Education is a partner to IACET.

[33] CEU requirements generally apply to professions which require licensure, and as such may be required to maintain one's license. These requirements can vary by field and state. A few examples of professions where CEUs are required include architects, building inspectors, educators, engineers, nurses, and well drillers.

[34] Short-term refers to certificates requiring less than one academic year, moderate-term refers to awards requiring at least one but less than two years, and long-term require more than two academic years to complete. See, Laura Horn and Xiaojie Li, *Changes in Postsecondary Awards Below the Bachelor's Degree: 1997 to 2007* (Stats in Brief, NCES 2010-167) (Washington, DC: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, November 2009): Table 2.

[35] U. S. Department of Labor, Bureau of Labor Statistics, *Employment Projections 2008-2018* (DL-09-1503) (Washington, DC: Author, December 11, 2009): Table 6.

[36] Email correspondence, OECD statistician, January 5, 2010. For further information about mapping educational attainment see, OECD data file "2765339.xls" obtained from www.oecd.org/dataoecd/11/18/2765339.xls.

[37] Minnesota Career and Technical Education, *Minnesota FasTRAC (Training, Resources and Credentialing) Supplement Background Information* (St. Paul, MN: Minnesota State Colleges & Universities, 2009): 1.

[38] For more information on the Shifting Gears initiative see www.shifting-gears.org.

[39] U.S. Department of Labor, Bureau of Labor Statistics, *Number of Jobs Held, Labor Market Activity, and Earnings Growth Among the Youngest Baby Boomers: Results From a Longitudinal Survey Summary* (USDL 08-0860) (Washington, DC: Author, June 27, 2008).

[40] Associate degree attainment has a varied history, influenced in part by state policies and relationships with other sectors of postsecondary education. If a state does not have a transfer policy built upon the acquisition of an associate's degree, the incentive for transfer-oriented students to pursue one is diminished. It is the case in some states that 4-year institutions wish for transfer students only to complete their general education requirements at the community college and then transfer. For further discussion, see *Community Colleges and Baccalaureate Attainment* (AACC Statement) (Washington, DC: American Association of Community Colleges, October 19, 2009).

[41] For more information see *Complete College Tennessee Act of 2010*, http://www.tbr.state.tn.us/news/default.aspx?id=6290

[42] One estimate places 70% of the increased awards will have to come from the adult learners. See, State Higher Education Executive Officers, *The College Degree Gap: One Million More Degrees Annually, 2009-2025* (Boulder, CO: Author, 2009).

[43] Burton R. Clark, The "Cooling-out" Function in Higher Education," *The American Journal of Sociology, 65*, No. 6 (1960): 569-576; Burton R. Clark, The "Cooling-out" Function Revisited," in New Directions for Community Colleges, No. 32, ed. George B. Vaughan (San Francisco, CA: Jossey-Bass, 1980): 15-31.

[44] See, Peter R. Bahr, "Cooling Out in the Community College: What is the Effect of Academic Advising on Students' Chances of Success*?" Research in Higher Education 49* (2008): 704-732.

[45] Christopher M. Mullin and Kent Phillippe, *Community College Enrollment Surge: An Analysis of Estimated Fall 2009 Headcount Enrollments at Community Colleges* (2009-01PBL) (Washington, DC: American Association of Community Colleges).

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AACC MISSION

Building a Nation of Learners by Advancing America's Community Colleges

PRINT FORM SUBMIT

GROSSMONT-CUYAMACA
COMMUNITY COLLEGE DISTRICT

Education Master Plan
Information Submission Form

The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resources allocation.

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Please answer the following questions for each document you submit:

(Feel free to submit as many of these forms as you would like)

1) What is the name of the document? Career Technical Education A Critical Components of States

2) Author: NASDCTE

3) Source:

4) Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ● Economy
- ○ Environment
- ○ Politics and Legal Issues
- ○ Education
- ○ Other

5) Relevance:

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Career Technical Education:

A Critical Component of States' Global Economic Strategy

National Association of State Directors of Career Technical Education Consortium (NASDCTEc)

Reflect, Transform, Lead:
A New Vision for Career Technical Education

Our vision's core principles are:

- **CTE is critical to ensuring that the United States leads in global competitiveness.**
- CTE actively partners with employers to design and provide high-quality, dynamic programs.
- CTE prepares students to succeed in further education and careers.
- CTE is delivered through comprehensive programs of study aligned to The National Career Clusters framework.
- CTE is a results-driven system that demonstrates a positive return on investment.

www.careertech.org

> "For the United States to assert its leadership in this complex and ever-changing economy, education must be central to our economic strategy."

In this dynamic global economy, the connection between education and the workforce could not be more apparent. For the United States to assert its leadership in this complex and ever-changing economy, education must be central to our economic strategy. That means for education programs to truly be effective, we must collaborate with business and industry to align what they teach with what the economy demands. Underscoring the urgency to address this issue, economic forecasts predict that as the U.S. economy fights to recover and excel, disconnect between the types of jobs employees need to fill and the education and technical skills people have to secure those jobs will grow.

Several international rankings suggest that the United States' status in the global economy is already slipping.

In a recent World Economic Forum report, the United States dropped from the number one to the number two rank in the 2009-2010 Global Competitiveness Index. Taking the top spot from the United States is Switzerland. **When looking at the top 10 most competitive nations – European countries have earned 6 of those top 10 rankings.** Further, according to an international student assessment, the United States ranks 25th of 30 industrialized nations in mathematics literacy with an average score of 474, which is below the nations' 498 average.

It is crucial for the United States to address this issue now. While national leaders have made some progress in connecting education and economic development, there are states that stand out as leaders. Alabama and South Carolina, which are highlighted in this brief, have used their investments in career technical education (CTE) to lure and retain international companies, and prepare students to vie for jobs across the globe. Their forward-thinking approach has helped them partner with leaders of major, burgeoning industries to develop programs that train their students for the jobs of tomorrow, and secure employment and high-wage opportunities for their states' residents.

"A global economy is also characterized by its diversity and agility. Thus, South Carolina has also geared its CTE programs toward high-tech and bio medical industries, a move that the state's workforce advisory committees have encouraged and policymakers' have supported."

The notion of global competition has long been simmering in South Carolina, which is now an established corridor for the advanced auto manufacturing industry. As early as the 90s, BMW courted the state as a potential site for a manufacturing plant. But before BMW would commit, the company deployed representatives to local workforce and education training sites and schools to assess whether South Carolina sufficiently prepared students to work for their German company, said Dr. James Couch, State Director of Office of Career and Technology Education in the South Carolina Department of Education. When BMW did decide to set up shop in South Carolina, the company offered to help boost education and provide engineers to train school teachers. To date, BMW remains in South Carolina and has more than doubled the number of people it employs in the state.

Since, South Carolina has lured a range of auto companies and established a strong network of automobile associations to help update the education systems, specifically CTE programs, as technology in the industry advances. Of recent, CT&T United, a U.S. subsidiary of a South Korean electric car manufacturing company, landed in South Carolina, bringing another internationally-based opportunity into the mix.

State leaders are cognizant of the value CTE has held with sustaining and cultivating such economic growth. In 1998, the Department of Education launched its mission to boost the number of CTE engineering education programs it offered. The state started at zero, but today engineering programs can be found in about 130 high schools, 65 middle schools and 30 elementary schools. The department is in the process of collaborating with industry and postsecondary institutions to develop an advanced manufacturing career cluster pathway that reflects the evolving auto industry and even the aerospace industry.

It is important to note that the state's investments in CTE programs are not limited to engineering. A global economy is also characterized by its diversity and agility. Thus, South Carolina has also geared its CTE programs toward high-tech and bio medical industries, a move that the state's workforce advisory committees have encouraged and policymakers' have supported. Industry partners include CISCO, Oracle and Boeing.

To ensure that students gain a comprehensive CTE experience that prepares them for both college and career, the state's Education Economic Development Act requires all CTE students to have a work-based learning experience that aligns with the Career Clusters program by which they are enrolled. All learning should be relevant and real, and employers have lauded the thorough intent of that law and other state policies.

"Alabama's governor has supported strategies that include the collaboration of aerospace engineering companies, and secondary and post secondary institutions."

In light of global competition, more states have established comprehensive statewide strategies that include improving education and training programs in schools to lure and retain industries. Alabama, for instance, co-founded The Aerospace Alliance with neighboring Mississippi and Louisiana. The initiative aims to assert the region as a corridor for aerospace companies and boast the states' highly-skilled workforce. That goal places a significant emphasis on CTE and the role such programs play to foster highly-skilled employees, said Sherry Key, Career and Technical Education Director with the Alabama Department of Education.

Alabama's governor has supported strategies that include the collaboration of aerospace engineering companies, and secondary and post-secondary institutions. The linkages allow for programs that offer seamless transitions across systems and for smoother shifts as changes in the economy occur. Further, Alabama schools participate in international programs such as the NASA Great Moonbuggy Race, a competition in which high school and college students participate, and ties students' classroom experience with the overall notion of global competition.

The concept of global competition is an issue in itself that the CTE department has worked to embed in all of its programs. For instance, an agricultural program includes exploration in the business aspect of exporting peanut products to countries such as Japan, which consumes Alabama's resource.

Global competition is not a buzz phrase; it is a reality that education and workforce leaders must embrace in order to prepare the nation's students to succeed in this dynamic economy. Comprehensive CTE programs can help attract and retain industries that may go abroad if our workforce does not have the skills and knowledge to fill positions. CTE is critical to ensuring that the United States leads in global competitiveness ; NASDCTEc is committed to programs aligned to internationally-benchmarked standards and the real-time demands of the economy.

For more information on this brief, please contact Warren Zentz, Research and Policy Assistant, at the National Association of State Directors of Career Technical Education Consortium.
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www.careertech.org | wzentz@careertech.org

i. Executive Office of the President Council of Economic Advisers, Preparing The Workers of Today For the Jobs of Tomorrow. 2009.
ii. Anthony P. Carnevale, Nicole Smith, Jeff Strohl, Help Wanted: Projections of Jobs and Education Requirements Through 2018. 2010. http://cew.georgetown.edu/
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v. National Association of State Directors of Career Technical Education, Reflect, Transform, Lead: A New Vision for Career Technical Education. 2010. www.careertech.org

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Please answer the following questions for each document you submit:

(Feel free to submit as many of these forms as you would like)

1) What is the name of the document? American Graduation Initiative

2) Author: President Obama

3) Source: White House

4) Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

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THE WHITE HOUSE
Office of the Press Secretary

FOR IMMEDIATE RELEASE July 14, 2009

Below are excerpts of the President's remarks in Warren, Michigan today and a fact sheet on the American Graduation Initiative.

..[T]he hard truth is that some of the jobs that have been lost in the auto industry and elsewhere won't be coming back. They are casualties of a changing economy. And that only underscores the importance of generating new businesses and industries to replace the ones we've lost, and of preparing our workers to fill the jobs they create. For even before this recession hit, we were faced with an economy that was simply not creating or sustaining enough new, well-paying jobs.

…

Time and again, when we have placed our bet for the future on education, we have prospered as a result – by tapping the incredible innovative and generative potential of a skilled American workforce. That is what happened when President Lincoln signed into law legislation creating the land grant colleges which not only transformed higher education, but also our economy. That is what took place when President Roosevelt signed the GI Bill which helped educate a generation – and usher in an era of unprecedented prosperity.

…

That is why, at the start of my administration I set a goal for America: by 2020, this nation will once again have the highest proportion of college graduates in the world…Today, I am announcing the most significant down payment yet on reaching this goal in the next ten years. It's called the American Graduation Initiative. It will reform and strengthen community colleges from coast to coast so that they get the resources students and schools need – and the results workers and businesses demand. Through this plan, we seek to help an additional five million Americans earn degrees and certificates in the next decade.

…

Not since the passage of the original GI Bill and the work of President Truman's Commission on Higher Education – which helped double the number of community colleges and increase by seven fold enrollment in those colleges – have we taken such a historic step on behalf of community college in America. And let me be clear: we pay for this plan by ending the wasteful subsidies we currently provide to banks and private lenders for student loans, which will save tens of billions of dollars over the next ten years. Instead of lining the pockets of special interests, it's time this money went toward the interest of higher education in America.

…

…[W]e also know that in the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as jobs requiring no college experience. We will not fill those jobs – or keep those jobs on our shores – without the training offered by community colleges.

THE AMERICAN GRADUATION INITIATIVE: STRONGER AMERICAN SKILLS THROUGH COMMUNITY COLLEGES

"Now is the time to build a firmer, stronger foundation for growth that will not only withstand future economic storms, but one that helps us thrive and compete in a global economy. It's time to reform our community colleges so that they provide Americans of all ages a chance to learn the skills and knowledge necessary to compete for the jobs of the future."
– President Barack Obama

In an increasingly competitive world economy, America's economic strength depends upon the education and skills

BLOG POSTS ON THIS ISSUE

April 29, 2011 12:00 AM EDT
West Wing Week: "Final Adjustments"
This week, the President celebrated Easter, worked on short term and long term ways to get away from high gas prices, pledged support for Alabama and other states in the South hit by devastating storms and announced new key members of his National Security team.

April 28, 2011 2:30 PM EDT
Joining Forces to Educate Military Children
The National PTA and the Military Child Education Coalition are teaming up to help parents and teachers make sure military children have the best opportunities to succeed academically.

April 28, 2011 9:12 AM EDT
Advance Estimate of GDP for the First Quarter of 2011

Austan Goolsbee, Chairman of the Council of Economic Advisers, discusses the latest quarterly Gross Domestic Product estimates.

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of its workers. In the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as those requiring no college experience. To meet this economic imperative, President Barack Obama asks every American to commit to at least one year or more of higher education or career training and set a new national goal: by 2020, America will once again have the highest proportion of college graduates in the world.

Today, at Macomb Community College in Michigan, he outlined his plan to reform our nation's community colleges, calling for an additional 5 million community college graduates by 2020 and new initiatives to teach Americans the skills they will need to compete with workers from other nations. He outlined new initiatives to increase the effectiveness and impact of community colleges, raise graduation rates, modernize facilities, and create new online learning opportunities. These steps -- an unprecedented increase in the support for community colleges -- will help rebuild the capacity and competitiveness of America's workforce.

The announcement comes a day after the Council of Economic Advisers released a report describing how the U.S. labor market is expected to grow and develop in the coming years. The CEA described an expected shift toward jobs that require workers with greater analytical and interactive skills and summarized the attributes of a well-functioning education and training system designed for the jobs of the future.

THE AMERICAN GRADUATION INITIATIVE

Fifty years ago, President Harry Truman called for a national network of community colleges to dramatically expand opportunities for veterans returning from World War II. Today, faced with rapid technological change and global competition, community colleges are needed more than ever to raise American skills and education levels and keep American businesses competitive. President Barack Obama called for an additional 5 million community college degrees and certificates by 2020 and new steps to ensure that those credentials will help graduates get ahead in their careers. Together, these steps will cost $12 billion over the next decade. The administration will pay for them as part of a package that cuts waste out of the student loan program, increases Pell Grant scholarships, and reduces the deficit.

Community colleges are the largest part of our higher education system, enrolling more than 6 million students, and growing rapidly. They feature affordable tuition, open admission policies, flexible course schedules, and convenient locations, and they are particularly important for students who are older, working, need remedial classes, or can only take classes part-time. They are also capable of working with businesses, industry and government to create tailored training programs to meet economic needs such as nursing, health information technology, advanced manufacturing, and green jobs, and of providing customized training at the worksite.

Business and industry play an important role in training the workforce of the future and meeting the on-going demands of the marketplace. Many community colleges are already working with businesses to develop programs and classes ranging from degrees to certified training courses for retraining and on-going training for enhancing skills. For example, Cisco's Networking Academy is working with community colleges to train students throughout the country on technology-based jobs and it is expanding this platform to train for broadband infrastructure and health care information technology.

The American Graduation Initiative will build on the strengths of community colleges and usher in new innovations and reforms for the 21st century economy. It will:

- **Call for 5 Million Additional Community College Graduates**: In February, President Obama called for America to once again lead the world in college degrees by 2020. Affordable, open-enrollment community colleges will play a critical role in meeting that goal. Today, he set a complementary goal: an additional 5 million community college graduates by 2020, including students who earn certificates and associate degrees or who continue on to graduate from four-year colleges and universities.
- **Create the Community College Challenge Fund**: Too often community colleges are underfunded and underappreciated, lacking the resources they need to improve instruction, build ties with businesses, and adopt other reforms. Under President Obama's plan, new competitive grants would enable community colleges and states to innovate and expand proven reforms. These efforts will be evaluated carefully, and the approaches that demonstrate improved educational and employment outcomes will receive continued federal support and become models for widespread adoption. Colleges could:
  - Build partnerships with businesses and the workforce investment system to create career pathways where workers can earn new credentials and promotions step-by-step, worksite education programs to build basic skills, and curriculum coordinated with internship and job placements.
  - Expand course offerings and offer dual enrollment at high schools and universities, promote the transfer of credit among colleges, and align graduation and entrance requirements of high schools, community colleges, and four-year colleges and universities.
  - Improve remedial and adult education programs, accelerating students' progress and integrating developmental classes into academic and vocational classes.
  - Offer their students more than just a course catalog, through comprehensive, personalized services to

help them plan their careers and stay in school.

In addition, the initiative will support a new research center with a mission to develop and implement new measures of community colleges' success so prospective students and businesses could get a clear sense of how effective schools are in helping students -- including the most disadvantaged -- learn, graduate, and secure good jobs.

- **Fund Innovative Strategies to Promote College Completion**: Nearly half of students who enter community college intending to earn a degree or transfer to a four-year college fail to reach their goal within six years. The College Access and Completion Fund will finance the innovation, evaluation, and expansion of efforts to increase college graduation rates and close achievement gaps, including those at community colleges. Promising approaches include performance-based scholarships, learning communities of students, professors and counselors, colleges tailored to promote the success of working adults, and funding formulas based on student progress and success as well as initial enrollment. Resources would also be provided to improve states' efforts to track student progress, completion, and success in the workplace.
- **Modernize Community College Facilities**: Often built decades ago, community colleges are struggling to keep up with rising enrollments. Many colleges face large needs due to deferred maintenance or lack the modern facilities and equipment needed to train students in technical and other growing fields. Insufficient classroom space can force students to delay needed courses and reduce completion rates. President Obama is proposing a new $2.5 billion fund to catalyze $10 billion in community college facility investments that will expand the colleges' ability to meet employer and student needs. The resources could be used to pay the interest on bonds or other debt, seed capital campaigns, or create state revolving loan funds.
- **Create a New Online Skills Laboratory**: Online educational software has the potential to help students learn more in less time than they would with traditional classroom instruction alone. Interactive software can tailor instruction to individual students like human tutors do, while simulations and multimedia software offer experiential learning. Online instruction can also be a powerful tool for extending learning opportunities to rural areas or working adults who need to fit their coursework around families and jobs. New open online courses will create new routes for students to gain knowledge, skills and credentials. They will be developed by teams of experts in content knowledge, pedagogy, and technology and made available for modification, adaptation and sharing. The Departments of Defense, Education, and Labor will work together to make the courses freely available through one or more community colleges and the Defense Department's distributed learning network, explore ways to award academic credit based upon achievement rather than class hours, and rigorously evaluate the results.

THE OBAMA-BIDEN AGENDA FOR COLLEGE AFFORDABILITY

Today's new initiatives complement President Obama's existing agenda for higher education. At this time of economic hardship and uncertainty, the Administration's agenda will build the country's capacity, innovation and confidence to drive the nation to first place in the highly skilled workforce crucial for success in the 21st century. These initiatives include:

- **Expanding Pell Grants and College Tax Credits**: The Recovery Act increased Pell Grants by $500 to $5,350 and created the $2,500 American Opportunity Tax Credit for four years of college tuition. Now, the Administration is working to make these policies permanent and ensure the Pell Grant continues to grow faster than inflation. Together, the Recovery Act and President's Budget call for nearly $200 billion in college scholarships and tax credits over the next decade.
- **Reforming the Student Loan Program to Save Billions**: Guaranteed student loans earn banks and other lenders large profits set by the political process rather than won in a competitive marketplace. The Administration will replace guaranteed loans with direct loans, which are administered by private-sector companies, like Sallie Mae and Accenture, selected through a competitive process and paid based upon performance. Direct loans have essentially the same terms for students, are more reliable and efficient, and will save billions of dollars to finance these investments in community colleges as well as increase Pell Grant scholarships and other investments in college opportunity.
- **Simplifying the Student Aid Application**: The application for federal student aid has as many as 153 questions, creating major obstacle in the path of aspiring college students. More than a million students fail to apply for aid because of the application's complexity. The Obama Administration is simplifying the financial aid process by modernizing the online application, seeking legislation that will eliminate unnecessary questions, and creating an easy process for students to use tax data to apply. The end result will be a modernized application that requests only easily obtainable personal information
- **Helping Unemployed Workers Get New Skills**: In May, President Obama expanded opportunities for unemployed workers to go to a community college and earn new skills. The Department of Education has clarified that these workers should not be denied student aid based upon incomes they no longer earn, and the Department of Labor is working with states to allow workers to keep their unemployment benefits while receiving education and training.
- **Expanding the Perkins Loan Program**: The low-cost Perkins loan program is an important option for

students who need to borrow more than allowed under the larger Stafford loan program. The Administration will expand it from $1 billion a year to $6 billion a year, making loans available to 2.7 million more students and at 2,600 additional colleges and universities.

- **Helping Families Save for College**: The President's Middle Class Task Force has directed the Department of the Treasury to investigate improvements to 529 savings plans to help families save for college more effectively and efficiently.

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2) Author: Perin

3) Source:

4) Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ● Education
- ○ Other

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COMMUNITY COLLEGE RESEARCH CENTER

CCRC BRIEF

NUMBER 53 APRIL 2011

Facilitating Student Learning Through Contextualization

Dolores Perin

Skills in reading, writing, and mathematics are key to academic learning but are conventionally taught separately from the discipline areas to which they must be applied. For example, students may be taught writing skills in the morning in an English course and then be expected to apply them to writing an essay in a history class in the afternoon. Several problems arise with this structure. First, students do not necessarily transfer their morning writing skills to the afternoon history assignment. Second, students may not be motivated to learn writing skills in the English class because they do not consider such skills to be relevant to their personal goals (Cavazos, Johnson, & Sparrow, 2010). Third, weaknesses in essay-writing skills may not be addressed by the afternoon content-area teacher, who aims to teach subject knowledge rather than basic skills (Fisher & Ivy, 2005).

These problems have serious implications for the academic trajectory of the many underprepared students who enter postsecondary education. Despite the allocation of considerable resources to developmental education, many students in college-credit courses display continuing difficulties in applying these foundational skills to the learning of subject matter (Perin & Charron, 2006). One way to address this issue is through *contextualization*, or the teaching of basic skills in the context of disciplinary topic areas.

The contextualization of basic skills is defined here as an instructional approach that creates explicit connections between the teaching of reading, writing, or math on the one hand and instruction in a discipline area on the other, as, for example, when writing skills are taught with direct reference to topics covered in a history class.

Based on a longer review that considers the hypothesis that low-skilled students can learn more effectively and advance to college-level programs more readily through contextualization of basic skills instruction, this Brief presents two major forms of contextualization and explores possible mechanisms by which they may benefit students. Evidence for the effectiveness of contextualization is then summarized in order to determine what is known about possible advantages for low-skilled students. The Brief ends by discussing practical implications and future directions for research on the relation between contextualization and academic outcomes for low-skilled college students.

Two Forms of Contextualization

Contextualization is implemented in two distinct forms: *contextualized* and *integrated* instruction. This distinction has not been made explicitly in previous literature, but it is an important one because each form involves different teaching staff and instructional emphases. To maintain consistency with previous literature, the umbrella term "contextualization" is used here to refer collectively to both forms of instruction.

Contextualized basic skills instruction involves the teaching of academic skills against a backdrop of specific subject matter to which such skills need to be applied, and is taught by reading, writing, and math instructors. The primary instructional objective is to teach academic skills rather than the subject matter. Generally, the same skills found in conventional developmental or other academic skills classes are taught, but they are presented in the context of content from current or future disciplinary courses. For example, instruction in an English class on procedures for writing a persuasive essay might use topics being taught in a concurrent history class (De La Paz, 2005). Also, since many community college students aspire to allied health degrees but have difficulty with the reading demands of required biology classes, developmental reading instructors can utilize content taken directly from the textbooks used in those courses in order to teach reading comprehension strategies (Perin & Hare, 2010).

Integrated basic skills instruction is the incorporation of reading, writing, or math instruction into the teaching of content. Integrated instruction is taught by discipline-area instructors, with the academic skills serving as a means of developing critical thinking about disciplinary content (Pearson, Moje, & Greenleaf, 2010). For example, a high school science teacher may teach students how to write an argument showing why evidence supports one conclusion rather than another on a scientific issue (Krajcik & Sutherland, 2010). Integrated instruction may also be used when a content instructor observes that many students are having difficulty with the basic skills needed to learn the material.

Commonalities. Both contextualized and integrated instruction are a departure from traditional basic skills instruction, where reading, writing, and math are taught in the abstract, with little or no reference to authentic applications (Johnson, 2002; Jurmo, 2004). Because instruction must be customized for specific contexts, both approaches may require considerable effort on the part of instructors. However, given the high incidence of difficulty with basic academic skills among many college students in the United States (Bailey, Jeong, & Cho, 2010; Grigg, Donahue, & Dion, 2007; Salahu-Din, Persky, & Miller, 2008), it is important to find instructional methods that can promote improved outcomes. Both forms of contextualization seem to be a promising direction for this purpose.

Underlying Mechanisms

The connection of basic skills instruction to applications and life goals is consistent with constructivism, which places students' interests and needs at the center of education (Dewey, 1966; Dowden, 2007). The theoretical literature suggests that both cognitive and affective mechanisms underlie the expected improvement in learning outcomes.

From a cognitive perspective, contextualization is thought to promote transfer of learning and improve the retention of information. However, knowing when and where one should apply a previously-learned skill requires metacognitive and self-regulation abilities that low-skilled students may lack. Linking basic skills in developmental education instruction directly to authentic content-area applications that students will encounter in a disciplinary course may increase the likelihood of transfer of skill to that particular setting. It has been suggested that by using authentic academic texts as part of academic assistance services, low-skilled students become more active learners and are then more inclined to use their skills in college courses (Simpson & Nist, 2002).

Barnett and Ceci (2002) proposed that the extent of transfer of skill varies according to the type of skill being targeted, how transfer is measured, the demands placed on memory of the skill to be transferred, and the distance between learning and transfer. According to this framework, the distance between original learning and eventual transfer can be measured in terms of the similarity of the two domains, as well as the physical, temporal, functional, and social contexts, and the modality for expressing transfer (modality refers to the setting in which the transferred skills are applied, such as the use of skills learned in a math class when completing a task assigned in an accounting class).

In addition to the cognitive mechanism of transfer of learning, the possible benefits of contextualization may be explained by the affective mechanism of intrinsic motivation, where a learner is drawn to engage in a task because it is perceived as interesting, enjoyable, and/or useful (L. Baker & Wigfield, 1999; Becker, McElvany, & Kortenbruck, 2010; Ryan & Deci, 2000). Low motivation can occur when students do not realize that their academic skills are not at college standard; they may therefore resist the need to sit yet again in classrooms that teach basic skills. Further, they may have competing job and family responsibilities (Caverly, Nicholson, & Radcliffe, 2004; Kozeracki, 2005). Connecting developmental reading, writing, and math instruction directly to the content courses students must pass in order to earn a postsecondary credential may improve intrinsic motivation to learn the skills.

Evidence on Contextualization

The literature was searched for evidence on the contextualization of basic skills instruction. Because there were few studies with college samples, research from elementary and secondary education was included as well. Studies were selected if they contextualized basic skills instruction and used quantitative measures of student academic outcomes. Twenty-seven studies were found, 17 on contextualized instruction, nine on integrated instruction, and one on both contextualized and integrated instruction.

Quantitative studies of *contextualized instruction* were conducted with college academic programs (six studies), adult basic education (six studies), K-12 academic education (four studies), and elementary education (one study), but no studies were found for this form of contextualization with college or high school career and technical education (CTE) students. Four of the 10 studies on *integrated instruction* were with CTE programs, and the other six studies were with academic programs in elementary and secondary education.

Many of the studies had methodological weaknesses that limited the conclusions about the effectiveness of contextualization. The studies that offered the best evidence are summarized below. A detailed breakdown of findings is discussed in the full review.

Summary of the Evidence

All of the outcomes of contextualization for basic skills achievement were positive, although there was minor variation in outcomes for particular subskills. For example, in a college CTE study integrating writing instruction in a business course (Cox, Bobrowski, & Spector, 2004), students improved their ability to write a business abstract but not to express business concepts in their own words. However, despite this, there is a trend in the research toward positive findings for basic academic skills, but not always disciplinary knowledge, for both contextualized and integrated instruction.

One of the assumptions underlying integrated instruction is that when basic skills instruction is incorporated in disciplinary instruction, ability in both academic skills and content knowledge should increase. However, of the five studies of integrated instruction that measured outcomes on knowledge development in a content area, two found no improvement in content knowledge (Parr, Edward, & Leising, 2008; Stone et al., 2006). Both of these studies embedded math in occupational courses in high school CTE. Since strong claims are made for the advantages of combining literacy with subject area instruction, these mixed findings are disappointing and warrant further research.

When we embarked on this review, we were particularly interested in how contextualization might promote better outcomes among low-skilled college students. However, only two studies, Wisely (2009) and Jenkins, Zeidenberg, and Kienzl (2009), provided data on college advancement. Wisely (2009) found that participation in contextualization was associated with the completion of developmental education courses and the speed of entry into, the performance in, and the completion of college level courses. However, these positive effects were limited to non-white students; no effects for contextualization were found for white students. Jenkins et al. (2009) found that adult education students who attended occupational classes that integrated basic skills instruction were more likely than adult education students who either did or did not enroll in a traditional occupational course to take subsequent credit-bearing courses, earn credits toward a college credential, persist to the next college year, as well as show greater gain in basic skills. Given college practitioners' enthusiasm about the value of contextualization (E. Baker, Hope, & Karandjeff, 2009), it is unfortunate that more evidence is not available.

Trends in the Research

While the studies identified in the review provide preliminary support for the efficacy of contextualization, conclusions are tentative at present because of the shortage of rigorous studies with academically underprepared students in college or with adult basic education programs. As mentioned earlier, research with K-12 samples was included in the review since there was relatively little information on the use of contextualization with college students. Outcome measures for almost all of these studies focused exclusively on, and found gains for, specific basic skills outcomes.

It should also be noted that most of the studies in the review compared contextualization to a business-as-usual comparison group; while this is a good start, more definitive conclusions can only be made when contextualization is compared to other interventions in addition to conventional instruction, so that results can be attributed to contextualization itself and not to other dimensions of the research such as novelty or the added attention that may be given to participants in a treatment.

While the lack of rigorous research suggests that it is premature to invest substantial funds in a contextualization intervention at this time, it would be worthwhile to mount a rigorous research and development effort to gather information about the potential efficacy of this approach, specifically with low-skilled adult learners, whether in community college degree and certificate programs or in adult basic education programs.

A topic that has not been addressed in studying the effects of contextualization on transfer of learning is possible interactions between student ability, student motivation, type of skill to be learned, and amount of contextualization. Thus, in future research, moderators of the possible effects of contextualization should be identified. Other suggested areas of research include inquiry on the relation between the contextualization of basic skills instruction and subsequent course work, on the issue of dosage of contextualization, and on the nature of the dependent variable used in studies of contextualization.

Practical Implications

Moving toward the greater use of contextualization will depend on practical conditions internal to colleges. Most important are instructors' willingness to modify their instruction and colleges' ability to provide incentives and support for this change. Many developmental education instructors are not highly aware of the day-to-day reading and writing requirements that students find so difficult in college-credit disciplinary courses. Further, many instructors are strongly committed to the generic, decontextualized instruction in reading, writing, and math that predominates in developmental education (Grubb, 1999). Disciplinary instructors may be equally unwilling to consider contextualization because they feel that basic skills instruction is beyond their range of responsibility and/or competence (Marri et al., in press; McDermott, 2010). Strong college leaders will need to provide ongoing direction and support for either version of contextualization.

The following summary of recommendations may support the implementation of contextualization for low-achieving students in a college setting:

1. Create conditions for interdisciplinary collaboration so that basic skills and content area instructors can familiarize each other with their curricula, assessment approaches, standards, and teaching techniques. Interdisciplinary collaboration will facilitate teaching students reading, writing, or math skills that are directly applicable to the subject areas they are learning.
2. Provide ongoing professional development to initiate and support contextualization with tangible implementation targets. Professional development should utilize evidence-based professional development methods, and common cross-discipline agreement should be established about the desired learning outcomes for contextualization and the means for achieving them. Follow-up activities and supportive monitoring should be provided after the conclusion of formal training sessions to maintain instructors' interest in and ability to contextualize or integrate basic skills instruction.
3. Develop assessment procedures that incorporate both basic skills and content area knowledge to evaluate the effects of contextualization.
4. As the basis of contextualization of basic skills instruction in community colleges, select discipline-area courses that are needed for graduation by large numbers of students but that also have high failure rates. Introductory science courses may be a useful place to start since these courses display high failure rates and because descriptive and quantitative studies are available on the contextualization of basic skills instruction in science content.
5. When contextualized courses are established, collect outcome data for examination by instructors and administrators alike. Both instructors and administrators should be made aware of both short- and longer-term outcomes; evaluating contextualization in this way will indicate whether the effort is worthwhile and may point to the need to modify teaching techniques.

Among the many different innovations underway that attempt to promote the learning of low-skilled college students (Perin & Charron, 2006), contextualization seems to have the strongest theoretical base and perhaps the strongest empirical support. Both contextualized and integrated instruction are supported by quantitative studies that include control or comparison groups. However, the studies also indicate that considerable effort is needed to implement contextualization because instructors need to learn from each other and collaborate across disciplines, a practice that is not common in college settings. Furthermore, there is very little information on costs or on what would be needed to scale up contextualization. Nevertheless, the available evidence, taken in combination with practitioners' considerable enthusiasm for contextualization, suggests that this approach may be helpful in improving the outcomes of academically underprepared college students.

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Education Master Plan
Information Submission Form

The GCCCD is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resource allocation.

As the first step in this planning process, everyone in the GCCCD community (faculty, staff, students and community members) are invited to identify and submit information sources to be reviewed for the trend analysis in one of six taxonomy areas - society, technology, economy, environment, politics, and education. We are not asking you to do new research - only to identify information you already have or that you encounter during the search period (March 21 - April 25) and bring it to the attention of the Scan Teams for review.

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2) Author: Diane Ravitch

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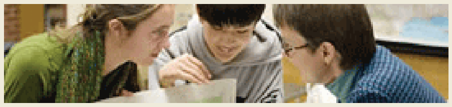

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Virginia Journal of Education

Dictating to the Schools

A nationally-known educator looks at the effects of the Bush and Obama administrations on our schools.

by Diane Ravitch

Momentous changes are occurring in American education, and they are occurring at a rapid pace, with far too little deliberation about the value and the likely consequences of these changes.

The most dramatic of these changes, and possibly the most significant, is the federal Department of Education's quiet but firm assumption of control of the nation's public schools. This is not an overnight development. Secretary of Education Arne Duncan is building on the precedent established by President George W. Bush's No Child Left Behind program, which established a strong federal presence in every public school district. NCLB not only required the states to create a testing and accountability regime for every public school in the nation, but prescribed the sanctions that would be applied to schools that did not make adequate yearly progress. Acting in a spirit of either ambition or ignorance (or both), NCLB dictated that every student in every school would be proficient by 2014, a goal that has never been attained by any state or nation. As that date draws nearer, more and more schools will be stigmatized as failing because of their inability to reach a goal that was unrealistic from the start. And, as they fail, they will suffer harsh penalties: They will be compelled to close, to fire the principal, to fire all or part of the staff, to be taken over by the state or a private management organization, or to "restructure" in some other fashion.

NCLB has been a costly disaster. None of its prescribed remedies has been successful as a template for turning around a low-performing school. No school was ever improved by closing it. Few schools see results if they are handed over to the state or private management, and thus far, restructuring has demonstrated little or no success. Low-performing schools can improve, and there are many examples of such improvement, but there is no model that Washington can prescribe or dictate to make it happen. When low-performing schools improve, it is almost always the work of an inspiring principal and a dedicated staff, whose efforts are enhanced by professional development, a strengthened curriculum, greater access to resources, better supervision, reduced class size, extra instructional time, and other commonsense changes.

NCLB's legacy is this: State accountability systems that produce inflated results; widespread cheating to meet the annual targets; a curriculum with less time for history, science, and the arts; teaching to the test; and meager academic gains on the National Assessment of Educational Progress. This too is the legacy of NCLB: a widespread public perception that the public schools have "failed," because they are unable to meet the law's demand for 100 percent proficiency. This perception of failure erodes public confidence in public education and sets the stage for privatization.

Instead of admitting that NCLB has been an expensive and demoralizing failure, President Obama and Secretary Duncan have accepted its fundamental premise that students must be tested annually and that schools and teachers must be subject to harsh punishment if they are unable to raise test scores. Their Race to the Top program will make student test scores even more consequential than they were under NCLB.

Race to the Top received funding of $4.3 billion from the economic stimulus plan enacted by Congress in 2009. Secretary Duncan used this money to launch a competition among the states at a time when every state was facing fiscal meltdown. To become eligible, the states had to enact changes that most were unlikely to do without the lure of the federal cash. Hoping to win a share of the billions, some states lifted their caps on charter schools; some passed laws to evaluate teachers in relation to their students' test scores; others agreed to "turn around" low-performing schools by adopting the punitive measures favored by the Obama administration; many embraced newly created national standards in mathematics and English language arts.

Secretary Duncan recognized early on that NCLB is a toxic brand and will drop the name in the administration's proposal for reauthorization of the Elementary and Secondary Education Act. But much will remain familiar. Like the Bush administration, the Obama administration will continue to emphasize test-based accountability, merit pay and choice. All of these are traditional elements of the Republican approach to school reform. Now, they have become the bipartisan consensus.

The mainstream media have applauded the Obama administration's bold plans to remake American education, but have been strangely uncurious about the evidence supporting it. In fact, there is little to no evidence for any part of this agenda. It is a risky venture, not only because it involves the expenditure of billions of dollars (leveraging billions more that will be spent by the states), but because it sets the nation's schools on a course that is unlikely to lead to meaningful improvement in the quality of education. This strategy may ultimately lead to even greater public dissatisfaction with public education and accelerate the movement towards privatization.

The Obama education reform program is indeed muscular. It is brash and confident in claiming to know precisely what is needed to reform American schools and raise student achievement. It represents a remarkable expansion of the federal role into what has traditionally been the province of state and local decision-making. If there was incontrovertible proof that the nation's schools would improve dramatically by taking the required steps, then there might be good reason for the federal government to take such assertive action. But incontrovertible proof does not exist for the federal government's agenda. Neither President Obama nor Secretary Duncan can point to any district that has applied their reforms and seen dramatic improvement.

Consider charter schools, which are now receiving royal treatment by the media. In 2010, three commercial films featured charters as the miracle cure for education, a beacon of hope especially for disadvantaged and minority students. There are currently about 5,000 charter schools in the nation. Some are excellent, some are terrible, and most are somewhere in the middle. On the whole, charter schools do not produce higher test scores than regular public schools. The CREDO national study, conducted by Stanford economist Margaret Raymond, compared nearly half the nation's charter schools to similar public schools and concluded that only 17 percent of the charters got higher math scores than the public schools. The remaining 83 percent of charters were either no different or worse than neighboring public schools.

When viewed through the scores on the National Assessment of Educational Progress (NAEP), the federal testing program that is considered the gold standard, charter schools achieve no miracles. Having been compared to regular public schools by NAEP in 2003, 2005, 2007 and 2009, charters have never outperformed regular public schools, not in reading or mathematics. Whether one looks at the performance of black students, Hispanic students, low-income students or urban students, there is no significant difference between the two sectors.

Nonetheless, the Obama administration is betting on charters as one of its key levers to reform American education.

Another reform that is supposed to lead to dramatic improvement is evaluating teachers by their students' test scores. In hopes of winning federal dollars, several states have passed laws to base as much as 50 percent of teachers' evaluation on test scores. The results of tying teacher evaluation, compensation and tenure to student test scores are predictable: There will be more teaching to the test; more time devoted to test preparation rather than instruction; and a consequent narrowing of the curriculum. The current generation of multiple-choice standardized tests are designed to measure a band of skills, not teacher quality.

Researchers have found that teacher effects, when measured this way, vary from year to year because scores are influenced by many factors other than teacher quality. Students are not randomly assigned to teachers. A teacher will get great results one year because she had a "good" class, but poor results the next year because the class had a few disruptive students. Test scores will also be affected by extraneous events, such as whether students got a good night's sleep, had a quarrel with a friend, or were distracted.

While the public, the press, and the administration seem keen on the idea of judging teachers by student test scores, it is important to remember that the tests are subject to random variation and measurement error. Furthermore, the more that policymakers attach high stakes--rewards and punishments-to test scores, the more they should expect to see cheating, gaming the system, inflated scores, and other efforts to hit the target. In recent years, even state education departments have gamed the system by lowering the passing mark on state tests, thus lifting their results without improving education.

Once this regime is well established, we can expect to see more attention to basic skills and less time for history, science, the arts, geography, civics, foreign language, even physical education. And as test preparation intensifies, we can expect to see students who master test-taking skills without necessarily becoming better at reading and mathematics. After eight years of NCLB, remediation rates in college have not declined. Some districts and states are producing higher test scores but no better education because students are learning to pass the state tests but not learning to comprehend complex material-that requires background knowledge-nor have they mastered the mathematics required for entry-level courses in college.

Another hallmark of federal policy in this administration is punitive action against low-performing schools. When the President and the Secretary saluted education officials in Rhode Island for threatening to close the only high school in the state's poorest urban center, they sent a message that was heard across the nation: Schools that have low scores should be shut down or turned into charters or privatized; their staffs should be fired. The problem with these approaches is that there is no evidence that any of them will consistently produce better education for the students in those schools. Closing a school is no guarantee that whatever replaces it will be better. Most of the schools that are identified as low-performing are sure to be schools that enroll large numbers of poor students, students who speak limited English, students who are homeless or transient. By its words and actions, the administration seems to assume that the school gets low scores because it has a bad principal or bad teachers. But the staff may be heroic in the face of daily challenges; they may be operating with fewer resources than schools in affluent neighborhoods. Absent individual evaluations, it seems unfair to conclude that the staff is failing.

No nation with a high-performing school system is following the policies advocated first by the Bush administration and now by the Obama administration. High-performing nations make sure that students have access to a rich and balanced curriculum, not just a steady diet of test preparation and testing. High-performing nations place their bets on a strong and well-prepared education profession. They prize highly-educated teachers and treat them with respect. They insist on having principals who are experienced educators. And at the same time, our own policymakers seem to be promoting the de-professionalization of education, as more districts hire noneducators as superintendents and create programs to train newcomers and inexperienced teachers to become principals. This approach is not a good bet for the future.

If we are serious about improving our schools, we must select well-educated teachers, give them the support and mentors they need to succeed, and make sure that they are evaluated by principals who are themselves master teachers. We must insist that all students receive a curriculum that inspires a love of learning, one that includes the arts, history, science, civics and other important and engaging studies. We must use tests for information and diagnosis, we must use them as part of an improvement strategy, not as a means to hand out money or pink slips. We must stop blaming educators for the social ills that get in the way of learning.

The work of school improvement involves small victories and occasional defeats. We must forego the search for silver bullets and dramatic transformations. Such strategies produce spectacular gains and equally spectacular losses in the financial markets. But these are risks we cannot take with our children, our schools and our communities. Above all, we must treasure public education as one of the prime elements of our democracy. We must not privatize it or give it away or outsource it. Nor should we set unrealistic goals that demoralize and punish those who do the daily work of schooling.

In this important work, the federal government certainly has a role to play. But it does not have all the answers. And we must take care not to invest our hopes in unproven, untried strategies.

Ravitch, a widely renowned education historian, is research professor of education at New York University. She has written numerous books and has served as Assistant Secretary of Education in the U.S. Department of Education and as a member of the National Assessment Governing Board. In addition, she currently blogs for Education Week, Politico.com and the Huffington Post. For more information, visit www.DianeRavitch.com.

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Grossmont-Cuyamaca
Community College District

Education Master Plan
Information Submission Form

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The Structure of Student Decision-Making at Community Colleges

Judith Scott-Clayton

Based on a longer review, this Brief summarizes research evidence and theoretical discussion regarding whether community college students are more likely to persist and succeed in programs that are tightly and consciously structured, with relatively little room for individuals to deviate (on a whim or even unintentionally) from paths toward completion, and with limited bureaucratic obstacles. The lineage of this hypothesis can be traced back in part to Tinto's seminal work on student persistence (1993), which recognized that the dropout phenomenon is not solely an individual failure but also an institutional one. In the community college context, this hypothesis has been prominently raised in recent years by Rosenbaum, Deil-Amen, and Person (2006), who examined differences in organizational procedures between public and private two-year colleges. The definition of *structure* used in this Brief refers not only to explicit institutional policies and procedures, but also to "norms and nudges" that may more subtly influence individuals' decisions at a point of action. This broad definition is influenced by recent literature on choice architecture, which calls attention to the way that choices are structured and presented (Thaler & Sunstein, 2008).

After outlining the kinds of decisions community college students face and the context within which they do so, this Brief introduces several concepts to examine how the structure of student decision-making may influence students' choices. It then discusses evidence regarding potential structure-based interventions and concludes with suggestions for future research and practice.

Navigating College

An important first step for a student in the pursuit of a postsecondary credential is deciding what program to pursue. Yet incoming students often lack well-defined, pre-established preferences. The abundance of program options offered by the typical multiple-mission, open-admissions community college may be particularly appealing to those who are undecided, yet it may also serve to perpetuate confusion and indecision. Incoming students may also be surprised to find that enrolling at a college does not necessarily mean that they can begin by taking college-level courses in any area. More than half of entering community college students are assigned to developmental coursework in at least one subject to better prepare them for college-level courses (Bailey, Jeong, & Cho, 2010; Bailey, 2009). Developmental credits may qualify a student for financial aid, but may not count as degree credits toward graduation.

Each term, students must also choose how many courses to take and when to take them, based on program descriptions that often provide little guidance about which courses should be taken when. On top of this, students may have to make tradeoffs depending upon the vagaries of class times, family responsibilities, and work schedules. Ideally, students should consider how the course choices they make will impact the set of choices they will have in the following term, but at many institutions it is difficult to confirm in advance what courses will be offered in a future semester. Thus, term after term, a complex decision-making process is repeated.

In general, throughout the college experience, students often encounter bureaucratic hurdles that throw them off course. Applying for financial aid and registering for courses are often characterized as frustrating experiences by students. Even after a given term begins, students may encounter unexpected obstacles. For example, financial aid may be delayed. Or a course may be more difficult than expected, but it may be too late to gain access to an appropriate course. Another common problem is that courses that count toward specific program requirements for a two-year degree may not be transferable if the student decides to continue at a four-year institution.

The level of assistance provided by advisors and counselors in helping students navigate community college and make appropriate decisions is typically low, owing to extremely high caseloads. The advising that does take place is often by necessity focused on mechanics of course registration rather than larger questions about goals and long-term plans. In some cases, family and peer networks may compensate for a lack of formal guidance. But because students at community colleges are disproportionately first-generation college-goers, many from minority and low-income families, they may be less able to glean information from the experiences of their family and friends.

How Students Make Choices

The great variety of program and course options found at community colleges may enable students with different backgrounds, preparation, interests, and constraints to match with similarly diverse programs and attendance schedules. Indeed, this wide variety of alternatives has been central to the rise of open-access community colleges. Yet recent work in psychology, marketing, and behavioral economics presents compelling evidence that more choice is not always better.

Experimental evidence concerning "bounded rationality" suggests that seemingly irrelevant contextual factors often influence choices (Bertrand, Karlan, Mullainathan, Shafir, & Zinman, 2005; Tversky & Simonson, 1993). The implication for higher education is that students' choices regarding programs of study or courses within programs may be highly dependent upon how these choices are structured and presented. Research also suggests when individuals make complex, high-stakes decisions with long-term implications, they may struggle in determining which factors are most important, in gathering all of the relevant information on these factors, and in appropriately weighing the costs and benefits of these factors in a final calculation.

Even after deciding on the best course of action, research on "bounded self-control" suggests that individuals may have trouble following through on a decision if it involves trading current pain for future gain, especially when the former is concrete and certain, and the latter is ambiguous and uncertain (Laibson, 1997), a phenomenon called "hyperbolic discounting." Individuals may also be averse to following through on a good decision when doing so means "locking in" some real or perceived loss—a phenomenon known as "regret aversion." "Hassle factors" and negative interactions can also cause individuals to delay taking an action they know to be beneficial (Bertrand, Mullainathan, & Shafir, 2004) simply because of unpleasant associations.

Bounded rationality and bounded self-control can lead to three potential problems: mistakes, delay, and dissatisfaction. First, individuals who are uninformed or overwhelmed with too much complicated information may make systematically biased decisions that are not in their best interest. Psychological and behavioral economic researchers have identified a number of decision-making heuristics and biases that individuals often resort to in the face of complexity. Madrian and Shea (2001), for example, found strong evidence of "default bias" in a study of 401(k) enrollment procedures at a large U.S. corporation. When the corporation instituted a policy of automatically enrolling new hires in the 401(k) plan unless they actively opted out, participation increased by about 50 percentage points. This indicates the large potential role for seemingly small differences in bureaucratic procedures.

In the community college context, the path from initial application to course enrollment requires numerous active decisions, where the default is simply not to enroll. And in the face of confusion, students may be unduly influenced by idiosyncratic factors, such as whether a friend is enrolling in a particular program or course. The tendency to base decisions on easily accessible information is referred to as "availability bias." Research suggests that students undertake surprisingly minimal search efforts regarding educational options, given their importance. Instead, they often resort to trial and error (Beggs, Bantham, & Taylor, 2006; Grubb 2006).

A second potential problem is "decision deferral." Greenleaf and Lehmann (1995) found that consumers may delay decision-making when they are uncertain about the consequences of their actions, when they are uncertain about how to identify and weigh the key attributes of alternative choices, and when they must wait on the advice of others. In higher education, some students, unsure about which courses to take, may simply never complete the registration process or, once they register, may delay decisions about degree concentration.

A third potential adverse consequence is dissatisfaction with the ultimate decision once it is made. Evidence from psychology and marketing suggests that consumers are less satisfied when they are uncertain about their final choice and when the decision involves highly consequential tradeoffs (Heitmann, Lehmann, & Herrmann, 2007; Botti & Iyengar, 2006). This perspective complements Tinto's (1993) model of student dropout, which he suggests is a consequence of student frustration and disengagement. Students who had an unpleasant experience in making prior decisions or who have lingering doubts about their choices may dread having to go through the process all over again the following semester.

Promising Interventions

The lack of structure in the community college experience encompasses several types of problems that could be addressed by a range of solutions—very "light-touch" informational interventions, moderately intensive interventions restructuring aspects of curricula and student services, or even the dramatic overhaul of an entire institution. Several promising interventions are discussed below.

Improved Information and Support

Intensive advising. Perhaps the most straightforward approach to addressing the complexity of the community college experience is simply to enhance student advising. Most campuses, however, do not have the resources to scale up intensive-advising programs across the entire campus; accordingly, such "high-touch" programs may be feasible only for targeted at-risk subsectors of the student population.

Technological innovation. Evidence on the positive impact of simplifying the federal financial aid application process (Bettinger, Long, Oreopoulos, & Sanbonmatsu, 2009) suggests that technological simplifications in other domains (such as course registration) might produce similar positive results. For example, one potential "light-touch" intervention would be a sophisticated online college advising tool, which would integrate career exploration and goal setting, prerequisite navigation, course planning and recommendations, tracking of student progress in the meeting of requirements, and early warnings when students fall off track.

Integrated Curricula

Learning communities. In their simplest form, learning communities group students together as a cohort that takes two or more courses together in a given term. Learning communities may address structural problems in at least two ways: first, they simplify students' course choices (and schedules); second, they may improve peer networks. Learning communities have been evaluated in a randomized experiment conducted by MDRC (Scrivener et al., 2008). The study found statistically significant positive impacts on a range of outcomes during the treatment period, including credits attempted, credits completed, GPA, and self-reported student experience; however, these impacts tended to fade in post-program semesters. One limitation of the study is that because the learning communities involved a cluster of intertwined interventions, it was impossible to disentangle the mechanisms driving these effects.

Washington State's I-BEST program. The Integrated Basic Education and Skills Training (I-BEST) model, developed by the community and technical colleges in Washington State, combines instruction in basic skills with college-level career-technical coursework for up to two academic years in an effort to streamline the curricula and improve student engagement. Research suggests that students who enroll in I-BEST are more likely to make point gains on a basic skills exam, earn college credits, and complete occupational certificates (Jenkins, Zeidenberg, & Kienzl, 2009; Zeidenberg, Cho, & Jenkins, 2010). While I-BEST is more structured than the standard curriculum, it is also more contextualized—basic skills are not taught in isolation but are integrated into an applied career-technical context. Thus, to the extent the intervention is successful, it is not possible to isolate structure as the primary causal mechanism.

Lessons from K-12 Curriculum Design

Instructional program coherence. Research on curriculum design in the K-12 sector provides some relevant insights for thinking about structure in community college programs. For example, Newmann, Smith, Allensworth, and Bryk (2001) found that Chicago public elementary schools with higher levels of teacher-perceived "instructional program coherence"—defined as "a set of interrelated programs for students and staff that are guided by a common framework for curriculum, instruction, assessment, and learning climate and that are pursued over a sustained period" (p. 299)—made higher gains in student achievement.

Constrained curriculum. In their study of the effect of high school organization and structure on student dropout rates, Lee and Burkam (2003) analyzed data from the High School Effectiveness Study, covering 3,800 students in 190 schools, controlling for student demographics, test scores, and school size. Their results suggest that schools offering mainly academic courses and few nonacademic courses have fewer dropouts.

Radical Organizational Change

Meaningful and lasting change may require more than tweaking around the edges; it may require overhauling the organization so that all aspects of the institution are aligned to promote student success (as discussed by Jenkins [2011] in a companion review in CCRC's Assessment of Evidence Series). This is the motivation behind a new community college in the City University of New York (CUNY) system that is being designed from the ground up and is expected to enroll its first students in 2012. Students at the new school will be required to attend full time and will choose from ten to twelve program offerings, and articulation (i.e., course transfer) agreements with CUNY's four-year institutions will be specified in advance (CUNY, 2008).

In describing its decision to limit students' options upfront, the concept paper for the new college cited compelling qualitative research comparing public and private two-year institutions by Rosenbaum et al. (2006), who found that at least some for-profit, or occupational, colleges produce better outcomes by providing students with a more structured experience. The researchers conducted in-depth qualitative and survey analyses at seven public and seven private two-year institutions within a single metropolitan area of Illinois to examine differences in organizational procedures. They concluded that the relative advantage of occupational colleges over community colleges stems from the "package deal" (Rosenbaum et al., 2006, pp. 225–227) afforded to students by the occupational colleges through a complementary combination of well-structured programs and mandatory, well-integrated support services.

Discussion and Conclusion

The observational evidence is very strong that community college students are often confused and sometimes overwhelmed by the complexity of navigating their community college experience. And the evidence from other fields (such as consumer choice and financial planning) is very strong that individuals' ability to make good decisions—or to make any decision at all—is adversely affected by several of the factors that are present in the community college context. The evidence relating to specific solutions in the community college context is limited but growing. Enhanced advising, assistance in navigating bureaucracy (e.g., completing the federal financial aid application), and the provision of linked cohorts/curricula through learning communities are among the interventions that have been evaluated and found to have positive (if not transformational) impacts.

It is worth emphasizing that the structure hypothesis raises several different types of problems, each of which might require different types of solutions. And indeed some of these solutions may confront values held by some educators. "Hassle factors" such as long lines at registration, burdensome and/or redundant paperwork, or negative interactions with financial aid staff may require behind-the-scenes streamlining of bureaucratic processes, additional support staff, and/or new staff training. While the cost and effort required for such reforms may not be trivial, the argument for reducing hassle factors is uncontroversial. Similarly, there is little substantive argument against providing students with better information (and better ways to search and navigate this information) to help them manage the sheer complexity of gathering and wisely utilizing all of the relevant information on the costs, benefits, and requirements of alternative educational paths.

A related but distinct challenge is the number of program options students must choose from, which psychological evidence suggests can cause decision paralysis, arbitrary decision outcomes, and dissatisfaction. Simply providing students with more information may not solve this problem, but reducing options is certainly more controversial. CUNY's new community college, which explicitly limits students' choices upfront, is one radical potential solution. Helping students navigate an abundance of options need not imply restricting student choice, however. A middle option would be for schools to provide the equivalent of a "prix-fixe" menu, offering a limited selection of pre-packaged college pathways that students could choose from instead of planning their schedules "a la carte." Similarly, colleges might experiment with setting "smart defaults," as companies have begun to do with their employees' retirement plan choices. These defaults do not limit students' ability to customize their own path through college but instead provide them with a reasonable starting point. For example, incoming students could be "pre-registered" for a set of common foundational courses, which they would then be free to change; returning students could be pre-registered for a set of logical follow-up courses based on their major and previous coursework.

Overall, the evidence that a problem exists is very strong, but the evidence on what policies best address it—particularly in terms of cost-effectiveness and scalability, as well as in terms of figuring out which types of interventions work best for whom and under what circumstances—is much more limited. But the fact that there is no simple clear answer need not be cause for discouragement. Instead, the issue of structure in higher education decision-making can be viewed as ripe for future innovation and research.

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Professional Development Learning Environments (PDLEs) Embedded in a Collaborative Online Learning Environment (COLE): Moving towards a new conception of online professional learning

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1. Introduction

The problems associated with the initial education and on-going learning of professionals, such as teachers, are magnified in the absence of adequate technological resources. Traditional mechanisms used for professional development by way of government directives, guidelines, advisory bulletins, "train-the-trainer" sessions for centrally assigned consultants (Fullan 1992, 1993, 2005; Olson 1990), workshops and seminars are unlikely to encourage large scale change within the profession. Fullan (1992, 1993) argued that the failure of these approaches can largely be attributed to the fact that no account is taken of the individual teacher's previous experiences, personal theories and values. Although many case studies acknowledge the uniqueness of individual educational environments, there is seemingly little general appreciation that teaching is a complex, fluid and uncertain enterprise.

In spite of profound, rapid changes in society such as the advent of high-speed access to the Internet and the inclusion of cell phones into most aspects of life, real reforms to the focus of education or the methods used by teachers have been slow to take hold in educational systems around the world (Fullan & Miles 1992; Fullan 2005; Barone 2005). Speaking from decades of experience with educational reform, Sarason (2002) recently concluded that reform was unlikely given the current architecture of the school system in North America, particularly given that the ways we work, live and play have all gone through important transformations in the past generation. Employers, governments and institutions have all realized that the needs of society towards education systems have also changed. For example, in a short document titled "Employability Skills 2000+", The Conference Board of Canada (2006) outlined the types of competencies that should be expected of graduates of Canadian school systems. The desired abilities are: 1) academic skills such as communication, thinking, and learning, 2) personal management skills that include "a positive attitude toward change", and finally, 3) teamwork skills. The new emphasis on both communication within teams and thinking/problem solving indicate that the critical skills required of citizens are profoundly different than just a few decades ago. Earlier, Goldman-Segall (1998) suggested that school should be transformed into places where rich, ill-defined, *real-world* problems can be examined using emerging technologies as a way of re-instilling motivation for learning. In addition, the rapidly expanding realm of e-learning provides examples of online courses moving from a content-centered approach towards "socialization as information objects" (Siemens 2009, p. 1). On the other hand, in spite of recent technological advances, the complex abilities related to the many faceted aspects of the mastery of technology remain one of the important barriers for users in the context of online learning (Martin 2006; Pettenati, Cigognini, Mangione & Guerin 2009).

The need for changing our assumptions about how we learn and share knowledge remains largely unanswered. Wenger (1999) suggests that much of the reluctance can be attributed to a widely held misconception of the nature of learning. He states that "institutional learning is largely based on the assumptions that learning is an individual process". On the contrary, constructivist learning theorists argue that, if knowledge is constructed by the learner (Piaget 1977; von Glasersfeld 1995; Papert 1980), as opposed to something that is delivered, and if it evolves through a series of conjectures while being systematically subjected to attempts at refutation, our concepts of learning and teaching must also change (Popper, 1963).

Wenger (1999) argues that learning is a normal life activity and that, since humans are essentially social beings, learning is a social activity – "learning as social participation". From this perspective, Wenger concluded that present institutionalized teaching and training, based on the notion of individual process and separate from the rest of our social activities is in danger of becoming completely irrelevant. If a constructivist view of knowledge is then considered in combination with the importance of language, culture and interpersonal communication in the development of higher psychological processes (Vygotsky, 1986) and the concepts of collaboration and of collective intelligence (Levy, 1994), it becomes rather apparent that the current dominant practices of online distance education are inconsistent with this view as they are constructed around the notions of objective content delivery and individual study and knowledge acquisition.

2.0 Theoretical framework and research questions

McPherson and Nunes (2004) suggest that traditional views of teaching and learning tend to serve as basic models on which online learning environments are built. A cursory examination of the tools and technologies that have been the most successful in education, at least in terms of adoption rates by teachers and instructors, support this idea. Typically, the Professional Development Learning Environments (PDLEs) that are most popular are those that deliver content most efficiently to the individual learners, systems that allow the management of this content, and systems that allow the automated use of quizzes and tests. In other word, traditional PDLEs replicate the tradition, transmission approach to teaching and learning.

Problem-Based Learning (PBL) is one approach that is both consistent with a constructivist and collaborative epistemological perspective and successfully used in teacher education (McPhee 2002). Although PBL was initially developed for medical education in the late 1960s, it has been demonstrated to be quite appropriate for most professional training because it can start with real-life situations from which the learner, in our case teachers involved in professional development or pre-service teacher candidates, are asked to work collaboratively to find and solve authentic, ill-defined problems (Savin-Baden 2007). Today, although many aspects of this approach are emerging as potentially useful to online learning (Kenny, Bullen, Loftus 2006), particularly in the areas of supporting and managing the activity, much work remains to be done before such as approach can be adopted on a broader scale.
One specific area of interest has been the design and use of video cases as a principal medium to present realistic situations in order to specifically initiate a problem-based learning activity in online learning for the professional development of teachers. Online environments that aim to bring real-world problems to classrooms hold the promise of enabling teachers to restructure their thinking about the nature of knowledge and consequently consider changing their teaching practices. By modifying and transferring theoretical constructs about learning, developed in face-to-face environments, to an online environment, this study aims to determine whether the concept of PBL can be initiated online with the use of video cases encapsulated into a specifically designed Learning Object (LO) and whether the use of such would present certain barriers in terms of required IT skills of learners.

The present case study examines the design, implementation and pilot use of what will be defined as a Problem-Based Learning Object (PBLO) with 34 pre-service teachers in a science education curriculum methods course. The student teacher volunteers accessed the PBLO, focused on the development of argumentation skills in a high school biology classroom, for a total of 2 hours over 2 days in the spring of 2008.

2.1 Design of the PDLE: to PBLO and COLE

The study described here centres on the use of Problem-based Learning Objects (PBLOs) created to support teacher professional learning (PL). The model of design and assessment was based on several concepts that are addressed within the constructed PBLOs: social constructivism, establishment of a community of learners, video case studies, learning objects, constructivist environments, and problem-based learning (PBL).

Social Constructivism

In general, constructivists believe that each person builds an individual perspective of reality based on his or her experiences and frames of reference, and that learning will occur if students are given opportunities to construct personal meanings out of their experiences, particularly when discussed with their peers (Piaget 1972, von Glasersfeld 1995, Vygotsky 1978). New conceptions or understandings should be intelligible, plausible, and fruitful (Posner, Strike, Hewson, & Gertzog 1982). While PBLOs can be used for reflection by individual teachers working independently, their strength is evident in socially defined spaces where individual perceptions are communicated and debated with others in collaborative processes of conjecture and refutation (Popper 1963). In this project, teachers will be able to engage in social constructivist practices with PBLOs that can be used to build new understandings in ways that are contextually appropriate for their students. Project researchers will determine the effects of constructivist structures within the PBLOs on teacher professional growth.

Community of Learners

The scientific academic community relies on the process of peer review to ensure that a certain standard of rigour and quality is maintained (Wenger 2000). The community of practitioners, like any other, has certain conditions and standards that determine the strength of warrants for knowledge claims. Longino (1994) identifies four conditions that a community of practitioners must meet if consensus is to count as knowledge rather than mere opinion.

1) There must be publicly recognized forums for criticism.
2) There must be uptake of criticism - the community needs to do more than merely tolerate dissent; it must act on it.
3) There must be publicly recognized standards for evaluation of theory and practice.
4) There must be equality of intellectual authority - what is included or excluded must result from critical dialogue rather than the exercise of political or economic power.

In this study, all project participants were required to participate in an online community of learners under such conditions. Simultaneously, researchers explored the structures needed to support the development of these communities within the online environment within which PBLOs will be embedded.

Video Case Studies

Recently, case studies have been used in business and legal schools as an effective teaching tool (Harvard Business Publishing 2009), and have also begun to appear in math, science and technology education programs. The use of case studies in these programs has been varied and includes:

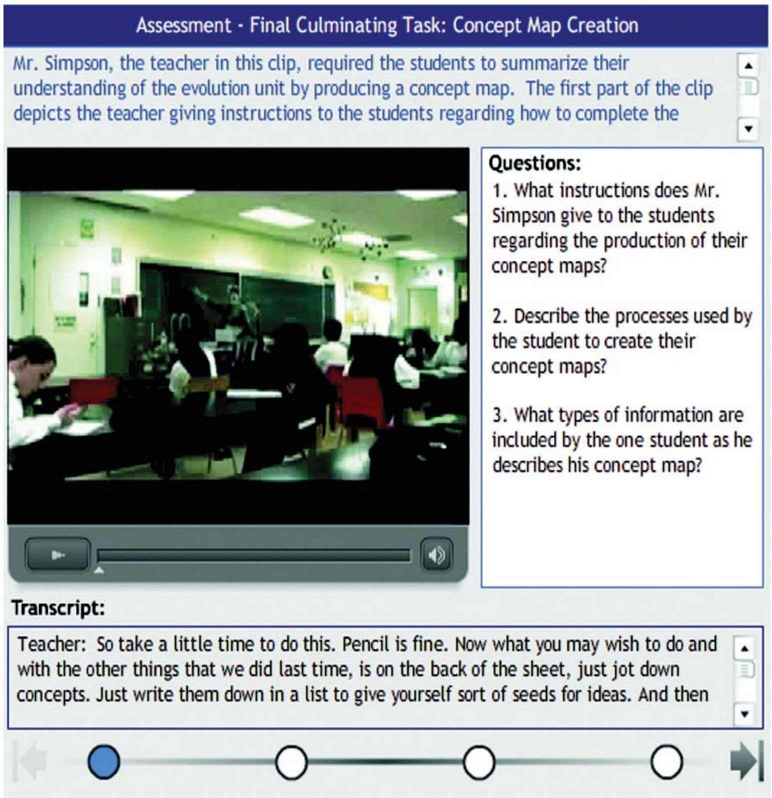
1) studies that focus on identifying teacher learning outcomes such as, higher-order reasoning, reflective thinking, decision-making, strategic inquiry and collaboration,
2) studies that examine variables influencing the success rate of case-based professional development activities such as the role of discussion and teacher experience, and
3) studies that report on the construction and implementation of new technologies that support case-based learning" (Yoon, Pedretti, Bencze, Hewitt, Perris & vanOostveen 2002).

Typically these case studies are text-based, although there is increasing interest in the use of multi-media (or video-based) cases in support of pre-service teacher education in the literature (Cannings & Talley 2002; Hewitt, Pedretti, Bencze, Vaillancourt & Yoon 2003; Pedretti, Bencze, Hewitt, Romkey & Jivraj 2008; Kurz, Batarelo & Middleton 2009). However, there is still little evidence to support the use of video cases in inservice teacher professional development (Bencze, Hewitt & Pedretti 2001; Copeland & Decker 1996; Louden, Wallace & Groves 2001; VandenBerg 2001). Consequently, it is one of the intentions of this project to investigate the usage of this method within the structure of the PBLOs and within an online environment.

PBLOs do not contain, nor are they predicated on, a preconceived notion of the learner's knowledge of or the skills that the learner brings to bear on problems which are presented. Instead PBLOs consist of video-cases that have been embedded into a specific 4-page structure which incorporates:
$ video clips,
$ transcripts of the video,
$ contextual information regarding the clips,
$ theoretical information that can be applied to the content of the video clips, and
$ 2 separate series of questions on pages 1 and 4 of the object (see Figure 1).

The questions require the user initially to analyse the clips and then later to synthesize the information that has been gathered by the users. The analysis/synthesis structure is an attempt to employ Piagetian principles of inductive and deductive reasoning along with hypothesis creation, defence and refutation (Popper 1963) within a PBL context so that the video cases are not simply presentations of ideas to be absorbed. The questions embedded in the video case structure are designed to provoke discussion amongst the learners and the formulation of hypotheses that could be described as Popperian 3rd World thought objects, such as models and theories (Popper 1972).

Learning Objects are digital, reusable content software applications that are intended to address specific curriculum topics (Hedberg 2008; Rey-Lopez et al. 2008). This traditional definition has been expanded to include larger environments that were designed for similar purposes. Learning objects can be found in a wide variety of shapes and sizes. Consequently, learning objects can be classified on a grid created by the intersection of two domains. As shown in Figure 2, one of these domains concerns



1**Figure 1:** Page 1 of an assessment PBLO in the Argumentation video case.

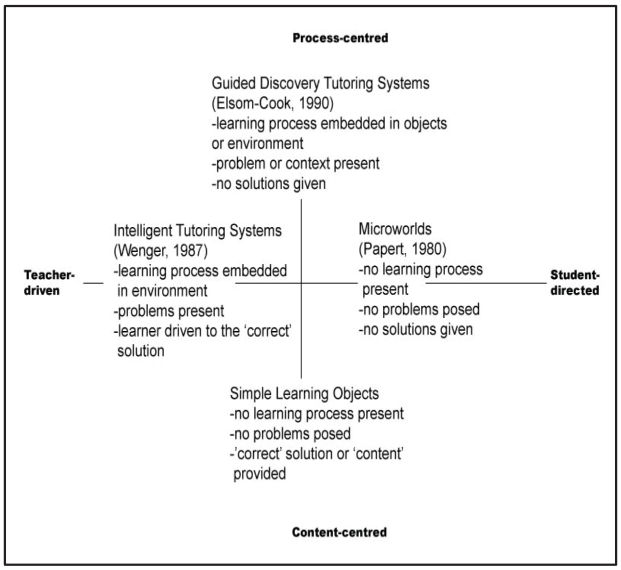
control of the learning enterprise, the second is oriented around the process/content dichotomy.

Learning Objects and Constructivist Environments

Problem Based Learning Objects (PBLO) differ from traditional characterizations of learning objects because they do not actually contain content that is tied to curriculum outcomes. They are specifically designed to motivate or to initiate a process rather than to deliver actual curriculum content. The content provided in PBLOs is used more to instigate thinking and discussion (process-centred) than to provide so-called knowledge intended to be acquired by users. As such, they are learner-driven, as the learners build their own context appropriate solutions to the posed problems. Consequently, PBLOs are *not* content delivery systems, nor do they offer simulation environments as proposed by Papert (1980). Since PBLOs also do not collect learner information to then tailor the training to the user, they do not fall in an adaptive technology category where intelligent tutoring systems (Wenger 1987) have been prominent. PBLOs, in their present iteration, contain a problem consistent with the problem based learning (PBL) approach commonly used in medical schools, such McMaster Medical School, and engineering faculties, such as McMaster University, Coventry University and Imperial College, today (Savin-Baden 2007). PBLOs do not contain the solution nor do they propose a method. These are left to the learners to construct. PBLOs can be best placed in the upper right quadrant of the grid

$$P = \left(\frac{S_D - S_C}{K + R} \right) Role$$

(see Figure 2) as they are both student (or learner) directed in their use and the overall orientation of the objects is one of process, as the intent of their use is not specifically to concentrate on the specific problems or the solutions but to focus on the consensually derived understandings arising from the



2**Figure 2:** Classification of Learning Objects as a function of control levels and content/process orientation

interaction with the objects and the other members of the environment.

Problem-based Learning (PBL)

Problems, in a PBL environment, provide a context within which to learn. Simultaneously, they provide motivation, as the learners already know why they are learning, i.e., to search for solutions to the problems. Problems can be viewed as objectives that cannot be achieved directly as there is some type of obstacle, or multiple obstacles, which must be overcome (Watts 1991). In an attempt to operationalise a definition of this concept (see Figure 3), the problem (P), is first characterized as the difference between the desired situation (S_D) and the current situation (S_C). Then, the level of difficulty that can be expected to resolve the differential between the desired and current situations can be determined, in an inverse relationship with, the amounts of relevant knowledge (K) and resources accessible (R) by the learner or problem solver. Thus, if the learner has a great deal of knowledge and/or resources and knows how to apply these to the differential, the problem should be rather simple to solve. Finally, the "Role" refers to the situatedness or contextual factors related to the potential problem solver since the role determines the background and type of perspective brought to bear on the problem.

Problems can be categorized into a variety of levels of complexity depending on how much contextual information is given to the learners. ‘Given’ and ‘goal’ problems (Watts 1991, p. 8) vary by the type of information given to the learners in that ‘given’ problems contain statements of both the goal and some suggested strategies to be used to solve the problem and ‘goal’ problems have the goal stated but no strategies are suggested. ‘Own’ problems (Watts 1991, p. 8) include neither the goal nor the strategies. Problems of this type consist primarily of a statement of context and the learners are

3**Figure 3:** Proposed model of a first level analysis of "Problem" (Desjardins & vanOostveen 2008b).

required to identify the problem or problems embedded in the context. In learning contexts such as those employed in the PBLOs, learners will collaboratively identify, access and use resources in order to solve problems of all 3 types described above. The model of problem-based learning used in PBLOs also fits the categorization structure of ‘Problem-based learning for professional action’, as proposed by Savin-Baden (2007). This model has, as its overarching concept, the notion of ‘know-how’. Action is seen here as the defining principle of the curriculum whereby learning is both around what it will enable students to be able to do, and around mechanisms that are perceived to enable students to become competent to practice” (Savin-Baden 2007, p.27). Since PBLOs combine a rich mix of theoretical elements, video exemplars and reflective questions, they are used to encourage pre-service and in-service teachers to critique the techniques and activities displayed in the video and to allow the teachers to determine the place of those techniques and activities in their own practices.

PBLOs need to be included within an infrastructure that provides opportunities for users to communicate their responses to the video clips and questions, interact and collaborate as they share their insights and perceptions, and gradually build consensual knowledge. A Collaborative Online Learning Environment (COLE) has been developed in which the PBLOs have been embedded. This Moodle-based environment designed to foster collaborative learning activities, provides communication tools such as video chatting, time management tools for scheduling and information tools such as an embedded wiki, while also providing the research team with the possibilities of recording all activities occurring within it (Desjardins & vanOostveen 2008a).

2.2 Design of COLE

Regardless of whether we consider that technological evolution is shaped by the user’s demands as expressed by market trends or that social changes are brought on by the diffusion of new technologies, the effects of one on the other is undeniable (Pinch & Bijker, 1987; Pinch 1996; Williams & Edge 1996). In order to carry out some manual tasks, humans have created tools that, in turn, have changed the way these tasks get accomplished. Eventually there is a change in the manner in which we think about these tasks and the tools, and then, humans alter the tool, then the tasks themselves and eventually the expectations. This loop has so far, been endless and, in recent times, rapid and accelerating, except in education.

There are many reasons why such changes are not quite as rapid in education. For teachers, the assumptions about teaching and learning have driven them to develop or at least to choose and therefore encourage the development of technological tools that reflect these assumptions. Since learning has traditionally been considered an individual process of acquiring knowledge as an object;

the tendency right from the introduction of the first micro-computers to the latest course management systems has been to prefer using tools that reflect traditional ideas of teaching and learning. Teachers initially opted for drill and practice software, CDROMs full of encyclopedic information, then as technology evolved, they chose to support the development of web-based content management systems (CMS) to organize sets of learning objects specifically designed to teach pre-determined content to the student (Jonassen, Peck & Wilson 1999). Unfortunately the use and development of these new tools, has not altered the general view of teaching and learning. The loop is incomplete and the attitudes about learning have not changed.

These unchanged attitudes about learning are reflected in online distance education as it remains entrenched in an objectivist perspective: technology is still used to deliver information to individual students, much as it is done in a large lecture hall. This tendency becomes particularly problematic when this perspective is used to select and develop tools used in professional development of teachers. In spite of the new social constructivist ideas that may be included in many of the courses offered to future teachers, the manner in which they experience these courses remains a familiar, unchanged but increasingly irrelevant experience. As Sarason (1996) noted, teachers are unlikely to adopt radically new pedagogies unless they experience pedagogical approaches that challenge traditional notions of teaching and learning in their professional education.

Changing the online learning experience for teachers in a professional development context might alter personal theories about learning. To achieve such a change in experience for teachers, a different online learning environment needed to be developed, one that would become, in essence, a *microworld* (Papert 1980). Microworlds are “experimental learning environments in which learners can navigate, manipulate, or create objects and test their effects on one another” (Jonassen & Carr 2000, p.178). Thus the technological environment design for online courses, rather than only the course content, should reflect the notions that first, knowledge is something that exists in the mind of the learner (vonGlasersfeld 1995) and that learning is an activity that occurs in everyday life of social beings as they collaborate, exchange and generally communicate (Wenger 1999). Such an environment should facilitate some constructivist aspects of learning while limiting the use of particular traditional teaching strategies by actually intentionally excluding other affordances.

The intention of designing the Collaborative Online Learning Environment (COLE), was to intentionally move from a *content centred – teacher driven* design to a *process centred – learner driven* approach. This means that a social constructivist position had to be adopted, with a strong intention to foster collaborative knowledge construction. Consequently the vocabulary and the meanings would have to be negotiated amongst the learners thus creating a ‘collective intelligence’ (Levy 1994) that would definitely require much communication as well as the rethinking of personal assumptions. Old ideas would have to be presented, defended by some and sometimes refuted by others. This process of inductive – deductive reasoning combined with the Popperian idea of refutation (Popper 1963) is only possible in a collaborative setting.

If knowledge is deemed to be constructed by the learner, learning environments cannot foster actual learning by simply delivering content or information. Knowledge is constructed through perceptual experiences and reflection about these experiences (Piaget 1977; Popper 1963; von Glasersfeld 1995). To achieve this, COLE would have to create an environment where the learner would become the producer of knowledge, much like the scientist (or educational scientist in this case) observes, analyses, thinks and writes his/her version of explanations of the phenomenon and then exposes these conjectures to others for discussion and potential refutation.

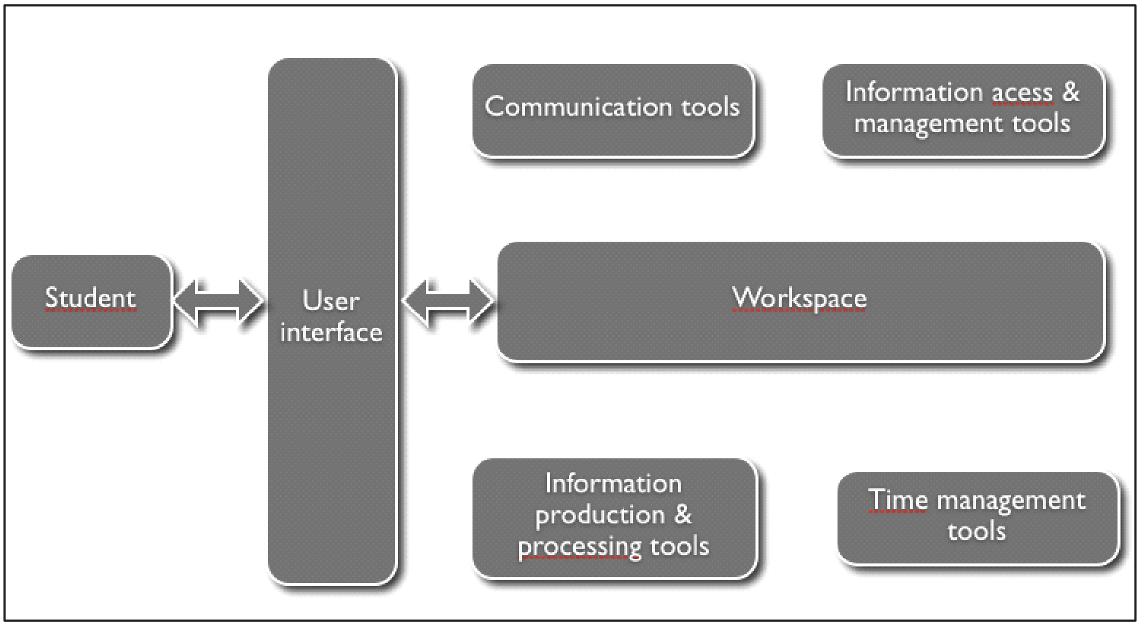
With these two basic principles, knowledge is to be constructed by the learners as a collaborative effort, the proposed online learning environment would have to offer the tools and functions to both allow this as well as the limitations to almost prevent direct exclusive delivery of information and the individual, non-negotiated production, or reproduction, of predetermined information.

With an objective to create a Collaborative Online Learning Environment that would respect these basic principles, it is further intended that the use of this environment by teachers involved in professional development, will foster a change in attitudes or at least in representations, of what teaching could be and of what learning is. It is also understood that as in any study program, an instructor would be involved. In this case, the instructor would play a specific role, that of a facilitator in accordance with the specific social-constructivist perspective adopted (Savin-Baden 2007)

The architecture

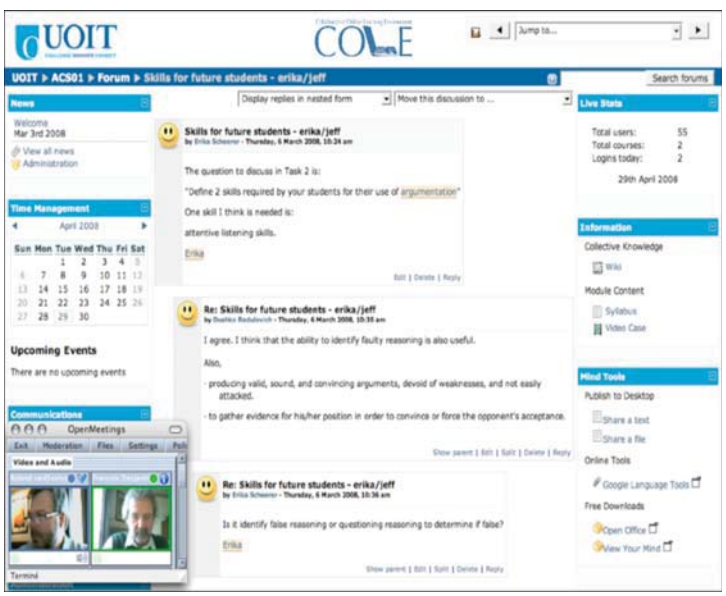
The first step in designing the online environment was an interplay between the functions required to support the collective knowledge construction process and the difficult decisions of the features to be explicitly excluded. Second, the interface was designed to specifically organize these functions by the types of interactions afforded by the technology (Desjardins, Lacasse & Belair 2001; Desjardins 2005), as shown in Figure 4. To do this, a prototype was created using the open source “*Moodle*" as a basic platform with a number of existing plug-ins having been selected and implemented.

The student-teacher, or user, initially comes into contact with the Web-based interface that is as simple as possible. The idea was simply that if too much time is required to learn how to “navigate” the interface, it is too complicated. This interface, if is to be a “learning environment” must first and foremost be a workspace. Around this workspace are the tools and resources, grouped under:
$ Communication tools
$ Information access & management tools
$ Information production and processing tools
$ Time management tools



4**Figure 4:** The basic architecture of COLE interface.

Communication tools include such affordances as asynchronous elements such as e-mail and synchronous multimedia made possible by technologies like peer-to-peer videoconferencing or video chat, as seen in Figure 5. The decision to have only one chat room was among several of the limitations built into the system. This was intended to not only allow free discussions amongst the learners, but also to allow the discussions to be open to the other learners in the cohort, in order to foster the negotiation of construction of the concepts.



5**Figure 5:** Sample screen capture of COLE showing a partial discussion from the forum and an OpenMeeting videoconferencing window open.

Information access & management tools are specifically chosen to achieve two basic goals. First, the most evident, these resources are to serve as a portal to access online information and documents, much along the same lines as present Web search engines. Second, it is in this area that any information or documents produced by the learner community will be stored. One of the main systems in this section is the "wiki" that allows users to collaboratively edit and negotiate the creation of a web page, in a similar manner to Wikipedia (http://wikipedia.org). There is only one wiki for each "course" or "theme". The wiki is initially empty and all content is to be created by the learners. Students can create articles about specific concepts but the built in limitation of it not being possible to have multiple distinct articles with the same title "forces" different contributors to discuss and eventually agree on each specific definitions stored and referred to in the wiki. Unlike the well-known "Wikipedia", experts are not expected to validate the content and therefore, it is explicitly up to the learner community to self-monitor and to negotiate the meanings to each term or concept. Here, the facilitator can participate in these discussions, but should not act as an expert but rather as one who would ask questions.

Information production and processing tools include the more standard word processing, spreadsheet, database and concept mapping tools, but with the specificity that all of them create files that are shared and in some instances, technology permitting, can be shared live online.

Because online students have a tendency to have some issues with managing their time when it comes to juggling work schedules, family life and studies (Volery & Lord 2000), a dynamic set of tools such as an agenda and a calendar are made available with automated reminders as to self set or group set deadlines.

Finally, in addition to these four basic sections, two small frames at the top of the environment, provide current information. First, a small "News" window represents the only place where the instructor can actually make some announcements or give small bits of information to the entire cohort of students. Second, on the left at the top, a "statistics" window will provide simple information, automatically generated by the system, on such things as the total time spent on the site, number of other participants online, number of connections in the recent past, etc. This information is made available to the individual to help in planning and establishing work schedules.

Although the working prototype meets most of the requirements expressed in the initial project, the user interface is still constantly revised and adjusted as comments arise from users as well as from new technological developments emanating from within the open source community of *Moodle*.

2.3 Professional learning

It has proven difficult to define "teacher professional development" partially due to a broad-based assumption that teachers already know what professional development is. The web sites of various teacher educational institutions seem to define teacher professional development as a matter of enrolling, attending and participating in pre-service teacher education programs or in additional qualification courses (Ontario Institute for Studies in Education of the University of Toronto, 2003; The Faculty of Education at York University, 2003).

For the sake of this report, the primary characteristics for authentic teacher professional development were drawn from a small number of sources. Authentic teacher professional development would seem to imply an improvement, or perhaps a maturing in the arts and sciences that define teaching. According to the Ontario College of Teachers (1999), the characteristics of authentic teacher professional development can be gleaned from the established Standards of Practice:

- Commitment to Students and Student Learning - The standard focusses on a commitment on the part of teachers to their students in the areas of learning, behaviour, individual growth and the promotion of life-long learning.
- Professional Knowledge - Teachers are expected to know the curriculum, subject content, students and teaching practices.
- Teaching Practice - Teachers are to use their professional knowledge to promote student learning using appropriate practices of teaching, reflection, assessment and evaluation.
- Leadership and Community - Teachers are called upon to create and support learning communities in the classrooms, schools and in their profession by collaborating with other stakeholders.
- Ongoing Professional Learning - Teachers are expected to acknowledge the relationship between teacher learning and student learning, and to support that relationship by actively engaging in professional growth (personal, social and educational) and improve their practice.

An additional list of similar principles is suggested by Little (as cited in Burnaford 1999).

- Offers meaningful intellectual, social, and emotional engagement with ideas, materials, and colleagues.
- Takes explicit account of the contexts of teaching and the experience of teachers.
- Offers support for informed dissent.
- Places classroom practice in the larger contexts of school practice.
- Prepares teachers (as well as students and parents) to employ the techniques and perspectives of inquiry.
- Involves governance that ensures a balance between the interests of individuals and the interests of the institution.

In a report about a teacher development project conducted in New Zealand, Bell and Gilbert (1994) suggest:

> Teacher development can be seen as having two aspects. One is the input of new theoretical ideas and new teaching suggestions. This tends to be present in current teacher development programmes and is usually done in more formal situations, for example, seminars and lectures. The second is trying out, evaluation, and practice of these new theoretical and teaching ideas over an extended period of time in a collaborative situation where the teachers are able to receive support and feedback, and where they are able to reflect critically. In our experience, this second aspect tends to be underplayed in many in-service programmes and tends to use more informal modes such as telephone conversations, conversations in the staffroom, sharing anecdotes and visiting each others classrooms (Bell & Gilbert 1994, p. 494).

Carr and Kemmis (1986) and Sagor (1992) examine the essential characteristics of authentic professional development comparing the teaching profession with other professions. Sagor indicates that most other professionals interact with each other as well as their clients on a daily basis and that these “interactions with other professionals stimulate and push these people to new levels of performance in both the art and the craft of their profession” (Sagor 1992, p. 2). He goes on to suggest that teachers, due to the structure of the school day and other pressures, rarely interact with each other except perhaps at staff meetings, and these meetings are rarely held to talk about advancing the teaching profession. He also argues that the knowledge base for teaching is not as defined and certain as that found in other professions such as law and medicine. In addition, generalized solutions to the problems of teaching, which tend to be very context sensitive, are difficult to determine. Experiential learning seems to be very important and if the experiences cannot be discussed on a regular basis then the problems will probably not be understood and will not be solved. These experiences need to be reflected upon, shared with other teachers and tested through a process that allows teachers to shape their experiences in ways that suit their contexts (vanOostveen 2005).

A second component that Sagor (1992) identifies as part of the teaching profession deals with contributions to the knowledge base. While he holds that the teaching profession is informed by a knowledge base, Sagor contends that teachers do not interact with and contribute to the development of this knowledge base. Teachers' work is not generally published in the academic literature. Rather, publishing in educational research journals tends to be the domain of educational researchers, professors and others in academic circles but not in the classroom. Carr and Kemmis (1986, p. 8) contend that "theory and research play a much less significant part in teaching than they do in other professions." Regardless of how teachers view theory, they must not only access the existing body of knowledge but also to take advantage of the available opportunities to add to that knowledge. Teachers therefore need to interact with their academic colleagues in such a way that both groups are mutually supportive of each others' efforts, or as Carr and Kemmis suggest: "the attitudes and practices of teachers must become more firmly grounded in educational theory and research" (1986, p. 9).

The final component that Sagor (1992) identifies as part of the definition of the teaching profession entails the 'separation of quality control.' According to Sagor, most professions involve self-assessment as measured against a standard established within the profession itself. This does not seem to be the case with teachers. Much of the assessment that occurs within teaching is in the hands of the administration (principals and other designates) and, with the changes a former government instituted in Ontario, it increasingly lies in the political arena. Currently, the situation remains relatively static. While the current government of 2009 has indicated a willingness to discuss some of these issues, this has not been supported with the type of changes in legislation which are needed (vanOostveen 2005). In contrast, authentic professional teacher education should allow teachers to regain control of the teaching environment enabling them to make decisions, within the context of the learning community in which they work, that they consider are appropriate for their local classrooms and schools.

Carr and Kemmis (1986) agree that teachers are severely limited in the autonomy that they possess. "Teachers operate within hierarchically arranged institutions and the part they play in making decisions about such things as overall educational policy, the selection and training of new members, accountability procedures, and the general structure of the organizations in which they work is negligible" (p. 39). In order to make teaching a more professional activity, teachers must take advantage of existing opportunities to participate much more widely in the decision making process.

The challenge becomes one of attempting to engage teachers in authentic teacher professional development which reflects the characteristics noted above. Perhaps the most effective way of achieving this would be to have teachers meet in small groups where they could interact with each other and the established knowledge base, discussing what theory would be most appropriate to their given situations. They need to be given opportunities to construct plans, to try some strategies out in their classroom, reflect on those experiences and then come back to the group and critique what happened. The teachers should take their reflections, the criticisms and ideas of their colleagues, and make new plans that they can take back into their classrooms for another cycle of action. The methodology described, action research, has become significant within educational communities for intervention, development and change.

It is not sufficient for teachers to rely upon their own instincts as they progress through an action research program. It is the contention of these authors that they need to have access to issues and concerns that impinge on their practice but of which they may not be aware. One way to do this may entail the establishment of a learning community of teachers complete with a facilitator who will be able to intervene, as necessary, to provide this 'outside' perspective and to provide additional resources (vanOostveen 2005).

PBLOs embedded in COLE were designed as a means of addressing the conditions required in order to accommodate a form of action research set within an online environment, allowing for a greater range of access than the traditional face-to-face format, while still providing opportunities to teachers to participate in communities of learning while accessing the literature and building their own understandings of theory and its relationship to their practice.

2.4 Online learning: change in stance and incorporation of constructivist principles

A host of complexities must be addressed when moving teacher professional development into an online environment. Not only does the system need to meet the constraints required for learning in general, it must go beyond these by providing for the affordances that will allow for high levels of interaction between learners and with the course or system designers. Wagner (2001) defines interaction as a "reciprocal event that requires at least two objects and two actions. Interactions occur when these objects and events mutually influence one another" (p. 8). With the incorporation of problem-based learning and constructivist principles, PBLOs when embedded into COLE speaks to many of these characteristics as described by Anderson (2008) in his model of online learning.

Bransford, Brown and Cocking (1999) suggest that effective learning environments are described by the four attributes of being community-centred, knowledge-centred, learner-centred and assessment-centred. Each of these attributes will be discussed with respect to the characteristics shown by PBLOs embedded in COLE.

Learning with PBLOs is community-centred in that supports and challenges are provided to the learners within communities that are structured within the environment, for example, learners work collaboratively with other learners completing tasks, discussing reactions to the video cases, and when negotiating understandings to be entered into the wiki. As teachers participate in discussions with others they will be engaging in problem-based learning, endeavouring to determine the relationship of their new-found knowledge to their classroom practice. After attempts to implement ideas derived while in the online environment, teachers will be encouraged to bring their experiences from the classroom back to the online community for sharing and critique. In doing so, the community will be actively participating in action research, albeit a very different type of action research undertaken while in a face-to-face setting.

Learning within the COLE environment is knowledge-centred and is situated within specific disciplines and fields. Teacher participants will be given opportunities to experience discourse and the knowledge structures that undergird discipline thinking. For instance, PBLOs have been developed regarding the exploration of using argumentation skills in Grade 12 biology classes or a contemplation of critical literacy in an elementary language class. Each of the video cases encased in the PBLOs is situated within specific contexts and fields. The tasks and questions which are part of the PBLOs are designed to instigate discourse. Participants will also be asked, as part of the tasks, to reflect upon their own thinking, as suggested by Bransford, Brown and Cocking (1999). In this way, learners will be able to develop deeper understandings of the issues involved in the contexts addressed in the PBLOs.

Learner-centredness deals with meeting the needs of individual learners within the context of the community. An important initial step in focusing on the learner is to determine prior knowledge. The initial tasks of concept mapping and definition building, undertaken by student teachers in the argumentation PBLO were designed for this specific purpose, as well as to establish a baseline to be used to measure growth throughout the video case. Recent increases in the bandwidth and open-source software for communication have lead to increased opportunities in this area. The use of affordances such as wikis, and potentially other social networking tools, within the online environment will provide even more possibilities in the future.

PBLOs are also assessment-centred in the sense that the major embedded forms of assessments are based on formative assessments that will be carried out through peer and self assessments. These are primarily done within the context of wiki entries, revision of concept maps, and definition negotiation.

According to Anderson (2008), interaction is a critical element in the online education process. A computer-based learning environment requires an interface design that takes into account functionalities issues and issues of Human-Computer-Human Interactions (HCHI). Using a model set out by Desjardins, Lacasse & Bélair (2001), four types of interactions can be identified within COLE, allowing issues to be addressed and tools chosen for each.

User/computer interaction: The users have to be able to understand and use the available functions and tools with ease. This implies that the user-interface has to be very clear, simple to use and any navigation must be kept to a minimum. In a learner-driven context, the interface cannot predict what the user will want to use and when, therefore these functions are to be accessible at all times. In order to support the principles of a learner-driven, process-centred approach, the greater part of the interface is dedicated to a workspace for the user. The functions are then displayed around the workspace, organized according to the three remaining types of interaction.

Interacting with others: A section of the COLE interface called “Communications” includes computer-mediated communication tools, both asynchronous and synchronous, such as a basic mail service, a text-based live chat and a peer-to-peer videoconferencing system allowing a maximum of four users per virtual meeting space. Some limitations are imposed to foster collaboration. For example, there is only one chat room for any given course in order to foster open communication amongst all members of the same cohort. Limiting the videoconferencing to four participants per meeting space is set to provide a forum where small groups or teams collaborating on a specific task can hold meeting in as close to a face-to-face fashion as possible.

Interacting with information: The resources in this section are selected and adapted both to facilitate access to information in general and, most importantly, to produce, share and co-construct information in a collaborative manner. For instance, this section contains the actual course outline or syllabus and this is also where instances of problems are found as PBLOs. As concepts and ideas emerge from the learners while interacting with the PBLOs, a wiki becomes the central location where the learners define these and this is also where this knowledge is negotiated. Since the wiki is shared amongst all participants in a course, the language is collectively developed and understood, as in most socially constructivist learning activities. Although there are other tools available to generate and share texts in the environment, this one represents the principal negotiated repository of the collective knowledge.

Using information processing tools: This section of COLE offers text editors, spreadsheets and concept mapping tools for use by the learners to help them in the process of generating new information.

PBLOs, set within an online system such as COLE, provide learners with a unique environment with many of the characteristics required for online learning.

3.0 Methodology, Findings and Discussion

A pilot test was conducted over the space of approximately 2 hours (1 hour for each of two class periods in the Spring of 2008). The students were paired up and each of the partners was placed in separate, but adjacent, classrooms. The physical distance between the students required that they use the communication affordances available within COLE rather than leaning over and just speaking to the partner. All students were pre-service teachers enrolled in a General Science Curriculum course at UOIT. The pilot consisted of a PBLO (a set of tasks corresponding to a video-based case study focused on the use of argumentation within a Grade 12 Biology course in an urban high school in Ontario). The argumentation topic for the case study was chosen by a class-room teacher and the principal investigator as an example of a pedagogical technique used to explore critical thinking skill development for secondary school students. The development of argumentation skills in the science classroom can help students to identify the characteristics of arguments and then to apply the developed knowledge (Newton, Driver & Osborne 1999). The video case itself consists of 26 separate video clips organized into 5 separate themes which illustrate pedagogical considerations, such as, assessment, learning styles, teaching styles, interactions and an exploration of argumentation. While the full range of video clips was available to the teacher candidates there was insufficient time for viewing more than one or two clips during the pilot testing period.

3.1 Survey and Recordings during trial session (including debriefing sessions)

3.1.1 What were we looking for?

In the intervening time between the two pilot sessions with PBLO/COLE the students were asked to complete an online survey which asked a series of questions designed to measure attitudes towards online learning and to collect some basic demographic information such as age, gender, and experience with online environments. During the in-class use of the COLE, several pairs of pre-service teachers were video recorded as they were collaborating with their colleagues through the affordances provided in the environment. At the conclusion of the case study viewing a brief full-class debriefing session was held and video recorded for each of the course sections.

3.1.2 What did we find?

The pre-service teachers' responses to the survey questions provided some interesting background information regarding their experience with digital technology and predispositions to online learning environments. A superficial analysis of the data has been performed and will be reported here. Statistical significance and conclusions based on any of the results should not be assumed. 75.8% of the 34 participants were female. 67.6% of the students were between the ages of 18 and 27, as might be expected in a pre-service teacher education program where the majority of the students had recently graduated from an initial science undergraduate program. These students also typically had work experiences (outside education) of less than 6 years. Of the students who were older than this, 5 had more than 15 years of work experience outside of education.

The students were asked to estimate their weekly use of various types of software, ranging from wordprocessors to video conferencing (see Table 1). Wordprocessors and e-mail applications (both client or web-based applications) were most frequently used by these students. Other applications that are typically local-machine based, such as spreadsheets, databases, personal calendars and concept mapping tools, were infrequently used. Social networking sites, such as Facebook, are well used (more than 2 hrs./week) by more than 50% of the students. Text messenging/chats were also frequently used by the students. Some of most interesting results, involved the use of video-conferencing (VC) and wikis. These applications were not used or infrequently used (<1 hr./week) by more than 50% of study participants. The infrequent use may, at least partially, explain the relative unfamiliarity to these applications expressed by students in the debriefing sessions below.

The students were asked about their familiarity with online courses and problem-based/collaborative approaches to learning. 70.6% of the students had experienced 1 or fewer online courses. Consequently, most of the students were unprepared for what they would experience with the PBLOs and COLE. The students' relative inexperience with online learning environments may be of benefit from the perspective that these students may not have to overcome negative expectations based on previous online experiences with these types of systems. Conversely, the students' relative inexperience may also be detrimental since their expectations for online learning environments may be unrealistic. Each of these types of reactions are reflected in the statements recorded in the debriefing sessions below. In response to the problem-based/collaborative learning question, 64.7% of the students indicated that they prefer to have "a problem presented and have to create the solution in small groups." The responses probably have no significance outside the pilot study; they may be more indicative of the pedagogical stance taken within the course that these students were in during the pilot study.

Application Type	<1	2-5	6-10	>10
WordProcessor (i.e., MS Word, WordPerfect)	0	11	12	11
Spreadsheet (i.e., MS Excel, Quattro Pro)	27	4	1	2
E-mail	1	12	7	14
Discussion Forums	11	11	8	3
Blogs	28	4	1	1
Social software (i.e., FaceBook)	14	9	4	7
Concept mapping (i.e., Smart Ideas, Inspiration)	27	7	0	0

Text messaging/Chat (i.e., Messenger)	8	9	9	8
VOIP/videoconferencing (i.e., Skype, iChat)	26	3	3	2
Wikis (i.e., Wikipedia)	21	9	0	4
Agenda/Personal calendar	19	9	2	5
Database (i.e., FoxBase, FileMakerPro)	25	4	4	2

Table 1: Self-reported use of software by pre-service teachers (hours per week).

The final question asked participants to indicate how comfortable they were taking responsibility for their learning. Specifically, students were asked if they preferred courses where: 1) readings are assigned, 2) some texts are assigned or 3) themes are proposed and sources suggested. The results were striking: 47.1% of the students indicated that they preferred to have readings assigned, but 38.2% of the students chose the response with sources suggested. In this case, the results may say more about how students have experienced learning in the past and consequently may not be aware that there are alternatives.

Participants had the opportunity to unpack some of their underlying beliefs about learning in an online environment during a debriefing session that was held in the week following the pilot sessions. Issues surrounding the technical aspects of COLE dominated the initial questions and comments. For example, the participants spoke of the problem with the slow response time for the text-based chat system. In spite of this difficulty, many indicated a preference for this particular form of communication. Students mentioned using similar tools, such as MSN instant messaging, in their own personal study situations.

Students went on to comment on the potential utility of peer-to-peer videoconferencing. Many commented on the ease of its use and quality, in spite of some of the known technical problems. One individual commented that such a system would create unrealistic expectations, as he believed that too many users in remote areas would have insufficient bandwidth to accommodate such tools. Overall, most students agreed that text chat is a very important aspect of the environment that could promote collaboration and that, if possible, they would use a built-in chat tool.

In spite of initial technical problems related to access, the wiki tool attracted some attention. As the discussion progressed, student expressed more elaborate opinions regarding the potential of this tool. For example, one participant remarked that if she had known how to use the wiki, "it would have been cool, I think it has lots of potential." This remark led to a discussion about the required collaboration built into COLE. One participant stated: "Having to argue or discuss, I personally like it, but I know a lot of people don't so I'm not sure." A number of comments made by the participants about their experiences within the teacher education program generally confirmed this statement. Some students even referred to the teachers they met in schools, stating that most just want the information and do not wish to spend time discussing.

One participant commented on the specific constructivist perspective inherent in COLE:

> "I think it's good because you're actually creating it and it's like right in front of you, like when you're doing it, it's not, you're just listening, it's like **you're** doing it. That's what I like about it."

This particular comment generated a lot of support within the group suggesting that many participants enjoyed taking responsibility for their own learning. Another individual noted that the use of video cases added a good sense of realism. For example, she found it easier to comment on a video clip than on a written description. However other participants believed that the video clips were too “choppy”, referring to the sometimes rapid shifts between video shots found within the clips. The students felt the shifts did not portray the unified story. We believe that participants were treating the video cases as *content modules* instead of PBLOs.

The following extracts were derived from the debriefing sessions:

Extract 1

S1: Same exact experience online as in the classroom?

S2: But if you integrate the chat and the forum you can match the experience. I can talk to R... whether its here or whether I’m on a computer and he’s on a computer.

S3: It’s never going to be identical. It’s just like two classes, it’s like your class and ours. The dynamics are going to be different with everything but you can try to get them as close to the same experience as possible. You need to give them the same knowledge and as close to the same experience as possible. The former set of quotations identities that the multimedia communications package is important.

Although these participants recognize that there are some limitations, synchronous communications are critical to the concept of collaboration. In this particular extract, remnants of the traditional representation of teaching and learning remain, thus illustrating clearly the basic difficulties that need to be overcome:

Extract 2

S4: *If you construct it and you on the other end won't necessarily construct the same one right. You are actually able to show me by constructing that question that you have taken the knowledge and everything that we have done over the course and you are able to apply it.*

S3: *Not necessarily. I think you are making an assumption. If I have to come up with… construct a calculus question I can tell you right now, honestly it will be the simplest question you could ever have. It will be page one of the textbook. Here you go.*

S4: *How is that any different from asking in science to construct a question and solve an independent investigation? How is that any different where you find a similar mathematical situation where you ask the question and you are actually helping drive your own learning through the same situation? How is that any different? Why separate the ideas of math from science?*

Extract 2 reveals the difficulty that participants had reconciling their experiences of negotiating meanings and collaborating to construct definitions in COLE with traditional modes of assessment. The existence of this tension between prior assumptions about learning and recent experiences in COLE reveals that the conceptual change process is at least partially underway. The concept mapping activity, discussed in the next section, sheds some light on the conceptual change process.

3.2 Concept Mapping

3.2.1 What were we looking for?

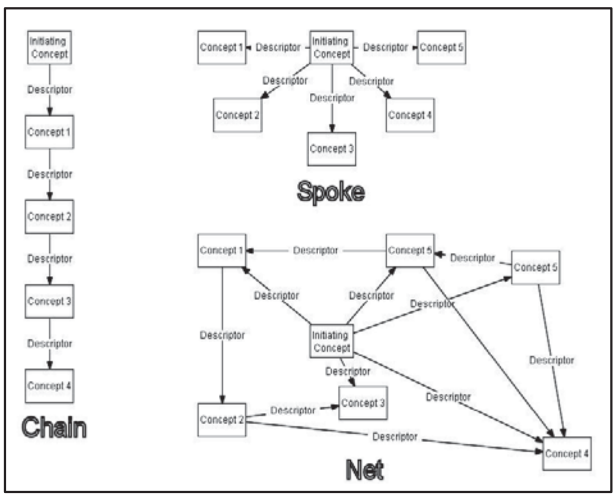
The first task in the PBLO required the students to produce concept maps regarding their conceptions of argumentation and online learning. Concept maps were collected from the students before they watched the video clips and again at the conclusion of the pilot test.

Concept maps were used in the study as a means of avoiding the often time-consuming tasks of creating and scoring open-ended response surveys (Jackson & Trochim 2002). Concept maps are graphical representations of the content and organization of individual's thoughts, constructed using pencil and paper, or as in this case study, an electronic application (Novak & Canas 2008). Daley (2004) suggests that concept maps are useful in qualitative research since they help the researcher to "see participants' meaning, as well as, the connection that participants discuss across concepts or bodies of knowledge" (p.1). Concepts are usually drawn as words enclosed in boxes or circles and are arranged in ways that allow closely related concepts to be found relatively close to each other. These closely related ideas are then connected to each other using lines and arrows. Descriptions placed on the lines indicate the nature of inter-relationships between the concepts. In this study, two sets of concept maps were created (pre- and post-intervention) as a means of identifying cognitive changes which occurred in the thought structures of the subjects as depicted as a consequence of the student's use of the PBLO's within COLE environment. The initial set of concept maps created by the teacher candidates reflect the prior assumptions that each teacher candidate held regarding the terms ("argumentation" in one concept map and "online environments" in another) and therefore establish a baseline of knowledge as understood by each individual. The second concept maps display the changes in participant thought processes following engaging in the use of PBLOs within COLE environment (Kinchin & Hay 2000).

The concept maps created in this study were analysed using a two-stage model developed by Kinchin and Hay (2000), Hay and Kinchin (2006, 2008) and Hay, Wells and Kinchin (2008). The two stages are characterized by the initial determination of concept map typology (chain, spoke or net) and subsequently identifying the quality of change that has occurred between the two concept maps (pre- and post-intervention) created by the participants using simple criteria (non-learning, rote learning and meaningful learning) (Hay 2007; Hay et al. 2008).

The first step in analysing the concept maps created by the participants was taken by applying the typology characteristics to each individual concept map. Concept maps have been classified into three types, depending on their organizational arrangement and characteristics (see Figure 6).

Spoke concept maps have concepts radiating from the central structure and indicate that the concepts are related in a simple association with no indication of interactions between the concepts. Chains consist of a hierarchy of terms that are related to each in a sequential fashion without any interactions



6**Figure 6:** The three main concept map structures.

with concepts outside of the chain of direct links. Nets display complex interactions as there are elements of chain and spoke concept maps found within the net with links between various concepts, not solely with the central (initiating term) nor with terms within a specific chain. The specific characteristics of each concept map type are found in Table 2.

The second step in the analysis process was to determine the quality of change which had occurred in the thinking of the participants as indicated in the changes to the structure and content of the second set of concept maps when compared to the first. To prepare the second set of concept maps, the participants were given the same instructions as they had for the initial set of maps, that is to create a concept map for each of the terms “argumentation” and “online learning”. The participants were asked not to refer to the first set of concept maps as the researchers were interested in the addition/deletion of concepts following the intervention, as well as the reorganization which occurred. The second set of concept maps was identified using the typology criteria as was the first set.

	Concept Map Type

	Spoke	Chain	Net
Hierarchy	One level only	Many levels, but often incorrect	Several justifiable
Processes	Simple association with no understanding of processes or interactions	Shown as a temporal sequence with no complex interactions or feedback	Described as complex interactions at different conceptual levels
Complexity	So little integration that concepts can be added without consequences for 'map integrity'	Map integrity cannot cope with additions, particularly near the beginning of the sequence	Map integrity is high. Adding one or more concepts has minor consequences as 'other routes' through the map are available.
Conceptual development	Shows little or no 'world view'. Addition or loss of a link has little effect on the overview.	Integrated into a narrow 'world view', suggesting an isolated conceptual understanding. Loss of a link can lose meaning of the whole chain.	Can support reorganization to emphasize different components to appreciate a 'larger world view' or to compensate for a 'missing' link

Table 2: Concept map typology characteristics. Modified from Kinchin & Hay (2000).

The two sets of concept maps were then matched according to participant and the initial term (argumentation or online learning) given. Each of the first concept maps within each pair was compared to the second, looking for the addition and/or deletion of terms and the reorganization and linking of terms which was changed from the first concept map. Changes of typology between the two concept maps were noted for some individuals (see Table 3).

3.2.2 What did we find?

In both cases, most students did not change their manner of representing and organising the concepts in the maps. The only exceptions to this were two students who changed form an initial spoke type concept map to a network approach after working through the "Argument" PBLO, (see Table 3). A similar result was obtained in the case of the students working through the "online learning" PBLO, with only two exceptions, one going from spoke to network and one doing the reverse, going from network to spoke.

Judgements regarding the quality of changes which occurred beyond the changes in typology were made between the pairs of concept maps. This was done again by the three members of the research team using the following criteria, as developed by Hay and Kinchin (2008):

$ Non-learning. Was defined by an absence of cognitive change. Non-learning was therefore measured by the lack of new concepts in the second map and by an absence of new links in the extant prior knowledge structure.

$ Rote Learning. Was defined in two ways. First by the addition of new knowledge. Second by absence of links between the newly acquired concepts and those parts of the prior knowledge repeated in the second map.

$ Meaningful Learning. Was defined by a non-trivial change in the knowledge structure. Thus evidence of meaningful learning comprised the emergence of new links in parts of the prior knowledge structure developed in the course of learning and/or the meaningful linkage of new concepts to parts of the pre-existing understanding (Hay & Kinchin 2008, p. 173).

Here most of the students who produced a network style of concept map, were deemed to have met the criteria of Meaningful Learning, whereas the spoke concept maps were judged to indicate more rote learning according to the Hay and Kinchin (2008) typology.

Argumentation, *N*=23	Post			
		Spoke	Chain	Network
Pre	Spoke	13	-	2
	Chain	-	-	-
	Network	-	-	8
Online learning, *N*=25	Post			
		Spoke	Chain	Network
Pre	Spoke	10	-	1
	Chain	-	-	-
	Network	1	-	13

Table 3: Concept map categorisation and comparison between Pre and Post

A binomial test was performed but, as expected, showed no statistically significant difference. We are thus forced to reject any hypotheses suggesting that using PBLOs would foster any measurable change in how students would represent the resulting constructed knowledge in concept maps. On the other hand, we can also conclude that the Collaborative Online Learning Environment, as well as the PBLO's basic design, did not present any effect on the learners' abilities to deal with the issues presented in this technological environment. In spite of the fact that no real content was presented by the PBLOs, and in spite of the fact that this intervention was the first time that students came into contact with both COLE and the PBLOs, students did not seem to require particular IT competencies to navigate and manipulate the Collaborative Online learning Environment. Thus, the environment did not appear to have any negative effects on the potential learning that was set as an objective for the PBLOs.

Although not statistically significant, it is also to be noted that most of the changes that did occur in this small sample, were on the positive side. In the case of the Argumentation concept maps, 2 of the 13 students who started with a spoke concept map changed their concept map to a more network configuration in the second iteration where none did the reverse. In the case of the Online Learning concept maps, two students did change, one in each direction.

3.3 Focus group after session (with Repertory Grids)

3.3.1 What were we looking for?

A few days following the pilot session, a focus group of eight students was convened. The students in the focus group were asked to participate in a discussion devised to identify a series of constructs and elements related to the construction and use of online environments. Most of the discussion revolved around the question that was posed to the group: What would you say are the most important factors to be considered when planning a university level course to be delivered online? This question was used for the elicitation of the characteristics of the topic, or elements, and then the students were asked to determine how they would measure the extent to which they had considered the identified elements, as a means of generating the required constructs. The constructs and the elements were used by the students to produce independent repertory grids. The focus group session was video recorded and subsequently transcribed.

In order to gain some insight into both the predispositions that teachers bring to bear on their conceptions of teaching and to determine if there had been any shift in the predispositions of the teachers during the lifetime of the project, the Repertory Grid technique was employed. A focus group of 8 participating teacher candidates was drawn out of the pool of students participating in the pilot study. The set of grid responses was completed during the focus group meeting in November 2007, a few days following the sessions where the PBLO/COLE was used. Repertory Grids are drawn from the Personal Construct Theory (PCT) of George Kelly (Bencze 2000; Feixas & Alvarez 2000). The Grid is designed to:

> capture the dimensions and structure of personal meaning. Its aim is to describe the ways in which people give meaning to their experience in their own terms. It is not so much a test in the conventional sense of the word as a structured interview designed to make those constructs with which persons organise their world more explicit. The way in which we get to know and interpret our milieu, our understanding of ourselves and others, is guided by an implicit theory which is the result of conclusions drawn from our experiences. The repertory grid, in its many forms, is a method used to explore the structure and content of these implicit theories/personal meanings through which we perceive and act in our day-to-day existence (Feixas & Alvarez, 2000).

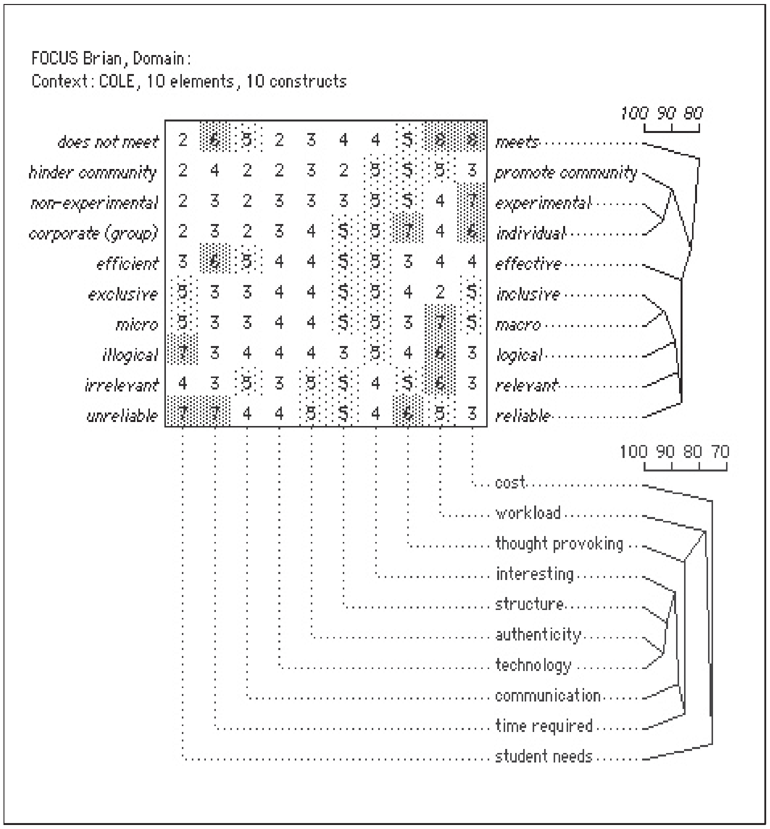
The description which follows is adapted from Bencze (1995). The technique used in this study is a graphical and numerical, computer generated (web-based) grid, which can be accessed at http://gigi.cpsc.ucalgary.ca/WebGrid/ (Gaines & Shaw 2003). It allows the user to illustrate relationships that exist in the user's mind between *elements* and *constructs*. The elements are characteristics of the topic, in this case COLE. The constructs are the two poles of a continuum (e.g., hinders community <–> promotes community) which are used by the teacher to make sense of the elements. The teacher determines the location (1 - 9) between the two extremes of the 'construct' using a numbered scale. By doing this the teacher is describing, in explicit terms, his/her beliefs and understandings regarding the chosen element (Bencze 1995, 2000). While a number of mechanisms can be used to elicit the constructs and elements from the teachers in the development phase of repertory grid analysis, the technique chosen was to use a manual method of elicitation that involved each of the teachers using a pen and a paper form. As a group, the students were asked to consider a series of questions which were designed to elicit the elements and constructs. The questions used included: What would you say are the most important factors to be considered when planning a university level course to be delivered online? Which of these is most likely to impact the success of such courses? During the course of the discussion based on the questions, the teachers were asked to make a list of characteristics of COLE (elements). This initial list was shortened to 8 by the entire group. 2 additional elements could be added by the individual teacher. The group then brainstormed and agreed upon a set of 10 constructs. These constructs were written into the grid on the paper, one pole of the construct on each end of the 9-point scale. The teachers were asked to rate each of the elements against the constructs by placing the number associated with the ‘element’ into the appropriate place on the 1-9 point scale between each of the constructs.

The teachers were then asked to explain why they rated the strategy as they did. The explanations were recorded and were available for analysis along with the paper grids (Bencze 1995). The paper grid results were transferred into WebGrid by the research team. The resulting grids and the analyses of the grids were stored on a laptop computer. Reading the grids involves taking note of the numbers in each ‘cell' or grid square: numbers below 5 indicate an association with the pole on the left hand of the construct; numbers above 5 indicate an association with the right pole of the construct. The number 5 would indicate that the person completing the grid felt that the element was equally associated with both poles of the ‘construct'.

Using the FOCUS option in WebGrid, it is possible to analyze the responses in greater detail. In the example illustrated in Figure 7, Brian (a pseudonym) gave ‘cost' a rating of 7 on the ‘experimental <–> non-experimental' construct. This indicates that Brian thought that the costs associated with using COLE allowed for it to be used in an experimental fashion. This element, ‘cost', was also given a rating of 6 on the ‘individual <-> corporate (group)' continuum. In other words, there is a high correlation between the two ‘constructs' for this specific ‘element'. This is indicated by the point where the lines, extended to the right from the ‘constructs', intersect with the grid which is printed on the top of the complex of lines. The intersection point is approximately 92.5%, indicating the strong relationship that exists between these two ‘constructs'. A similar analysis can be seen for the ‘elements' as well. Here, again referring to the example given in Figure 7, a strong relationship (approximately 90%) is indicated between authenticity and technology. This may be interpreted as a belief that the technologies used in COLE allow it display an authentic portrayal of the classroom (for the argumentation PBLO).

Taking all of the associations represented in a repertory grid into account, a representation of a person's value system (at the time of the elicitation) with respect to the concepts alluded to in the ‘elements' and ‘constructs' (characteristics of COLE and how these characteristics help the teacher candidates interpret the characteristics) may be constructed. However, it is important to be aware that these interpretations are tentative and must be corroborated with evidence collected by other means.

While the overall reliability and validity of individual Repertory Grids remains an issue (Gaines & Shaw, 2003), the tool did provide some insight into individuals' personal constructs. In addition, Repertory Grids may provide access to changes in teacher attitudes towards the issues about the construction and use of sophisticated online technologies to support teacher professional learning.



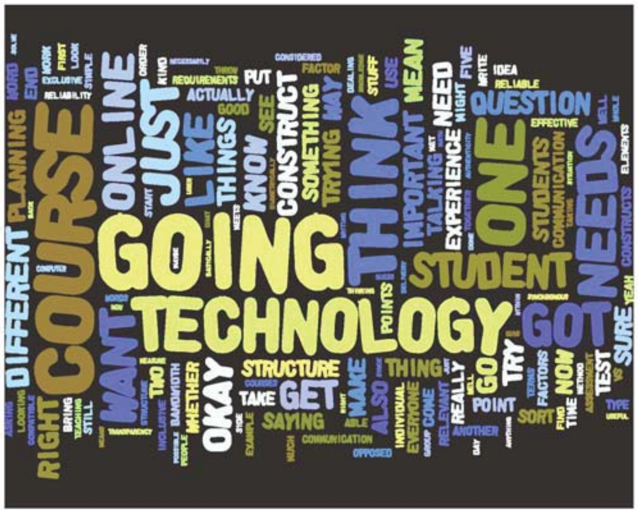
7**Figure 7:** Brian's repertory grid depicting his thinking about his use of COLE during the pilot study.

Unfortunately, while the analysis of the resulting grids was straight forward, the interpretation of these same grids was inconclusive as there were no consistent strong correlations between individual student responses. Consequently, we decided to return to the video recording of the focus group session in order to determine if any insights could be derived from the responses of the students with respect to the element and construct elicitation process.

To do this, the text transcript of the focus group session was fed into a word cloud application. This type of application creates a "visual depiction of words. The more frequent the word appears within the text being analysed the larger the word becomes. In essence a word cloud plots word frequency by the size of the word" (Ramsden & Bate 2008, p. 1). The largest words as indicated by the word cloud, were subsequently sought in the transcript document. Instances of student use of these specific terms within the transcript were noted and compiled. These instances were analysed using a grounded theory approach (Glaser & Strauss, 1967; Strauss & Corbin, 1990) and themes were allowed to arise from the instances in which the terms were used (Lincoln & Guba, 1985, p. 41).

3.3.2 What did we find?

The most frequently appearing words, as identified in the word cloud (see Figure 8), found in the focus group session, in order of size, included: 'going', 'course', 'technology', 'think', 'got', 'needs', 'one', 'want', 'student', 'online', 'different' and 'planning'. Several of these words,



8**Figure 8:** Word cloud produced based on repertory grid focus group transcript.

such as ‘going’, ‘got’, ‘think’, ‘student’, ‘one’, ‘want’, and ‘different’ were used frequently by the students in the group as a manner of speaking.

No significance could be found arising from their use during the discussion, with respect to the questions under consideration for the elicitation of either elements or constructs. The term ‘course’ was used frequently but it was impossible to distinguish themes that were specifically related to this term as it was usually used in the same context as ‘technology’, ‘online’ or ‘planning’, consequently the term will not be reported here separately. Similarly ‘needs’ was typically used within the context of student needs which needed to be addressed. There was not sufficient diversity to identify any specific theme with this term. Excerpts from the discussion will be reported, rather than every occasion when the students used each of the terms, in an effort to portray the theme which emerged.

When discussing the ‘technology’ in online courses, the students seemed to focus on the idea that the technology should recede or disappear so that student work within the online environment or ‘course’.

> Some students might really want to take this course but they are being held back due to the technology.
>
> It [the technology] needs to be very simply laid out so that you can focus on the course and not try to get through the technology.
>
> The technology [needs to be simple] so that you can focus your ideas on the course. The technology you're just using it as a tool.
>
> It should be an applicable technology and as a tool not be a hindrance to the ... It shouldn’t overshadow the actual content of the course. It should complement it and assist.
>
> It shouldn’t take away from the content of the course. It should complement it, rather than you know, just because you can doesn’t mean that you should have that kind of technology in there unless it complements the course.

These excerpts bring to mind Jonassen's (1996) concept of *learning with technology* or using technology as *mind tools*. Mind tools are digital technologies which support learning such that "learners and technologies should be intellectual partners in the learning process, when the cognitive responsibility for performing is distributed to the part of the partnership that performs it the best" (Jonassen, Peck, Wilson 1999, p.12). In this case, the digital space within which the online course exists should provide the tools for communication, file production and processing so that the students can concentrate on thinking and developing skills as required by the activities set within the course. If the technology intrudes into the student's thinking processes, as a result of poor choice, design or execution, then the technology is not sufficiently transparent.

While considering the impact of teaching in an 'online' course structure, the students had some difficulties in describing what an online course would look like, even though they had experienced COLE.

> Are you going to [conduct an online course] with reading? Are you going to do it with recorded lectures? Are you going to do it with discussions online? So what's the delivery method that's going to be used to deliver the course, I guess is what I'm saying?

> I also think that bandwidth considerations that do exist should also be factored in because they are going to limit the delivery method. If you want to [view] an online video live and you don't have the bandwidth that's not going to work very well so you sort of have to factor those in.

> I'm going to plan this online course but if the appropriate educational experience is not possible through an on-line course, should I even deliver it? Is it the right way to do it?

> If I put two people in a room and one took it online and one took it face-to-face, shouldn't they have been able to construct similar types of knowledge in the same types of courses?

> I think, the point is if they want to cheat [while engaged in traditional testing], they are going to find a way, no matter what, whether they are sitting with MSN open and they are still doing the online course at the same time and talking. The point is at some point you've got to rely on people's integrity.

Focus group participants continued to think about online courses as efficient delivery methods for content to students who were at a distance to the instructor. These ideas are particularly striking when the final comment in this group read. The student acknowledges that there are some inherent issues with traditional testing methodology when placed in an online setting. It is acknowledged that if the structure of the online experience is not changed then instructors must rely on the ethical integrity of the learners. It is clear that the teacher candidates have not realized that their definition of learning is a matter of presenting information to learners and then asking the learners to reiterate that information in a formal testing situation.

The discussion regarding 'planning' in an online environment followed a similar path to the discussion about online courses. The students attempted to reconcile notions of traditional face-to-face courses while using online settings.

> I guess the other thing is, what are the requirements, if I was going to teach this course, not online, what would my requirements be? And do those change when I turn to an on-line course, in terms of planning?

> If I'm planning a course and I was going to do it in a classroom, and what would I do and what are the requirements I would have of my students? Should those requirements really change if I'm going to an on-line

> situation or do I still want the students to get the same amount of stuff, the same experience out of it as if they were in the classroom.
>
> Maybe when you are planning that is what you need to consider is some of those bigger [assessment activities], be it culminating tasks or be it authentic assessment or whatever it is to be done in order to evaluate appropriately for that type of course.

It is readily apparent from the comments that part of the difficulty students were having was related to their relative inexperience with the online setting and with teaching in general. They assumed that an online course would have a similar structure and experience to a face-to-face course and that each class in a face-to-face environment is different so that even if, as the second comment implies, the instructor wanted to provide the same experience to the learners, this is impossible to do. The short period of time available to them through the pilot study was not sufficient to orient them to alternative experiences.

Through the repertory grid focus group session discussion, the participating teaching candidates were able to identify elements, such as student needs, technology, structure, communication, authenticity, and constructs, such as relevance, efficiency, reliability, promotion of community, and inclusivity. They wrestled with the notions of online courses and the impact that a change of environment would have on the nature of learning. However, the teacher candidates were not able to reach the conclusion that the structure of online environments need to be radically different from face-to-face classrooms to meet the needs of the learners and do justice to notion of using technology as mind tools.

5.0 Conclusions

It is important to consider that this paper presents the results of a very short pilot study intended more to explore than to conclude. As initially expected, the pilot study was by no means long enough to foster the kinds of changes that would be desired. Nonetheless, it demonstrated that the developed tools are useable by students, and it would suggest that further investigation with larger samples over a longer period of time is warranted.

Overall, the initial reactions centred on two fronts, one being the technical issues and the second on more pedagogical aspects surrounding the Collaborative Online Learning Environment. On the technical question, the servers used for the main part of COLE were insufficient to handle the number of students, even in this limited experiment. Most of the delays experienced either in loading of certain elements or the particular lag in the online Chat, was due to a technical issue with servers that can easily be addressed in future trials.

The wiki was also problematic because it did not manage the entries as it should have. This also was an easy fix after the trial. In spite of these difficulties, the concept was understood by the participants and sufficient interest and understanding as to its purpose was shown to suggest that the wiki tool should remain central to COLE.

Although COLE is designed to foster collaboration and for collective knowledge construction to occur, it should be noted that the task design, the presentation of the problems and the actual participation of the learner in the learning community is what drives the learning process. We caution against adopting a traditional framework for understanding COLE, as it might lead us to simply adding more features to the environment, as though an increase in tools would equate to increasing its potential as a learning tool. At worst, COLE could devolve into a transmission-based teaching tool like other well-known course management systems. At best, we see the potential of COLE to facilitate the kind of collaborative learning that we believe is central for a 21st-century citizenry.

The prototype of this COLE was constructed in a relatively short time using the *Moodle* platform and many open source plugins were used. The central idea was to attempt to produce an online learning environment that would actually be solidly based in learner-driven process-centered paradigm with a clearly social-constructivist perspective. The prototype, presently used in trials, has been shown to offer good potential to support a problem based learning approach as users, in a very short time, have shown some awareness of difference and of change. What remains to be examined, thus outstanding as the principal focus of this research, is the question: Can the use of PBL set in a Collaborative Online Learning Environment, deeply rooted in a social constructivist perspective, have any effect on teacher's individual representation of "learning" and maybe "pedagogy"?

The time available to use the PBLO within the pilot testing sessions was extremely short and consequently the responses were minimal. It remains to be seen if the four-page structure described here will be effective in allowing in-service teachers to examine and reflect on issues of importance to their professional career and their practice. Although five additional PBLOs were recorded in response to requests that arose within this project, only two of these have been implemented within the COLE environment. The remaining three have yet to be fully edited and restructured into PBLOs before they can be used. While there is potential to have all of these PBLOs used within professional learning programs, there have not yet been opportunities to do so.

Savin-Baden (2007) provides a vision for the integration of problem-based learning and online learning environments. She labels systems which integrate these concepts as 'computer-mediated collaborative problem-based learning (CMCPBL)' environments (p. 23). According to Savin-Baden, these CMCPBL environments should be focused on a 'team-oriented knowledge building discourse,' rather than concentrating on teacher-directed, content-centred methods and they should exemplify the three characteristics of this type of discourse:

- focus on problem scenarios and depth of understanding
- open knowledge building that focuses on collective knowledge so that inquiry is driven by a quest of understanding
- an inclusion of all participants in the broader knowledge community, this learning involves students, teachers, administrators, researchers, curriculum designers and assessors (Scardemalia & Bereiter 1994).

PBLOs embedded within the context of COLE was designed to embody a process centred, learner-driven approach (Desjardins & vanOostveen, 2009). The PBLOs serve to orient the learner to specific contexts and situations within which problems can be found through discourse with others within the learning community. Overall the PBLO/COLE environment seems to be a direct answer to the CMCPBL call to action.

Our preliminary research has called attention to the potential ability of PBLO/COLE to disrupt conventional, transmission-based conceptions of online learning as content delivery. At the same time, however, our preliminary work has also indicated that learners who are not used to the collaborative opportunities provided within PBLO/COLE may still hold traditional orientations to teaching and learning as a “gold standard” to which all other options are compared. A purposeful direction for our future research will entail not only presenting PBLO/COLE as an answer to the CMCPBL call to action, but also to working with learners in PBLO/COLE over a sustained period of time so that they may engage in an online experience grounded in principles of socio-constructivism.

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Professional Development Learning Environments (PDLEs) embedded in a Collaborative Online Learning Environment (COLE): Moving towards a new conception of online professional learning

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Executive Summary

Teaching, and education in general, remain firmly rooted in the practices of the past and continue to resist the implementation of strategies and theories arising from educational research. Consequently significant reforms have been slow to take hold in educational systems around the world. Much of the reluctance can be attributed to a widely held misconception of the nature of learning. This project attempts to address this misconception through the development of Professional Development Learning Environments (PDLEs are a series of learning tasks and a video-based case study) embedded in an online learning environment that requires the collaboration of users to solve problems. To use a Problem-Based-Learning (PBL) approach in an online context requires a major paradigm shift as well as using tools that were not designed specifically for such a student-driven, process-centred pedagogical paradigm. This becomes a problem when online resources and systems are used for supporting in-service teacher in their pursuit of furthering their education. Although the current theories of learning and teaching may present the philosophical content of such courses, the online strategies used often conflict with the theory. In an attempt to study the formal implementation of PBL as a social-constructivist pedagogical approach, into an online learning environment as a means to provide the tools for e-learning that would be closer in design to the current thinking on the very nature of learning, the PDLEs were modified to become small reusable video clips with a structure designed to facilitate PBL and focus learners' attention on higher order thinking skills rather than specifically on content. These modified PDLEs are referred to as Problem-Based Learning Objects (PBLOs). The PBLOs were embedded into a prototype of a *Collaborative Online Learning Environment* (COLE) which was developed simultaneously. The entire system was pilot tested with small groups. Preliminary results show that although many technical difficulties remain to be solved, using the environment does show evidence of some effect on beliefs about personal theories of learning, causing shifts from technical issues to those surrounding processes of learning. Our preliminary research has called attention to the potential ability of PBLO/COLE to disrupt conventional, transmission-based conceptions of online learning as content delivery. At the same time, however, our preliminary work has also indicated that learners who are not used to the collaborative opportunities provided within PBLO/COLE may still hold traditional orientations to teaching and learning as a "gold standard" to which all other options are compared. A purposeful direction for our future research will entail working with learners in PBLO/COLE over a sustained period of time so that they may engage in an online experience grounded in principles of socio-constructivism.

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COMMUNITY COLLEGE DISTRICT

Education Master Plan
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The Grossmont-Cuyamaca Community College District is starting a year-long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long-range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resources allocation.

As the first step in this planning process, everyone in the GCCCD community (faculty, staff, students and community members) are invited to identify and submit information sources to be reviewed for the trend analysis in one of six areas – society, technology, economy, environment, politics, and education. We are not asking you to do research, only to identify information you already have or that you encounter during the search period (March 21- April 25) and bring it to our attention for review.

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' Making a World that is Worth Living In' : Humanities teaching and the formation of practical reasoning

Melanie Walker

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'Making a World that is Worth Living In'

Humanities teaching and the formation of practical reasoning

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ABSTRACT

This article considers humanities teaching as a vital space where students might develop their capability as 'practical reasoners'. The importance of this for self-development, but also for society and democratic life, is considered, while the economic purposes which currently dominate higher education are critiqued. An example is taken from the teaching of history to show how lecturers teach and students learn secular intellectual practices under pedagogical arrangements of communicative reasoning and ontological becoming.

KEYWORDS *capabilities, democratic life, history education, practical reasoning, teaching and learning*

> If we do not insist on the crucial importance of the humanities and the arts, they will drop away, because they don't make money. They only do what is much more precious than that, make a world that is worth living in, and democracies that are able to overcome fear and suspicion and to generate vital spaces for sympathetic and reasoned debate.
>
> (Nussbaum, 2006: 15)

INTRODUCTION

Philosopher martha nussbaum offers a striking anecdote which in my view captures much of what is wrong with the purposes and direction of higher education today, certainly in the UK. She describes a visit to a Hindu temple in Illinois and a guided tour from a young man recently arrived in the USA from the province of Gujerat in India. As he showed her around the temple he recounted his own beliefs in the spiritual powers of the

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current head of the Swaminarayn sect of Hindus, distinctive, says Nussbaum, for uncritical obedience to a leader who is taken to be the direct voice of God. Nussbaum recounts how the young man pointed to the ceiling of the temple and asked her if she knew why it glowed. She said she did not know, confidently expecting an explanation invoking the powers of his spiritual leader. She continues: 'My guide smiled even more broadly. "Fiber optic cables", he told me. "We are the first ones to put this technology into a temple".' 'Here', writes Nussbaum, 'you see what can easily wreck democracy: a combination of technological sophistication with utter docility' (Nussbaum, 2008: 370). Her necessary point is that an understanding of advanced technology can sit all too easily with submission to authority.

Now it may be that this young man was not himself the product of a university education. Nonetheless we can still say, as Barnett (1994) does, that a university education 'is necessarily a process of becoming'. But Barnett then goes on to ask the most important question: 'what kind of becoming?' (1994: 190). This article takes up his question in order to explore humanities teaching and the formation of students as 'practical reasoners' in democratic societies, by which I mean people acquiring the knowledge and attributes to live comfortably and compassionately in their society and in the world alongside people different from them.

The article foregrounds the decisive importance in contemporary times of how humanities teaching in universities has a meaningful and delicate part to play in preserving and deepening democracy in the face of what Nussbaum characterizes as not so much the clash between cultures, but 'the clash within' each of us as 'we oscillate uneasily between self-protective aggression, and the ability to live in the world with others' (2008: 336). This involves, she argues, a struggle within the self, tugging us this way and that, between a delight in diversity and safety in homogeneity. We need, she argues, to foster a public culture (including universities) as contributing to public spheres of 'non-domination and equality' that can inspire us, even as 'fearful human beings', to value 'mutual aid and reciprocity' (2008: 374). Such a culture is fundamental to human security but is not well served by universities training 'useful profit-makers with obtuse imaginations' (2006: 15).

However, in recent decades, it seems that university education policy (if not its academic professionals) has been much more concerned with science and technology and with economic applications of knowledge. To be sure, internationally and nationally, higher education is regarded as central to the creation of intellectual capacity and the construction of knowledge and skills for participation in an increasingly knowledge-based world economy. Castells (2004) argues that if knowledge is the 'electricity' of the new international economy, then higher education institutions are the power sources on which a new development process must rely. Higher education policy has thus focused on educational outcomes that support economic growth and enhanced individual incomes – a human capital approach to education which measures the returns to education and applies a cost–benefit analysis to decisions about education expenditure and profitability. That education should equip graduates with the knowledge and skills to participate in the economy is unsurprisingly the aspect that most concerns governments. But the problem arises when the meaningfulness of economic opportunities is not debated, and when goals such as intellectual development, equal democratic citizenship and broader social goods are overlooked.

In the UK, universities have been particularly intensively affected as bearers of the knowledge economy, to a degree somewhat different from the historical links between higher education and economic objectives. 'Serving the economy has become their raison d'être', suggests Holford (2008: 25). This is reflected, for example, in the 2003 White Paper on Higher Education with its emphasis on the language of human capital and business (DfES, 2003). Evans (2004) suggests that there has been a palpable shift from valuing independent and critical thought to valuing the marketplace and the economy. Even creative arts are recast as creative industries to 'transfer knowledge', expand economies, drive innovation, and improve competitive market positioning. For example, an Arts and Humanities Council fellowship is being funded to explore the relationship between university research in the arts and humanities and innovation processes in the creative industries because the creative industries 'are seen across the world as one of the key sectors of the future and governments are actively developing support measures to capitalize on a wide variety of their claimed impacts. In the UK the creative industries are regarded both nationally and regionally as critical tools for economic and cultural adaptation and development' (AHRC, 2009).

Similarly, in reporting on European social science and humanities Griffin (2006: 234) acknowledges the contribution of both to unique paradigms and to the education of citizens, but also prioritizes 'the contribution of our cultural heritages to national and European wealth'. On the other hand Parker (2007: 124), in considering what the humanities have to offer in Europe, warns against 'instrumental assumptions that need to be resisted'. Rather, she emphasizes the significance of multivoiced and complex narratives, of rhythms counter to those of the digital age, to offering disputed knowledge and learning to thrive in a supercomplex world. Generating economic growth as a direct impact is not mentioned. It is then fair to say that the arena of humanities education is contested, even though humanities may have been less affected by human capital public policies than other areas (but even this is debatable: for example, there has been a decline in funding for the humanities). In general what is more interesting are the shifts in emphasis and discourse in public policy from creative and liberal learning with intrinsic value to learning that must *always* be for something else.

Moreover, in 2009 we find ourselves deep in a severe global economic crisis. Yet the focus on human capital outcomes in the UK and market policy drivers in university education have neither equipped us to avoid such an outcome, nor removed continuing inequalities at the heart of society. They are nowhere near to solving resurgent conflicts based on contested identities, cultures and religions, or human greed. Furthermore, universities are public institutions which ought, as recipients of public money, to be contributing in some way to a better society; with a participation rate still under 50% in England, graduates arguably have obligations beyond their own personal benefit, to others who have not had the advantage of a university education (Walker, 2009). How are students to learn this, and from whom?

PRACTICAL REASONING AND UNIVERSITIES

The argument put forward is that the humanities can respond to these concerns and develop the knowledge and 'capabilities' (Nussbaum, 2000) of students in ways which foster 'the value of enquiry, the ferment of doubt, a willingness to dialogue, a spirit of criticism, moderation of judgment, philological scruples, and sense of the complexity of things' (Eagleton, 2001: 12). To cultivate through the humanities the capability for practical reasoning and judgement and for an expanded moral imagination is to develop not only selves, but also attention to others and society (Booth et al., 2009). I have in mind not a scientific form of practical reasoning which envisages the agent as technocrat making choices based on an objective science of measurement but a form of Aristotelian practical reasoning in which discernment, perception, context and complexity all feature in choosing well (Nussbaum, 1990: 71). Why does this distinction matter for private citizens and for public policy? Nussbaum explains that we are often confronted with 'unpalatable moral choices' in which there is no clear right (or measurable) course of action, thereby demanding tough choices in a world of change, and confronting us 'with ever new configurations, ever new situations for the determining of the virtuous course'. This requires, says Nussbaum (1990: 84) quoting Henry James, that we become 'finely aware and richly responsible' human beings, equipped with insight and practical wisdom, able to evolve our own view of the good or complete human life, and also able to use these insights to benefit others.

Bérubé (2006), Nussbaum (1997), Parker (2007) and Bates (2005), among others, therefore argue for the special importance of the liberal arts (humanities) in being able to 'cultivate humanity' by fostering students' capabilities for examined selves, their narrative imagination, and their sense of themselves as world citizens with ethical obligations to others beyond national boundaries in a global world (Nussbaum, 1997). It is the humanities that 'teach people to think deeply and reflectively about the good life, the good society and the idea of the good' (Bérubé, 2006: 295), thereby suggesting an optimistic view of the potential of university education to bring about transformative change and to address human problems. This ascribes to the humanities a particular form of 'social utility' (Bérubé, 2003: 23) – not the utility of human capital which says that if education makes one a better economic producer it has succeeded, but a utility which highlights 'our struggles to grasp how things mean as well as what they mean' (Bérubé, 2003: 37). Bérubé explicates further:

> Common to all enterprises of the Humanities . . . is the recognition that we are in the business of deciphering, or trying to construct and deconstruct meanings that make intelligible to us some aspects of this social world that we sometimes think we know . . . it is useful only to the extent that humans need to know the meaning of human affairs, past and present. (2003: 37f)

I take as fundamental to 'making a world that is worth living in' that we learn to reason together, modifying and revising our ends as we reach unforced agreements through intersubjective communication about the better argument in order to deepen democratic life (Habermas, 1989; Richardson, 2002). Such reasoning is oriented to 'figuring out the truth about what ought to be done' (Richardson, 2002: 76), including making judgements about which explanations have greater merit than others as we shift from 'reasons to reasoning' (Richardson, 2002: 83). In turn this requires of us that we respect the autonomy of our peer deliberators so that we are 'willing to offer one another reasons and arguments and to attend to the ones that others offer' (Richardson, 2002: 83). These ideas applied to university education would involve educating for 'wide-awakeness' (Greene, 1992; Nussbaum, 2006) so that we form people who can (although we cannot guarantee that they will) stop and think when apprehensive or angry or liable to irrational responses.

But we need also to be mindful that reasoning can be and is cultivated in diverse public spheres and spaces. Universities are not unique in this respect. We need to be clear what precisely it is that universities do that is distinctive in society. Here Marginson (2007) is helpful. He sketches two essential domains which constitute, he argues, the contemporary idea of the western, humanist university. These are the domain of communicative association, which requires 'the right to speak, and the conduct of dialogue on the basis of honesty and of mutual respect' situated within and across universities characterized by 'relationships grounded in justice, solidarity, compassion, cosmopolitan tolerance and empathy for the other' (128). The second essential domain is that of 'secular intellectual practices'. In pedagogical terms this domain would demand the opportunity for and achievement of 'practices integral to productive intellectual activity, including curiosity, inquiry, observation, reasoning, explanation, criticizing and imagining' (Marginson, 2007: 128). Marginson underlines the importance of this university knowledge project:

> In forming knowledge, scholars and researchers remember what they know, and they think of something new. Then they each systematize this something 'new'. This 'something new', the thing that scholars and researchers seek, emerges in a zone vectored by criticism and imagining. In the absence of this zone universities lose their driving force and their ultimate modern rationale. (Marginson, 2007: 128)

This second domain involves producing (new) knowledge as the key mission of universities, but each domain supports the conditions for the other to thrive. Indeed, Habermas (1989) would argue that, in the face of shrinking public debate, universities remain as one of the last places where the 'lifeworld' of personality, culture and society can flourish (Booth et al., 2009). For Habermas, scientific and scholarly learning processes are egalitarian and universalistic, sustained by the discursive debate that carries with it 'a promissory note of the surprising argument', the new viewpoint, the new idea (1989: 10).

TURNING TO PEDAGOGY

Thus universities ought to be spaces where the 'lifeworld' can be found both in research and teaching. The pedagogical project of practical reasoning is then one of the formation of distinctive intellectual practices under communicative conditions that are open and inclusive, grounded in academic practices that are truth seeking and reasonable. Put pedagogically, suggests Bérubé, 'any reasonable proposition can and should be debated from any reasonable angle' (2006: 290). It demands a plurality of perspectives, both popular and unpopular, but also that none of these ought to be shielded from robust criticism or obscured by a relativism that claims all views are equal. As Bérubé writes, 'everyone is entitled to his or her opinion, and yet some opinions are more informed by the weight of empirical evidence and the historical record than others' (2006: 291).

Pedagogy is thus located in the university's key purposes of intellectual practices and communicative reasoning. But beyond this we also require attention to what Barnett (2005) describes as the need for an 'ontological turn' in university teaching, aligned with Marquez's (2006) call for dissolving the boundary between being (contemplation and knowledge) and becoming (action) as an individual and collective project of flourishing through the teaching of humanities. It demands, Marquez writes, that our students learn to become agents in their own lives and society, not mere spectators or, worse, 'strategic objects' in the economy. His ambition is to 'reinstate the university as the center of the development of human potentiality in all its power and diversity' (Marquez, 2006: 160). Such purposes would be particularly educational in a university system losing its way in the face of human capital demands (NEF, 2008; Walker, 2006). We then have three features: intellectual practices, communicative association and ontological being. While the first two may be distinctive to universities, the last is not. However we need pedagogies within the humanities that promote *both* knowledge *and* learning to be fully human so that in universities we educate citizens able to engage fully with the challenges of an increasingly interdependent, fluid and uncertain world.

This pedagogical and social importance of a university education and university educators cultivating reason and moral imaginations is summed up by Bérubé:

> To be a professor in the liberal arts . . . is to try and enhance one's students' abilities and desires to participate in substantive discussion on and off campus, and to enhance their abilities and desires to compose written arguments about all kinds of complex texts . . . Professors who do those things will find that, whatever else they do in their lives as citizens, they promote the cause of democracy. (2006: 296)

How then might teaching humanities subjects provide resources and possibilities for fostering practical reasoning as a process of becoming and being, but also as a knowledge-based project?

AN ILLUSTRATIVE EXAMPLE FROM TEACHING AND LEARNING HISTORY

This article now turns to the teaching of history to illustrate the issues sketched above. Knowledge from history seems especially to foster the kind of practical reasoning described in this article. For example, Richard Evans says of history that it 'has all sorts of civilising functions for students'. 'I've always thought', he says, 'that the main justification for history is that it extends our knowledge and understanding of what being human means' (quoted in Hodges, 2008: 3).

This article draws on interviews with four history lecturers and ten of their students at one research-intensive university in the north of England.[1] While the focus of the research was on the research/teaching nexus, here the lens shifts to a more specific concern with the work that teaching and learning history can do to form richly imaginative and critical understanding. The four historians varied in their own research interests: colonial southern Africa and liberation struggles (Robert Young), a post-colonial approach to colonial genocide (Peter Otto), twentieth-century Russian history (Judith Dowling), and early English cultural history (Jillian Marsh). There is no claim made that these voices of lecturers and students are either representative or comprehensive, especially not of history, historians or the diversity and number of history students. Indeed not all universities in England are research-intensive and selective; higher education is both stratified and diversified. Nor is there any claim made that the teaching described here is new or innovative (the latter a much over-used term in my view). The emphasis here is on the data as illustrative rather than representative, and on the capacity even of small-scale fieldwork data on lived experiences to generate rich narratives of practices and learning, as a form of grounded theorizing (Strauss and Corbin, 1997). The data are organized around Marginson's two themes to capture both the distinctive domains of university practice, while showing how at the same time the knowledge project in the humanities is also a distinctive ontological project of the formation of complex human understanding.

'Secular intellectual practices'

Turning first to the knowledge project – what kind of knowledge, why and how – history requires us to interrogate all the available evidence, and not just choose the bits that suit us; to search for meaning and narrative in and through this evidence and our own theories; to understand but also evaluate values; to construct provisional yet truthful knowledge which may be reconfigured in the light of new evidence or new conceptualizations (for example feminism, post-structuralism, globalization, post-colonialism, and so on); and, uniquely, enables our understanding of the present through an examination of past events (Anderson et al., 2006). Pedagogically, history ought to provoke thinking and demand that students are reflective, critical, honest, analytical and interpretive, cautious, emphatic and dialogic agents in a community of peers (Anderson et al., 2006).

Professor Robert Young explained that doing history involves 'looking at the questions which have been asked and adjusting or reconsidering things we thought we already knew' and then 'working from existing interpretations, through successive layers of detail and recognizing at every point that these different layers of evidence and interpretation constantly interrogate each other'. A historian needs 'scepticism, the ability to focus a critical questioning of both the published and unpublished record . . . not taking anything at face value', and this means having 'concentration, enthusiasm, hard work, the willingness to recognize where you've gone wrong or suddenly realize that some of the assumptions and connections which you've been making have been misplaced and to know when to stop or rethink your starting point'. In turn students need 'to think critically and comprehensively about a range of perspectives' (interview, 5 March 2007). This process of discovering and constructing historical knowledge is 'reflective' and 'creative' (Dr Jillian Marsh, 6 March 2007) and demands 'passion' (Dr Judith Dowling, 6 March 2007).

Argument is 'absolutely key' (Jillian Marsh) to engaging in historical debates in a coherent and purposeful way. This requires marshalling available evidence, challenging information and assumptions (including our own), weighing up competing explanations and dealing with 'inconvenient facts', locating questions in wider contexts, and having both the critical knowledge, autonomy and confidence to defend an interpretation. The idea is not to tell students what the 'truth' is but to enable them 'to figure it out for themselves that it is slightly more complicated' (Dr Peter Otto, 26 April 2007). These capabilities are seen as crucial for living in a democratic society in which students are able to recognize what Judith Dowling describes as 'speaking Bolshevik', which is the idea that the regime has 'a certain kind of rhetoric and a certain way of speaking that you're supposed to do in public'. She described a student who, returning after a vacation spent working in a large supermarket chain, explained that they had had training 'using all this kind of advertising, commercial kind of rhetoric; when I went home to my Mum I realized I was talking Bolshevik!' Judith explains that she was pleased that it had made her think about the course more deeply 'but also about how things work in our society . . . that there are various discourses that are fairly ubiquitous in our society and infiltrate the way we think about things'. Similarly, Jillian Marsh describes how for her students learning about homosexuality in the eighteenth century opens out the opportunity for them to discuss tolerance, rights and liberty.

These four historians also described the importance of narrative and narratives in history, so that knowledge and narrative are embedded one within the other. To arrive at historical knowledge is to engage with narratives of different kinds. Both in research and teaching, it enables 'being able to take people to a foreign land . . . to be able to think about what it meant for someone living in 1930s Russia' (Judith Dowling). History fosters thinking imaginatively and empathetically about lives different from one's own so that students come at least to recognize that 'you can't just say the way I live is the best way to live and it's the only way to live and therefore it's a great way to live and I'm not responsible for the consequences' (Peter Otto). At the same time this ought not to take the form of 'subjective relativism which is unable to prioritize points of view' (Robert Young). Students need instead to develop 'an informed critical understanding of the past and the ways a good historian can think about contemporary issues', because this is 'absolutely vital to an independent, democratic and progressive politics' (Robert Young).

Thus for these historians, gaining critical historical knowledge is central to the university education and to student learning. They foster secular intellectual practices which are robust, argumentative, imaginative and reasoned. In all four cases they sought to develop and implement those aspects of pedagogical arrangements under their control (for example forms of communication) to give all their students an equal opportunity to acquire such knowledge. Small group seminars of around 15 students were central in their pedagogical approaches and, while these groups may be under pressure to become even larger as funding is squeezed further, the approach is integral and valued in the department (see Booth et al., 2009 for a further example of a small-group teaching approach in history).

'Communicative reason'

Students were provided in these lecturers' classes with opportunities to achieve critical thinking oriented to communicative reason which questions ends and ethics, rather than instrumental reasoning which takes ends as given. This requires pedagogies which teach students to recognize the 'better argument' through an exchange of views with texts, lecturers and peers. It is arguably the case that for these lecturers each student was provided with the opportunity for effective agency and participation in pedagogical arrangements, which in all cases was sensitive to participation, confidence and voice on the part of all the students. For example, recognizing that 'it is difficult to find one's own voice', Peter Otto explains that he makes his students 'experts', 'especially the weaker ones', who know more than their peers about the topic they are researching for their dissertations so that 'even the quiet ones tend to dare to speak and have an opinion'. But, he adds, 'what I must not do is tell them in front of their classmates, "That's completely rubbish"'. At the same time he encourages constructive peer criticism because 'it gives them confidence because they are all commenting on each other's papers'. Robert Young highlights the importance of getting to know individual students, allowing students to make the connections between processes, events and interpretations so that pedagogy develops each student's mature capability for independent and autonomous working.

Secular intellectual practices and communicative reason come together in the formation of students, their 'becoming'. As Narend said of Robert Young, 'He always asks us questions or asks if we have questions. I think nothing is accepted at face value in his seminars; he always make us look for the quirks and omissions [. . .] making you look for what's not there in the source material'. Or Paula, talking of Peter Otto's classes: 'It's kind of like we're educating each other' [. . .] I feel like now if I was debating with someone I could have a proper debate. I would know what I was talking about as opposed to having vague general ideas of what was right, of what I thought was right. Now I could say, "I think this is right because".' It is in this formation we seek what impact the humanities might have on identities and ways of being, feeling, thinking and relating to others. Moreover, significant as the knowledge project is in what we understand to be a university or higher education, this engagement with historical knowledge and disciplinary content is made compelling by these teachers. Through the combination of their own love for the subject and pedagogy, they seek to make this passion and scholarship visible and available to students, 'creating value' through 'a systematic exploration of the discipline's vital processes' (Chambers et al., 2002: 7).

Student formation: Narend and Paula

How then did students talk about their own learning in, of and through history? How and in what ways did they say they had positively changed? There were variations in their responses: some were more critical, others were more instrumental. In the most powerful examples, students came to understand themselves differently and had acquired knowledge and reflexivity that were enabling them to weigh up the opportunities and life choices at this point in their lives. Such 'capabilities and functionings' (Nussbaum, 2000; Sen 1999) to be and do in ways that they valued being and doing were not evenly distributed and, given the diversity of student biographies, this is not entirely surprising; students took up learning opportunities shaped by their individual circumstances. What this section of the article seeks to demonstrate is exemplars of students' developing practical reasoning in order to point to what is possible.

I now turn to two particularly interesting illustrative stories of learning and the formation of practical reasoning from two final-year undergraduate students. However, the narratives of all 10 students provide a kind of backstage understanding which shapes and informs the analysis. I consider the accounts of their development in acquiring knowledge mediated through pedagogical processes of communicative reasoning generated by the nature of the subject – debating evidence and interpretation, reading texts and writing.

Narend, a student of Robert Young's, was studying the special subject on Liberation Struggles in Southern Africa, over two semesters meeting twice weekly in seminars and by arrangement individually with Young. His own parents, of Indian descent, had left South Africa when apartheid policies were put in place in the 1950s, so that he was curious about the region and its history. He evaluated his own learning in terms of having become 'a better person', and explains what he means by this – 'less naïve', less likely 'to accept the mainstream view of events without really investigating them [. . .] I think the ability to rationally view arguments and try to put yourself out of yourself. I think that makes you good.' He suggested that 'you have to be really honest with yourself when you're analyzing data. Most people try and be unbiased and non-partisan, but I think it's incredibly difficult to do that [. . .] I do think debate is an integral part of trying to come to better historic judgments on things.'

Narend explained that he hoped to follow a career in the field of international relations, saying that 'I guess just studying something I'm interested in all along, it's made me decide that if I'm going to do a career, I want to do something I enjoy and something that's relevant to me [. . .] I think why should I just do something like banking if I'd rather, I think it's made me want to sort of follow my ambitions rather than just kind of go after money, so to speak.'

He articulates a complicated civic agency in formation along with his own hesitations and ambiguities. Learning to understand the other, and to cooperate, is not uncomplicated, he thinks, because, 'the idea that there's kind of a common viewpoint will never be fully realized', but 'learning helps you understand that we're not all the same. I think once you understand that, then it helps engender better relations between different groups.' His study of history, while enormously valuable, had also led him to confront the difficulty for individuals 'to really work against the tide' or to make a difference. Yet, he 'wouldn't want to be ignorant of this [. . .] once you realize the constraints you can work within them, then you can try and do little things that can make a difference [. . .] I'm not so sure if I'll be able, unfortunately, to make such a big difference. I think the role of agency in international relations isn't quite as great as people would hope it to be' (interview, 5 March 2007).

The second student whose learning I consider is Paula, a student of Peter Otto's special subject on Travelers and Explorers in Colonial Africa. She describes history as a 'human subject' which has fostered her understanding of people 'more than anything', making her 'cautious in judging people on stereotypes or making snap judgements'. She explains how learning to undertake a close and critical reading of texts has enabled her to 'take them beyond face value'. She recognizes how language works in forming critical reasoning. 'I never really thought about it before, but just the certain words you use to describe something, certain metaphors you draw, the way how you write about something can tell you something about yourself.'

In turn this acquisition of knowledge had enabled Paula's awareness of her own viewpoint and of other lives different from her own, 'the way I look at news stories and things like that and the assumptions I make'. She comes, she explains, 'from a very white middle-class background, I come from a town [where] there's not racial tension because there are only white people, so it's very easy to make assumptions or hold views that you never have to test because you are only surrounded by sort of the same kind of people as you.' The course had made her 'reassess and think about my own prejudices and my own stereotypes'. But it had also generated confidence, which Bernstein (2000) argues is the basis of self-formation, in this case confidence in debate. Paula states, while debate 'was always quite big at my school, everyone held the same opinion, I think that was half the problem [. . .] I think I'm better at expressing my opinion than I was. I was quite inarticulate but seminars really force you to express your own opinion and talk.'

Paula feels she has changed in significant ways because of the way history has 'made me reassess my prejudices because that's very much, I mean, your judgements and your prejudices characterize the way you deal with the world and deal with people, read things, interpret things, things like that, and by having to look at that and challenge those being challenged'. Paula talked about her learning of history contributing to her 'quality of life' because she enjoys it and finds the subject interesting; she felt history had 'just broadened my opinions and sort of made me think outside my small world I guess'.

In turn, this knowledge has led her to review her future choices in the direction of a modest but promising civic agency so that 'I think I couldn't do a job now where I went home at the end of the day and couldn't sort of justify what I was doing [. . .] that said, I have no idea what I want to do [. . .] so, it could be difficult matching my ideals against the reality of the world, I'm not sure.' Even though, she says, she has not changed 'in any dramatic sense, it's made me just more aware of the way I look at the world [. . .] I think it is something that could, you know, if you choose the right thing, [. . .] maybe make a difference, I'm not sure' (interview, 2 April 2007).

It is certainly the case that, across the 10 students interviewed, not all were as thoughtful or as reflexive about their learning and future choices as Narend and Paula, but that is not the point I want to emphasize. Even where reflexivity was less nuanced, all the students appreciated the development of their capability to reason critically, and to apply this in their lives and their choices. For none of these students were economic opportunities the main motivator for their studies, although all were realistic enough to see that this was an issue. In different ways all 10 students saw their study of history enabling them to pursue careers that they valued. A common refrain was 'I've decided this is what I want to do.'

CONCLUSION

It is arguably not a foregone conclusion that opportunities for practical reasoning will continue to diminish or that students must take on the identity of consumers, even if current economic and policy conditions have promoted this way of being over others. Habermas might characterize this as the human lifeworld 'breaking through' in university education (Booth et al., 2009). Is it not also the case that a narrow human capital agenda looks somewhat thread-bare in current times, and business practices not necessarily the ones to slavishly implement? As Holford (2008: 25) suggests, do 'the rich and powerful really have all the best tunes'?

What this article has proposed is an argument for the fundamental significance of humanities knowledge, when taught well, as the basis for forming practical reasoning in university education. Under pedagogical arrangements of communicative reason and a knowledge project which seeks to promote secular intellectual practices, the humanities provide a distinctive space to form students' capabilities and ontological being as practical reasoners of the Aristotelian type. The emphasis is on transforming individual selves rather than groups or society, but it is precisely this individual transformation that is what universities ought to be engaged in (McLean, 2006). It is a good place to start when thinking about how change in universities might influence and connect into change in society, and how history lecturers might respond as teachers and researchers to and for a more generous human spirit in judging the quality of university education.

Moreover, colleagues and I (Booth et al., 2009) have noted hopeful stirrings from policy bodies: for example, the Quality Assurance Agency has recently commissioned the New Economics Foundation's centre for well-being to produce a report 'to give explicit consideration to quality from the perspective of the individual learner and with regard to the well-being of the wider economy, environment and society' (NEF, 2008: 1), in short 'making a world worth living in'. In this, the humanities are essential to foster Nussbaum's (1997) concern with critical selves, imaginative understanding and world citizens as constitutive elements of well-being for individuals and democratic society.

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NOTE

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BIOGRAPHICAL NOTE

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GROSSMONT-CUYAMACA
COMMUNITY COLLEGE DISTRICT

Education Master Plan
Information □ubmission Form

The Grossmont□Cuyamaca Community College District is starting a year□long process to develop an Educational Master Plan that will serve as the blueprint for our future. The Educational Master Plan is a long□range, comprehensive document intended to guide institutional and program development at both the college and district levels. The priorities established in the Educational Master Plan will serve to guide College and District decisions about growth, development and resources allocation.

As the first step in this planning process, everyone in the GCCCD community □faculty, staff, students and community members□are invited to identify and submit information sources to be reviewed for the trend analysis in one of si□ areas □society, technology, economy, environment, politics, and education. We are not asking you to do research, only to identify information you already have or that you encounter during the search period □March 21□April 2□□and bring it to our attention for review.

Please answer the following □uestions for each document you submit:

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2□ Author: William Flynn

3□ □ource: Planning for Higher Education

4□ Which of the following areas does this document best address□ □Please select only one□

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- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
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- ○ Other

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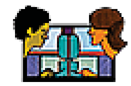

The Future of Learning: 12 Views on Emerging Trends in Higher Education

by William J. Flynn and Jeff Vredevoogd

On behalf of our campuses, we need to seek out change; to be more flexible, more thoughtful, and more open to student decision making; and to build outcomes measurement feedback into integrated planning.

Note: In 2005, Herman Miller, Inc., a Zeeland, Michigan-based furniture manufacturer, convened a series of leadership roundtables in an attempt to predict what trends would affect higher education in the year 2015. Representatives from research universities, state colleges, community colleges, private institutions, and architectural and design firms participated in exercises designed to brainstorm about the future. Their collective thoughts were combined into a list of 12 predictions, which were revised in 2009 to reflect the current global economic situation.

Faced with diminishing resources, advances in technology, and increasing enrollments, colleges and universities are striving to find a balance between innovation and tradition to remain relevant and current in a rapidly evolving world. These 12 predictions have been identified to inform and assist colleges and universities in that endeavor.

1. Globalization will influence and shape all aspects of teaching and learning.

Global higher education mobility is a rapidly growing phenomenon, with over 2.9 million students seeking an education outside their home country—a 57 percent increase since 1999 (Institute of International Education 2009).

Thomas Friedman (2005), in his best-selling book, The World is Flat: A Brief History of the Twenty-First Century, offers this observation about globalization and the contributing role of technology: “Never before in the

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William J. Flynn and Jeff Vredevoogd. 2010. The Future of Learning: 1
Education . *Planning for Higher Education.* 38(2): 5–10.

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Please answer the following questions for each document you submit:

(Feel free to submit as many of these forms as you would like)

1) What is the name of the document? 2011 Trends to Watch: Education Technology

2) Author: slideshare.net/aarks222/2011-trends-to-watch-education-technology

3) Source:

4) Which of the following areas does this document best address? (Please select only one)

- ○ Society
- ○ Technology
- ○ Economy
- ○ Environment
- ○ Politics and Legal Issues
- ◉ Education
- ○ Other

5) Relevance:

6) Page/Section:

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Questions email: lynne.davidson@gcccd.edu Research, Planning and Institutional Effectiveness

2011 Trends to Watch: education technology

Emerging from the worst of the economic crisis, the higher education industry is facing a confluence of events: record enrollments, reduced endowments and public funding, and a surge of technological innovation. Higher education will continue to face unpredictability in 2011 as consumer technology trends create an added strain on the institutions technology infrastructure.

Scope of this research
Offers insight into factors driving higher educations need for technology and how vendors can help institutions overcome market challenges. Explains the state of the education industry and its technology market across various global regions. Highlights new and upcoming consumer technology trends that will influence and change how institutions operate over time.

Research and analysis highlights

IT spending must grow in 2011, but the economic strain is still palpable. Therefore, institutions will squeeze existing IT investments for all they are worth. Cost-conscious institutions will seek open-source solutions to drive down costs in 2011.

Technology that promotes collaboration and interactivity will become a valuable differentiator for institutions in 2011. To that end, uptake of online learning will accelerate in the coming year.

Ubiquitous connectivity will be imperative in 2011 as each incoming class enters with new mobile devices. With the proliferation of new channels, content will surge to unprecedented volumes, urging institutions to ramp up investments in ECM.

Key reasons to purchase this research
Gain insight into the scope of the higher education market and opportunities for market penetration. Understand the market factors influencing investments in technology today and in the future. Develop a deep knowledge of market trends in order to develop more effective product development strategies.

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For more information, please visit :

http://www.aarkstore.com/reports/2011-Trends-to-Watch-education-technology-80190.html

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2) Author: New media

3) Source:

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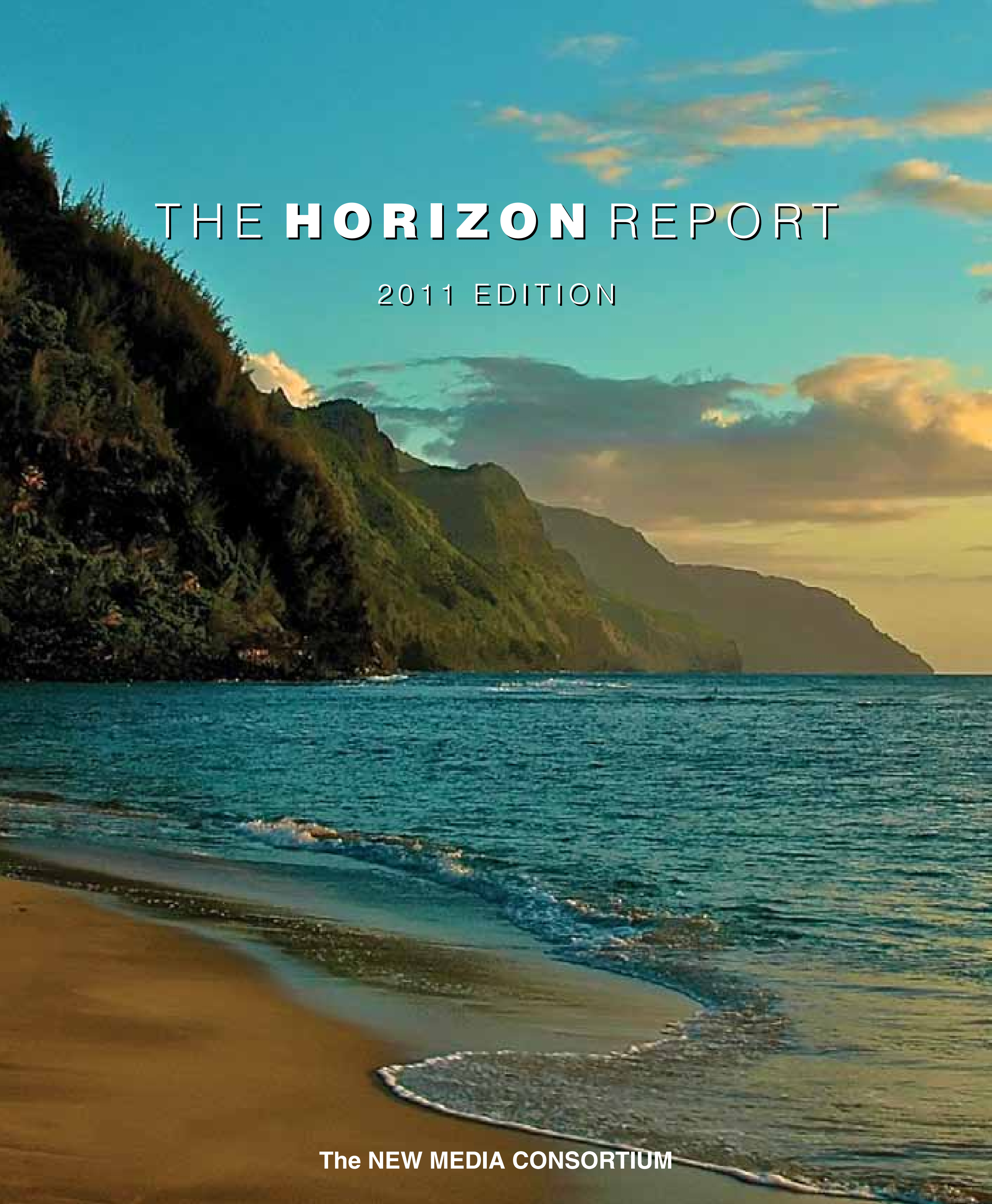

THE HORIZON REPORT

2011 EDITION

The NEW MEDIA CONSORTIUM

The 2011 Horizon Report is made possible via a grant from HP

HP creates innovative technology solutions that benefit individuals, businesses, governments and society. HP's Office for Global Social Innovation applies HP's global reach, broad portfolio of products and services, and the expertise of its employees to support initiatives in education, healthcare and communities around the world. As the world's largest technology company, HP brings together a portfolio that spans printing, personal computing, software, services and IT infrastructure to solve customer problems. More information about HP is available at http://www.hp.com.

THE HORIZON REPORT

2011 EDITION

The NEW MEDIA CONSORTIUM

The *2011 Horizon Report* is a collaboration between

The NEW MEDIA CONSORTIUM

and the

EDUCAUSE Learning Initiative

An EDUCAUSE Program

Since 2005, the annual Horizon Report has been the most visible aspect of a focused collaboration between the EDUCAUSE Learning Initiative (ELI) and the New Media Consortium in which the two organizations engage their memberships in both the creation and outcomes of the research.

The New Media Consortium (NMC) is a globally focused not-for-profit consortium dedicated to the exploration and use of new media and new technologies. Its hundreds of member institutions constitute an elite list of the most highly regarded colleges, universities, and museums in the worlds. For nearly 20 years, the consortium and its members have dedicated themselves to exploring and developing applications of emerging technologies for learning, research, and creative inquiry. For more information on the NMC, visit www.nmc.org.

The ELI is a community of higher education institutions and organizations committed to advancing learning through information technology (IT) innovation. ELI is a strategic initiative of EDUCAUSE. While EDUCAUSE serves those interested in advancing higher education through technology, ELI specifically explores innovative technologies and practices that advance learning and promotes innovation in teaching and learning using information technology. To learn more about the ELI, visit www.educause.edu/eli.

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EXECUTIVE SUMMARY

The internationally recognized series of *Horizon Reports* is part of the New Media Consortium's Horizon Project, a comprehensive research venture established in 2002 that identifies and describes emerging technologies likely to have a large impact over the coming five years on a variety of sectors around the globe. This volume, the *2011 Horizon Report,* examines emerging technologies for their potential impact on and use in teaching, learning, and creative inquiry. It is the eighth in the annual series of reports focused on emerging technology in the higher education environment.

To create the report, the Horizon Project's Advisory Board, an international body of experts in education, technology, business, and other fields, engaged in a discussion based on a set of research questions intended to surface significant trends and challenges and to identify a broad array of potential technologies for the report. This dialog was enriched by a wide range of resources, current research, and practice that drew on the expertise of the NMC community and the communities of the members of the board. These interactions among the Advisory Board are the focus of the *Horizon Report* research, and this report details the areas in which these experts were in strong agreement.

Each edition of the *Horizon Report* introduces six emerging technologies or practices that are likely to enter mainstream use within three adoption horizons over the next five years. Key trends and challenges that will affect current practice over the same time frame add context to these discussions. Over the course of just a few weeks, the Advisory Board came to a consensus about the six topics that appear here in the *2011 Horizon Report.* The examples and readings under each topic area are meant to provide practical models as well as access to more detailed information. Wherever possible, an effort was made to highlight the innovative work going on among learning-focused institutions. The precise research methodology employed is detailed in the closing section of this report.

The report's format is consistent from year to year and edition to edition, and opens with a discussion of the trends and challenges identified by the Advisory Board as most important for the next five years. The format of the main section of this edition closely reflects the focus of the Horizon Project itself, centering on the applications of emerging technologies in higher education settings. Each section is introduced with an overview that describes what the topic is, followed by a discussion of the particular relevance of the topic to teaching, learning, and creative inquiry. Several concrete examples of how the technology is being used are given. Finally, each section closes with an annotated list of suggested readings and additional examples that expand on the discussion in the report, including a link to the tagged resources collected during the research process by project staff, the Advisory Board, and others in the global Horizon Project community.

Key Trends

The technologies featured in every edition of the *Horizon Report* are embedded within a contemporary context that reflects the realities of the time, both in the sphere of education and in the world at large. To ensure this context was well understood as the current report was produced, the Advisory Board engaged in an extensive review of current articles, interviews, papers, and new research to identify and rank trends that are currently affecting the practices of teaching, learning, and creative inquiry. Once detailed, the list of trends was then ranked according to how significant each was likely to be for learning-focused institutions over the next five years. The highest ranked of those trends had significant agreement among the Advisory Board members, who considered them to be key drivers of educational technology adoptions for the period 2011 through 2015. They are listed here in the order in which the Advisory Board ranked them.

- *The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense-making, coaching, and credentialing.* This multi-year trend was again ranked very highly, indicating its continued influence. With personal access to the Internet from mobile devices on the rise, the growing set of resources available as open content, and a variety of reference and textbooks available electronically, students' easy and pervasive access to information outside of formal campus resources continues to encourage educators to take a careful look at the ways we can best serve learners.

- *People expect to be able to work, learn, and study whenever and wherever they want.* This highly-ranked trend, also noted last year, continues to permeate all aspects of daily life. Mobiles contribute to this trend, where increased availability of the Internet feeds the expectation of access. Feelings of frustration are common when it is not available. Companies are starting to respond to consumer demand for access anywhere; in 2010, programs like Google's Fiber for Communities sought to expand access to underserved communities, and several airlines began offering wireless network access in the air during flights.

- *The world of work is increasingly collaborative, giving rise to reflection about the way student projects are structured.* This trend continues from 2010 and is being driven by the increasingly global and cooperative nature of business interactions facilitated by Internet technologies. The days of isolated desk jobs are disappearing, giving way to models in which teams work actively together to address issues too far-reaching or complex for a single worker to resolve alone. Market intelligence firm IDC notes that some one billion people fit the definition of mobile workers already, and projects that fully one-third of the global workforce — 1.2 billon workers — will perform their work from multiple locations by 2013.

- *The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized.* This trend, too, was noted in 2010 and continues to influence decisions about emerging technology adoption at educational institutions. As we turn to mobile applications for immediate access to many resources and tasks that once were performed on desktop computers, it makes sense to move data and services into the cloud. The challenges of privacy and control continue to affect adoption and deployment, but work continues on resolving the issues raised by increasingly networked information.

Critical Challenges

Any discussion of technology adoption must also consider important constraints and challenges, and the Advisory Board drew deeply from a careful analysis of current events, papers, articles, and similar sources, as well as from personal experience in detailing a long list of challenges institutions face in adopting any new technology. Several important challenges are detailed below, but it was clear that behind them all was a pervasive sense that individual organizational constraints are likely the most important factor in any decision to adopt — or not to adopt — any given technology. While acknowledging that local barriers to technology adoptions are many and significant, the Advisory Board focused its discussions on challenges that are common to institutions and the educational community as a whole.

The highest ranked challenges they identified are listed here, in the order of their rated importance.

- *Digital media literacy continues its rise in importance as a key skill in every discipline and profession.* This challenge, first noted in 2008, reflects universal agreement among those on the Horizon Project Advisory Board. Although there is broad consensus that digital media literacy is vitally important for today's students, what skills constitute digital literacy are still not well-defined nor universally taught. Teacher preparation programs are beginning to include courses related to digital media literacy, and universities are beginning to fold these literacy skills into coursework for students, but progress continues to be slow. The challenge is exacerbated by the fact that digital technologies morph and change quickly at a rate that generally outpaces curriculum development.

- *Appropriate metrics of evaluation lag behind the emergence of new scholarly forms of authoring, publishing, and researching.* Noted first in 2010, this challenge continues. Electronic books, blogs, multimedia pieces, networked presentations, and other kinds of scholarly work can be difficult to evaluate and classify according to traditional metrics, but faculty members are increasingly experimenting with these alternate forms of expression. At the same time, reconciling new forms of scholarly activity with old standards continues to be difficult, creating tension and raising questions as to where faculty energy is best directed.

- *Economic pressures and new models of education are presenting unprecedented competition to traditional models of the university.* The twin challenges of providing high-quality services and controlling costs continue to impel institutions to seek creative solutions. As a result, innovative institutions are developing new models to serve students, such as streaming survey courses over the network so students can attend from their dorm or other locations to free up lecture space. As these pressures continue, other models will emerge as well.

- *Keeping pace with the rapid proliferation of information, software tools, and devices is challenging for students and teachers alike.* New developments in technology are exciting and their potential for improving quality of life is enticing, but it can be overwhelming to attempt to keep up with even a few of the many new tools that are released. User-created content is exploding, giving rise to information, ideas, and opinions on all sorts of interesting topics, but following even some of the hundreds of available authorities means sifting through a mountain of information on a weekly or daily basis. There is a greater need than ever for effective tools and filters for finding, interpreting, organizing, and retrieving the data that is important to us.

These trends and challenges are a reflection of the impact of technology that is occurring in almost every aspect of our lives. They are indicative of the changing nature of the way we communicate, access information, connect with peers and colleagues, learn, and even socialize. Taken together, they provided the Advisory Board a frame through which to consider the potential impacts of nearly 50 emerging technologies and related practices that were analyzed and discussed for possible inclusion in this edition of the *Horizon Report.* Six of those were chosen via successive rounds of ranking; they are summarized below and detailed in the main body of the report.

Technologies to Watch

The six technologies featured in the *2011 Horizon Report* are placed along three adoption horizons that indicate likely time frames for their entrance into mainstream use for teaching, learning, or creative inquiry. The near-term horizon assumes the likelihood of entry into the mainstream for institutions within the next twelve months; the mid-term horizon, within two to three years; and the far-term, within four to five years. It should be noted at the outset that the *Horizon Report* is not a predictive tool. It is meant, rather, to highlight emerging technologies with considerable potential for our focus areas of teaching, learning, and creative inquiry. Each of the six is already the focus of attention at a number of innovative organizations around the world, and the work we showcase here reveals the promise of a wider impact.

On the near-term horizon — that is, within the next 12 months — are *electronic books* and *mobiles.* Electronic books are moving closer to mainstream adoption for educational institutions, having appeared on the mid-term horizon last year. Mobiles reappear as well, remaining on the near-term horizon as they become increasingly popular throughout the world as a primary means of accessing Internet resources. Resistance to the use of mobiles in the classroom continues to impede their adoption in many schools, but a growing number of institutions are finding ways to take advantage of a technology that nearly all students, faculty, and staff carry.

Electronic books continue to generate strong interest in the consumer sector and are increasingly available on campuses as well. Modern electronic readers support note-taking and research activities, and are beginning to augment these basic functions with new capabilities — from immersive experiences to support for social interaction — that are changing our perception of what it means to read.

Mobiles enable ubiquitous access to information, social networks, tools for learning and productivity, and much more. Mobile devices continue to evolve, but it is the increased access to affordable and reliable networks that is driving this technology now. Mobiles are capable computing devices in their own right — and they are increasingly a user's first choice for Internet access.

The second adoption horizon considers technologies expected to gain widespread usage within two to three years, and this year's candidates are *augmented reality* and *game-based learning.* Both intersect with practices in mainstream popular culture, both have been considered significant tools for education for many years, and both have made appearances on a number of campuses already. Advances in hardware and software, as well as in a broader acceptance of new methods in teaching, secured the place of these innovations as the top technologies for the mid-term horizon.

Augmented reality refers to the layering of information over a view or representation of the normal world, offering users the ability to access place-based information in ways that are compellingly intuitive. Augmented reality brings a significant potential to supplement information delivered via computers, mobile devices, video, and even the printed book. Much simpler to create and use now than in the past, augmented reality feels at once fresh and new, yet an easy extension of existing expectations and practices.

Game-based learning has grown in recent years as research continues to demonstrate its effectiveness for learning for students of all ages. Games for education span the range from single-player or small-group card and board games all the way to massively multiplayer online games and alternate reality games. Those at the first end of the spectrum are easy to integrate with coursework, and in many institutions they are already an option; but the greatest potential of games for learning lies in their ability to foster collaboration, problem-solving, and procedural thinking. For a variety of reasons, the realization of this potential is still two to three years away.

Looking to the far-term horizon, four to five years from now for widespread adoption, are *gesture-based computing* and *learning analytics.* Both remain largely speculative and not yet in widespread usage on campuses, but both are also garnering significant interest and increasing exposure.

Gesture-based computing moves the control of computers from a mouse and keyboard to the motions of the body via new input devices. Depicted in science fiction movies for years, gesture-based computing is now more grounded in reality thanks to the recent arrival of interface technologies such as Kinect, SixthSense, and Tamper, which make interactions with computational devices far more intuitive and embodied.

Learning analytics loosely joins a variety of data-gathering tools and analytic techniques to study student engagement, performance, and progress in practice, with the goal of using what is learned to revise curricula, teaching, and assessment in real time. Building on the kinds of information generated by Google Analytics and other similar tools, learning analytics aims to mobilize the power of data-mining tools in the service of learning, and embracing the complexity, diversity, and abundance of information that dynamic learning environments can generate.

Each of these technologies is described in detail in the main body of the report, where a discussion of what the technology is and why it is relevant to teaching, learning, and creative inquiry may also be found. Given the practical focus of the report, a listing of examples of the technology in use, especially in higher education, is a key component of each of the six main topics. Our research indicates that all six of these technologies, taken together, will have a significant impact on learning-focused organizations within the next five years.

The Horizon Project

This report is part of a longitudinal research study of emerging technologies that began in March 2002. Since that time, under the banner of the Horizon Project, the New Media Consortium and its research partners have held an ongoing series of conversations and dialogs with hundreds of technology professionals, campus technologists, faculty leaders from colleges and universities, museum professionals, teachers and other school professionals, and representatives of leading corporations from more than thirty countries. These conversations have been the impetus for a series of nearly 20 annual reports focused on emerging technologies relevant to formal and informal learning in colleges, universities, schools, and museums.

In 2008, the NMC embarked on a new series of regional companion editions of the *Horizon Report,* with the dual goals of understanding how technology is being absorbed using a smaller lens, and also noting the contrasts between technology use in one area compared to another. To date, companion editions have been prepared that center on education in Australia, New Zealand, and the fourteen countries of Iberoamerica; the series will expand to include Europe, Singapore, and Africa over the next two years.

The flagship *Horizon Report,* published each January, focuses on higher education globally, and is translated into multiple languages every year. Over all editions, the readership of the reports is estimated at well over 600,000 worldwide, with readers in more than 70 countries.

The Horizon Project Navigator. This edition of the *Horizon Report* kicks off the ninth year of the series and a turning point in the NMC's Emerging Technologies Initiative, which is dedicated to charting the landscape of emerging technologies for teaching, learning, and creative inquiry. In each of the preceding years, the Horizon Project process has focused on the creation of a print-based publication (or its pdf analog), one produced through a collaborative process that leveraged the productive potential of a wiki for posting and responding to ideas, RSS feeds for gathering information dynamically, and tagging for collecting and sharing references. The decision to print the NMC report was based on the fact that a physical report remains a powerful tool on many campuses.

However, in its continuing interest in modeling the advantages of new technologies, over the course of 2010, and with the generous support of the HP, the NMC designed and produced the Horizon Project Navigator (http://navigator.nmc.org), an online database that harnesses the power of technology and social media to create an information and resource hub that is made stronger through the participation of its users.

The Horizon Project Navigator leverages the affordances of social media and computation to offer users access to the same materials — and more — used by the Horizon Project Advisory Board. It is a dynamic, customizable, and powerful tool for individuals who want the ability to chart the landscape of emerging technologies for teaching, learning, and creative inquiry through their own set of needs and interests. The platform provides a fully dynamic online version of the *Horizon Report* created for the emerging technology professional.

Dynamic reports can be adapted and modified to suit the needs of individual users, and Navigator itself provides a space within which anyone can participate in the gathering, sifting, and sharing of ideas related to the trends and challenges of emerging technologies in the context of formal and informal learning. The Horizon Project Navigator includes all the research materials, project information, and other ephemera that has been created from the intensive and collaborative process used in creating each annual *Horizon Report.* The *2011 Horizon Report* was the first of the series that was able to draw on the resources of the Horizon Project Navigator in its creation, and marks a new epoch in the history of the project.

The Horizon Project Wiki. The Horizon Project uses qualitative research methods to identify the technologies selected for inclusion in each report. The process begins with a comprehensive survey of the literature, technology news reports, and the work of other organizations. The 43 members of this year's Advisory Board engaged in a comprehensive review and analysis of research, articles, papers, blogs, and interviews; discussed existing applications, and brainstormed new ones; and ultimately ranked the items on the list of candidate technologies for their potential relevance to teaching, learning, and creative inquiry. This work took place entirely online and may be reviewed on the project wiki at http://horizon.wiki.nmc.org.

The effort to produce the report and the findings detailed within it began in mid-September 2010 and concluded in early January 2011, a period of just under four months. Most of the work on the project took place in and is preserved on the wiki. All of the interim materials and rankings used to create the report can be found there, as well as the discussions of the Advisory Board around each topic. The six technologies and applications that emerged at the top of the final rankings — two per adoption horizon — are detailed in the chapters that follow.

Each of those chapters includes detailed descriptions, links to active demonstration projects, and a wide array of additional resources related to the six profiled technologies. Those profiles are the heart of the *2011 Horizon Report,* and will fuel the work of the Horizon Project throughout 2011-12. For those wanting to know more about the processes used to generate the *Horizon Reports,* many of which are ongoing and extend the work in the reports, we refer you to the report's final section on the research methodology.

ELECTRONIC BOOKS

Time-to-Adoption Horizon: One Year or Less

Now that they are firmly established in the consumer sector, electronic books are beginning to demonstrate capabilities that challenge the very definition of reading. Audiovisual, interactive, and social elements enhance the informational content of books and magazines. Social tools extend the reader's experience into the larger world, connecting readers with one another and enabling deeper, collaborative explorations of the text. The content of electronic books and the social activities they enable, rather than the device used to access them, are the keys to their popularity; nearly everyone carries some device that can function as an electronic reader, and more people are engaging with electronic books than ever before.

Overview

Electronic books have continued to rise in popularity since their appearance on the mid-term horizon in the *2010 Horizon Report* and that popularity has won them a place on the near term horizon for 2011. The variety of content available — and the range of readers that cater to individual preferences — has grown over that time to the point that electronic books are a viable and easy alternative to printed ones. In addition to dedicated electronic readers, multifunction devices like the Apple iPad and the Samsung Galaxy represent a new class of tools that merges the utility of electronic book readers with web browsing, a wide variety of applications, and an expanding set of entertainment options. The ready availability of both reading devices and digital content makes it very easy to integrate electronic books into everyday portable computing.

The most interesting aspect of electronic books, however, is not the devices they are accessed with; it is not even the texts themselves. What makes electronic books a potentially transformative technology is the new kinds of reading experiences that they make possible. Publishers are beginning to explore richly visual interfaces that include multimedia and collaborative elements. The social magazine format used by Flipboard, for example, turns the browsing of RSS-enabled web content into a serendipitous experience, a dynamic journey that changes every time it is opened. Magazines like *Time, Wired,* and others include interactive graphs, links that extend the reader's experience, video, and more. *Epicurious* for the iPad is a rich media cookbook complete with reviews, tips, recommendations, and the ability to add recipes.

As the electronic book moves further from a digital reproduction of a printed piece, some writers are seeing it become something far richer, allowing journeys through worlds real and imagined, undertaken not alone but in company with other readers. The gestural interfaces of new electronic devices enhance the intellectual experience of reading with tactile interactions. Electronic books have the potential to transform the way we interact with reading material of all kinds, from popular titles to scholarly works. For three compelling visions of the future promised by the electronic book, see the five-minute video *The Future of the Book* produced by design firm IDEO (http://vimeo.com/15142335).

Standards for the creation of electronic publications are still in development, and those that exist often focus on the text and do not include guidelines for the kinds of interactivity that is possible in electronic books. As more of its media morphs into digital forms, the publishing industry is undergoing a shift very similar to the one that took place in the music industry in the last decade. New business models and methods of distribution are appearing as older ones begin to falter. While there is no clear winner among the many available and emerging formats, the acceptance and widespread use of electronic books has enabled the industry to see a potential path through the times ahead.

Relevance for Teaching, Learning, Research, or Creative Inquiry

Despite their obvious advantages of size and weight, electronic books are not as established among scholarly readers as they are among the general public. Several obstacles have stood in the way of general adoption among academic institutions: scarcity of academic titles, lack of necessary features in electronic readers to support scholarly work, a restrictive publishing model, and digital rights management (DRM) issues. Most of these constraints are now vanishing. Still to be solved are accessibility issues, as a number of institutions found with 2010 Kindle textbook programs. Many academic titles are now available alongside the broad selection of consumer titles; reader technology has developed to the point that graphs, illustrations, videos, and interactive elements can easily be included, and many enable bookmarking, annotation, commentary, dictionary lookup, and other useful functions.

Publishers have at last begun to uncouple print and electronic sales of textbooks, making it easier to choose one or the other as desired. In some parts of the world, DRM restrictions still impede the adoption of electronic textbooks; titles that are released in one country may be unobtainable in another, or available only on certain platforms. Until electronic textbooks are divorced from reader-dependent formats, broad adoption will continue to be problematic for universities. Nonetheless, the promise offered by the technology is such that electronic books are being explored in virtually every discipline. Clear advantages for students (e.g., price and portability) are other factors that make this technology worth pursuing.

For those with smart phones, iPads, and similar devices, subscription-based services are available that allow students to receive textbooks and ancillary materials on the devices they already own. Some models offer free membership with a pay-per-book feature; others charge on a per-course basis. Business models are emerging that may lower costs for students, including textbook rentals and bulk purchases by the institution. For-profit universities such as the University of Phoenix have begun requiring faculty to assign electronic texts, and in 2010, the California State University system piloted a similar program. While this reduces student choice, it also provides a way for the university to secure cheaper buying options for students. Course management systems (CMS) are another point of entry to electronic texts; Blackboard has partnered with McGraw-Hill and two booksellers to enable faculty to assign, and students to buy, electronic texts within the Blackboard system. CourseSmart, a consortium of five publishers, has also developed CMS integration for assigning and purchasing electronic texts.

Scholarly journals are beginning to appear in electronic form as well. The European-based Directory of Open Access Journals lists some 5,500 titles — nearly half of which are searchable online at the article level — and a typical university research library will have access to many more. Scholarly journals are not yet common in the mobile space, although electronic versions of many consumer periodicals are already available as custom apps. Pricing models for mobile periodicals vary widely; paper subscribers can sometimes receive mobile versions free, but others must pay separately per issue — sometimes at a higher rate than for a paper subscription.

Pricing and DRM issues aside, electronic books have the potential to truly transform educational practice. Currently, most electronic books and journals are essentially copies of printed versions that can be read on a computer or mobile device. Exciting new examples hint at the possibilities offered by more advanced forms of electronic books — self-directed, interactive experiences; easy exploration; collaborative work; multi-modal, immersive activities; and other deeply engaging approaches to learning. Mobile applications add easy social interaction around electronic books that could be marshaled in support of group study and focused teacher-student interaction at any point in the text. Electronic texts can be linked to a myriad of supporting materials that can extend and enrich them.

A sampling of applications of electronic books across disciplines includes the following:

- **Biology.** *Raven Biology,* an electronic text from publisher Inkling, brings the study of this science to life with detailed illustrations and animations, in-line keyword definitions, and interactive quizzes embedded in each chapter.
- **Business.** Students in *Business Computing* at RMIT University participated in an electronic book pilot using custom course material developed from the traditional textbook. Students using the electronic books were able to delve more deeply into the material, access related information beyond what the instructor provided, and use the device's highlighting and annotation tools to take notes in the digital text.
- **Education.** At Ball State University, a grant-funded project provided Kindles to students in *Studies in Educational Technology.* While using the readers for their own study, the future teachers also experienced firsthand how electronic books can be used in teaching and learning.

Electronic Books in Practice

The following links provide examples of how electronic books are being used in higher education settings.

Amazon to Launch "Kindle Singles"

http://phx.corporate-ir.net/phoenix.zhtml?c=176060&p=irol-newsArticle&ID=1481538

In the fall of 2010, Amazon announced the launch of "Kindle Singles," short texts of between 10,000 and 50,000 words. The service is designed to provide a market for pieces longer than a magazine article but shorter than a novel, such as academic articles, thought pieces, and research papers.

Constellation

https://content.ashford.edu/horizon

Created and maintained by Ashford University, Constellation is an electronic textbook series developed expressly for Ashford courses by faculty and special editorial boards. Students may use textbooks on their computers or mobile devices, print them, or store them locally, as they wish.

Cooliris Releases a Wikipedia Magazine Experience for iPad

http://www.padgadget.com/2010/07/27/cooliris-releases-a-wikipedia-magazine-experience-for-ipad

The Cooliris Wikipedia application draws in content from the online encyclopedia, transforming it into a visually rich, magazine-like display that invites browsing and exploration.

Page2Pub

http://opl.rit.edu/projects/page2pub/

Rochester Institute of Technology's Open Publishing Lab has developed a system for collecting different types of digital content that can then be published to the open epub format for use on a variety of different electronic readers.

The Pedlar Lady of Gushing Cross

http://www.moving-tales.com

This interactive, immersive retelling of a classic story with animation, audio, and rich graphics is designed for the iPad.

Stanford University Medical School Issues iPads to Students, Potentially Replacing Textbooks

http://med.stanford.edu/ism/2010/september/ipads-0913.html

The Stanford University School of Medicine provides students with iPads containing course materials and interactive study aids. Students find that the iPad reduces the number of textbooks they must carry between classes and appreciate having content in a variety of forms, including video and interactive graphics.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about electronic books.

2009 Librarian eBook Survey

http://www.apo.org.au/research/2009-librarian-ebook-survey

(Michael Newman, *HighWire-Stanford University,* 26 March 2010.) This comprehensive report analyzes how electronic books are being used in libraries in 13 countries.

Delicious: Electronic Books

http://delicious.com/tag/hz11+ebooks

Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report,* including the ones listed here. To add to this list, simply tag resources with "hz11" and "ebooks" when you save them to *Delicious.*

Handheld E-Book Readers and Scholarship: Report and Reader Survey

http://www.humanitiesebook.org/heb-whitepaper-3.html

(Nina Gielen, *American Council of Learned Societies (ACLS) Humanities E-Book,* 18 August 2010.) This report describes an experiment and reader survey conducted by the ACLS Humanities E-Book in 2009-10 to assess the effectiveness of electronic scholarly monographs.

A Magazine Meant for Mobile

http://www.nytimes.com/2010/08/11/business/media/11nomad.html

(Tanzina Vega, *The New York Times,* 10 August 2010.) This article discusses a new online publication for mobile devices. *Nomad Editions,* written by freelance journalists, will appear on a subscriber's mobile device as a monthly mini-magazine tailored to his or her interests.

Making Disposable Dynamic Displays With Electronic Ink on Real Paper

http://www.wired.com/gadgetlab/2010/11/making-disposable-dynamic-displays-with-electronic-ink-on-real-paper/

(Tim Carmody, *Wired Gadget Lab,* 23 November 2010.) Electrowetting allows electronic ink to be embedded in real paper, merging analog and digital media to create inexpensive displays. This article describes a prototype project that is exploring the possibilities.

What Publishers Can and Should Learn from "The Elements"

http://radar.oreilly.com/2010/08/what-publishers-can-and-should.html

(Mac Slocum, *O'Reilly Radar,* 12 August 2010.) This article interviews Theodore Gray, author of *The Elements,* and discusses how the digital version pushes the envelope of electronic book publishing.

Yes, People Still Read, But Now It's Social

http://www.nytimes.com/2010/06/20/business/20unbox.html

(Steven Johnson, *The New York Times,* 18 June 2010.) Writer Steven Johnson argues that electronic books will transform reading into a more social experience.

MOBILES

Time-to-Adoption Horizon: One Year or Less

According to a recent report from mobile manufacturer Ericsson, studies show that by 2015, 80% of people accessing the Internet will be doing so from mobile devices. Perhaps more important for education, Internet-capable mobile devices will outnumber computers within the next year. In Japan, over 75% of Internet users already use a mobile as their first choice for access. This shift in the means of connecting to the Internet is being enabled by the convergence of three trends: the growing number of Internet-capable mobile devices, increasingly flexible web content, and continued development of the networks that support connectivity.

Overview

Mobiles continue to merit close attention as an emerging technology for teaching and learning. The devices available today are multi-functional and robust, but the story of mobiles is no longer solely about the devices we carry. Mobiles — be they phones, iPads, or similar "always-connected" devices — are doorways to the content and social tapestries of the network, and they open with just a touch. The *2010 Horizon Report* placed mobile computing on the near term horizon, with an emphasis on the wide range of activities that are now possible using mobile devices. This year, mobiles are here because so many people use them as their first choice for accessing networked resources. The impact of mobiles is being felt in every part of the globe and by more people than ever before. Active mobile accounts continue to grow dramatically, and the supporting infrastructure continues to expand both in urban and remote areas.

The number of mobile devices produced and purchased each year continues to grow, and the new devices like the iPad and its counterparts are expanding our notions of portability. With increased screen real estate, battery life, and input options, these new mobile devices have rapidly become a viable alternative to heavier, more expensive laptop computers. It is not uncommon to find that someone carries both a smart phone and a tablet; when a quick glance at email, social networks, or other tools is needed, the smart phone fills the bill. For more involved web browsing, reading, watching videos, or to use any of the tens of thousands of Internet productivity and lifestyle applications, the tablet provides just enough extra space to enable comfortable use over longer periods of time.

For most people in the developed world, a mobile is always close at hand and available with speedy Internet access whenever it is needed. Mobiles are easy to use for web browsing; much of the available content seamlessly adjusts for optimal display on whichever device is used to access it. Mobile and wireless data networks continue to evolve, supporting faster connections and higher bandwidth throughput; the forthcoming 4G network promises the highest speeds yet, and 4G devices are already beginning to appear on the market.

As more people choose to reach for a mobile rather than sitting at a desk to access the Internet, our views and behaviors about that access are shifting. Specialized applications are available that, for many, replace a standard web browser for mobile access. It is not unusual to use several different applications to access online financial information, read and contribute to social networking sites, check email, browse and upload media, and so on. Tasks that once were gathered into a single piece of software — the web browser — are now distributed among many specialized (and optimized) applications.

Easy mobile access also means that the full range of networked information and applications accompany us wherever we go. The Internet is no longer something that is piped into homes and offices via a cable anchored to the wall; it is a pervasive, ever-present entity, accessible from anywhere there is a cell signal.

Relevance for Teaching, Learning, Research, or Creative Inquiry

Mobiles embody the convergence of several technologies that lend themselves to educational use, including electronic book readers, annotation tools, applications for creation and composition, and social networking tools. GPS and compasses allow sophisticated location and positioning, accelerometers and motion sensors enable the device to be used in completely new ways, digital capture and editing bring rich tools for video, audio, and imaging — more and more, mobiles encompass it all, and innovation in mobile device development continues at an unprecedented pace.

The potential of mobile computing is already being demonstrated in hundreds of projects at higher education institutions. At Ball State University, computer science students can study mobile applications programming, creating usable applications in a single semester; recent examples include games, a reference tool for birdwatchers, and an English-Spanish tutoring program. At Oberlin College, faculty may borrow iPads to evaluate their potential use in courses. Countless applications are available for self-study, reference, drill and practice, fieldwork, and research in hundreds of disciplines. Cultural heritage organizations and museums are also turning to mobiles to educate and connect with audiences. The Museum of Science in Boston, for example, collaborating with researchers from Tufts University, has created Firefly Watch, a mobile application for visitors and native Bostonians that allows them to serve as local "citizen scientists" to aid real scientists in a large regional study of firefly populations.

Mobiles allow very simple tools to be easily integrated into classroom activities with no need for involvement of IT or support staff. Twitter, a short-message micro-blogging service that is very easy to use on phones, is a good example, finding ever more common use as an in-class discussion tool. Students participate by sending messages to ask and answer questions or expand on thoughts. Another simple tool, Poll Anywhere, turns mobiles into personal response systems, enabling teachers to quiz students, assess their understanding before, during, and after a lesson, and reveal patterns of thinking in the classroom. Any mobile will work for these purposes; all that is required is the ability to send text (SMS) messages. At Abilene Christian University, attendees at a recent performance of Othello were asked not to turn their phones off during the performance, but instead to use them to receive messages throughout the performance. Cast members behind the scenes sent messages to clarify Shakespearean language, share scene summaries, and interact with the audience through a live blog.

The increasing availability of network access means that the growing capabilities of mobiles are available to more students in more locations each year. Educational institutions around the world are investing in the infrastructure that supports mobile access, sponsoring programs that provide devices to students who do not already have them, and commissioning custom mobile applications to serve their communities. Mobiles are recognized as advantageous tools for learning and study, and mobile offerings are quickly becoming a selling point for prospective students considering educational options.

The unprecedented evolution of these devices continues to generate great interest. They are increasingly capable tools for learning that schools often do not have to buy or maintain: virtually 100% of university students worldwide come equipped with mobiles. The sheer power of these devices is what makes them interesting, and that power derives from their ubiquity, their portability, the wide range of things that can be done with them, and their ability to access the Internet nearly anywhere.

A sampling of applications of mobiles across disciplines includes the following:

- **Chemistry.** Reference applications assist students studying chemical formulae, allowing them to review and take notes on what they learn, visualize 3D structures, see the reactions taking place — and then test their understanding.

- **History.** Mobile applications using location-based data and augmented reality help students discover historical information about places they visit on field trips.
- **Journalism.** A team of sixteen faculty and students across three academic departments at Abilene Christian University collaborated to produce the first university student newspaper designed expressly for the iPad.

Mobiles in Practice

The following links provide examples of how mobiles are being used in higher education settings.

100 Most Educational iPhone Apps

http://www.accreditedonlinecolleges.com/blog/2009/100-most-educational-iphone-apps

This is a comprehensive list of mobile applications that can be used for study in a wide variety of disciplines.

ACU Business Students Integrate iPads into Innovative Study Abroad Experience

http://www.acu.edu/news/2010/100611_iPadinOxford.html

Abilene Christian University business students studying in Oxford are using iPads to deploy research plans, present product concepts, and conduct market research. As part of the program, the students will evaluate the use of the devices for education and research.

Bucks County Community College

http://buckslib.wordpress.com/2010/05/24/bucks-unveils-first-mobile-app

Bucks County Community College has developed a mobile application for the campus community. Early features focus on library use, allowing users to browse the library collections, map a route to BCCC campus locations, and communicate with library staff. The application will be expanded to include course offerings and other campus resources.

Cupids 400

http://www.cupids400.com/english/education/iphone.php

This application, designed for the iPhone and iPod Touch, is used to explore the 1610 English Canadian settlement at what is now Cupids, Canada. The application includes an interactive map, details about the settlement of the area, and historical information in a variety of media. Visitors to Cupids using the application can use the map to explore real-world locations of the original settlement.

LIU Brooklyn Campus Extends iPad Program

http://campustechnology.com/articles/2010/10/04/liu-brooklyn-campus-extends-ipad-program.aspx

Following a successful pilot in which freshmen were issued iPads, Long Island University's Brooklyn Campus has improved the campus wireless network and committed to subsidizing iPad purchases for its 11,000 students.

Mobile Devices as Emerging Educational Tools

http://emergingmediainitiative.com/project/mobile-education

Computer science faculty members at Ball State University are developing mobile applications for political science, computer science, and chemistry. Once the applications are deployed, the faculty plan to conduct longitudinal testing to evaluate the effectiveness of mobiles as a study tool.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about mobiles.

Abilene Christian University's 2009-2010 Mobile Learning Report

http://www.acu.edu/promise/innovative/mlreport2009-10.html

(Abilene Christian University, 2010.) Two years after launching an innovative pilot program to issue mobiles to every student, Abilene Christian University has published a comprehensive report detailing the program and its impact on campus.

AdMob Mobile Metrics Highlights 2010

http://metrics.admob.com/2010/06/may-2010-mobile-metrics-report

(*AdMob Metrics,* 30 June 2010.) This report analyzes data captured by AdMob, a mobile research unit owned by Google, to discern trends about mobile uptake and use.

Delicious: Mobiles

http://delicious.com/tag/hz11+mobiles

Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report,* including the ones listed here. To add to this list, simply tag resources with “hz11” and “mobiles” when you save them to *Delicious.*

Designing mLearning: Tapping into the Mobile Revolution for Organizational Performance

http://www.designingmlearning.com/

(Clark Quinn, *Pfiiffer,* February 2011) This new book offers a comprehensive guide for designing learning for the mobile platform.

Global Mobile Statistics 2010

http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats

(*MobiThinking,* October 2010.) This compilation of independent research on mobile uptake and usage includes global statistics related to mobile use. Of special interest is a section of reports about the ‘mobile-only generation,’ or those consumers who only use a mobile device to access the Internet.

Pew Internet Research Report: Mobile Access 2010

http://pewinternet.org/Reports/2010/Mobile-Access-2010.aspx

In this article drawn from his 2005 Clair Maple Memorial Address at the Seminars on Academic Computing, MIT President Emeritus Charles Vest discusses open content and outlines the promise and opportunity that drove the creation of MIT OpenCourseWare.

Smartphones Give You Wings: Pedagogical Affordance of Mobile Web 2.0

http://www.apo.org.au/research/smartphones-give-you-wings-pedagogical-affordance-mobile-web-20

(Thomas Cochrane, Roger Bateman, *Australasian Journal of Educational Technology,* 7 June 2010.) This paper examines how mobile Web 2.0 tools can be used in higher education.

The State of Mobile Apps 2010

http://blog.nielsen.com/nielsenwire/online_mobile/the-state-of-mobile-apps

(The Nielsen Company, *Nielsen Wire,* 1 June 2010.) This report identifies global usage patterns for mobile applications by mobile device type.

World’s Largest Open University Goes Mobile

http://www.pr-inside.com/world-s-largest-open-university-goes-r1553595.htm

(Press release, *PR-inside.com,* 29 October 2009.) The Indira Gandhi National Open University, in partnership with Ericsson, offers courses on mobile phones to more than 2.5 million students.

AUGMENTED REALITY

Time-to-Adoption Horizon: Two to Three Years

Augmented reality, a capability that has been around for decades, is shifting from what was once seen as a gimmick to a bonafide game-changer. The layering of information over 3D space produces a new experience of the world, sometimes referred to as "blended reality," and is fueling the broader migration of computing from the desktop to the mobile device, bringing with it new expectations regarding access to information and new opportunities for learning. While the most prevalent uses of augmented reality so far have been in the consumer sector (for marketing, social engagement, amusement, or location-based information), new uses seem to emerge almost daily, as tools for creating new applications become ever easier to use.

Overview

Augmented reality (AR) refers to the addition of a computer-assisted contextual layer of information over the real world, creating a reality that is enhanced or augmented. AR was on the mid-term horizon for 2010, and throughout the year, enjoyed widespread attention in conferences and industry showcases internationally. The Augmented Reality Event in June 2010, for example, featured keynotes by Bruce Sterling and Will Wright, which suggests the technology's growing cultural significance. Augmented reality was the Advisory Board's highest-rated topic for 2011, which is a testament to its increasing importance within higher education.

Various forms of augmented reality, starting with early head-mounted displays, have been around for more than 30 years. Over that time, increased bandwidth and smart phone adoption, as well as a proliferation of AR browser applications, have helped AR evolve from a family of cool gadgets on the periphery of graphics and visualization technologies to an increasingly central player in the technology landscape. Further, the powerful significance of the concept of "blending" information and the real world in an increasingly experiential environment has pushed AR to the forefront in the realms of business, technology, entertainment, branding, and education. Companies are developing augmented reality brochures, packaging, and kiosks, while game developers are using augmented reality to create new kinds of entertainment.

Augmented reality is often described with reference to its two predominant modes of gathering information. The first mode relies on a visual metaphor and the second relies on spatial positioning. In the first method, the position of "markers," which are visual cues, are "seen" by a camera on a computer or mobile device. The marker is interpreted by software that brings up information in response to physical reference points. These points (markers) are used to interpret the device's precise location and the nature of objects in their field of view. As marker-based systems continue to develop, many are beginning to recognize common real-world objects as markers, or even special gestures, increasing their flexibility dramatically.

Position-based applications are called "gravimetric," and make use of a mobile device's GPS and compass information, and then use the device's location and position to discern what objects are nearby. Some applications also use image recognition, in which input to the camera is compared against a library of images to find a match; more recent applications can detect and interpret gestures and postures as commands to perform certain functions.

Relevance for Teaching, Learning, Research, or Creative Inquiry

One of the most promising aspects of augmented reality is that it can be used for visual and highly interactive forms of learning, allowing the overlay of data onto the real world as easily as it simulates dynamic processes. A second key characteristic of augmented reality is its ability to respond to user input. This interactivity confers significant potential for learning and assessment. Augmented reality is an active, not a passive technology; students can use it to construct new understanding based on interactions with virtual objects that bring underlying data to life. Dynamic processes, extensive datasets, and objects too large or too small to be manipulated can be brought into a student's personal space at a scale and in a form easy to understand and work with.

In a broader context of education, augmented reality is appealing because it aligns with situated learning. Students find connections between their lives and their education through the addition of a contextual layer. The ability to transfer learning from one context to another is a significant skill, one that AR can facilitate in its overt use of context and layering. Finally, AR that relies on mobile devices leverages an increasingly ubiquitous tool, not for social interactions but for learning, blurring the boundaries between formal and informal learning, which can in turn contribute to the evolution of a learning ecology that transcends educational institutions. Indeed, the potential for just-in-time learning and exploration, without special goggles or other equipment, is a deeply compelling aspect of this technology.

A tremendous market is emerging for network-aware applications that convey information about specific places or objects. These applications have great promise for learning. This market is being explored in especially compelling ways by museums. The J. Paul Getty Museum, for example, has made available an AR complement for the Augsburg Display Cabinet, a 17th century collector's cabinet of wonders, often described as the precursor to the contemporary museum. Both Web-based and on view in the museum, the presentation offers users the opportunity to explore the cabinet without actually touching the delicate objects within. London's Natural History Museum is also using AR with a recent project called *Who Do You Think You Really Are?* that gives museum visitors handheld screens featuring an interactive video that allows users to learn about the evolution of dinosaurs, which are seen in the video moving around the actual space of the museum. Embedding AR within video and merging these two media forms is a novel use of this technology.

One of the most prevalent uses of augmented reality is to annotate existing spaces with an overlay of information. The Museum of London, for example, released a free iPhone app called StreetMuseum that uses GPS positioning and geo-tagging to allow users as they travel around the city of London to view information and 3D historical images overlaid on contemporary buildings and sites. Similarly, a project call iTacitus (Intelligent Tourism and Cultural Information Through Ubiquitous Services) allows users to visit historical locations, such as the Coliseum, pan with their mobile device, and witness an event from the past.

Augmented books are also gaining traction. Developers at the Gwangju Institute of Science and Technology have created a format that allows 3D characters to emerge from the pages of books, but the technology requires the use of goggles. Tony DiTerlizzi's book *The Search for WondLA* incorporates "WondLA Vision," which gives readers an AR experience by having them hold the book and several special images up to a webcam. While much of the early exploration of this area has centered on children's books, the use of AR for textbooks in higher education holds great promise.

Creating projects using augmented reality is becoming far more prevalent in media design programs across the U.S. For example, Georgia Institute of Technology is home to the Augmented Reality Lab, where Iulian Radu and Blair MacIntyre recently developed "Augmented Reality Scratch," an augmented reality programming environment for children. Ball State University's Department of Emerging Technologies and Media Design, in partnership with augmented reality developer Total Immersion, offers students an opportunity to develop a range of augmented reality applications. And at New York University's Interactive Telecommunications Program, as part of a class assignment, students Craig Kapp and Nisma Zaman created an interactive AR memory matching game designed for children in rehabilitation at the Rusk Institute of Rehabilitation Medicine.

Continued experimentation in the development of AR simulations, games, texts, and situated information bode well for the expansion of AR in higher education learning in the coming year.

A sampling of applications of augmented reality across disciplines includes the following:

- **Chemistry.** Using handheld devices, students explore a physical space to uncover clues and receive data related to a simulated environmental disaster detailed in a game-based scenario using AR simulations.
- **Geography.** Students study an augmented globe in a textbook, and gain both a better representation of the cartographic information and greater options for interaction and comprehension.
- **History.** Visiting actual locations tagged with information, students view images and information from the past in situ, enhancing their comprehension.

Augmented Reality in Practice

The following links provide examples of how augmented reality is being used in higher education settings.

Augmented Reality, Blogs and Geo-Tagging to Connect Students with their Environment Abroad

http://blogs.dickinson.edu/edtech/2010/11/23/augmented-reality-blogs-geo-tagging-to-connect-students-with-their-environment-abroad/

Study Abroad students from Dickinson College visiting Japan were assigned the task of documenting their surroundings using augmented reality. They built a simple AR layer that was complemented with geo-tagged photographs and blog entries. The project's goal was to help better familiarize students with the new surroundings.

MIT Teacher Education Program

http://education.mit.edu/drupal/ar

This is a description of augmented reality simulations created by the MIT Teacher Education Program, in conjunction with The Education Arcade, to enhance student learning.

Powerhouse Museum Augmented Reality Application

http://www.powerhousemuseum.com/layar/

The Powerhouse Museum has developed an augmented reality application that allows visitors to use their mobile phones to see Sydney, Australia, as it appeared one hundred years ago.

Radford Outdoor Augmented Reality (ROAR) Project

http://gameslab.radford.edu/ROAR.html

ROAR is an augmented reality game developed by researchers in the Games, Animation, Modeling and Simulation (GAMeS) Lab at Radford University. The project uses AR to help teach K-12 students more about Native American history and teamwork through a game called Buffalo Hunt. The project was done in collaboration with HP Labs and MIT.

Skidmore Campus Map

http://academics.skidmore.edu/blogs/onlocation/2010/10/21/augmenting-reality/

The Skidmore GIS Center used augmented reality to create the Skidmore Campus Map.

Text Spaces in Augmented Reality

http://blogs.ubc.ca/etec540courseproj/course-assignment-major-project/

Text Spaces in Augmented Reality is a project at the University of British Columbia using AR in conjunction with text. The project gives many examples and a list of references related to the subject.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about augmented reality.

Augmented Reality - Its Future in Education

http://www.publictechnology.net/sector/augmented-reality-its-future-education

(Mark Smith, publictechnology.net, 15 November 2010.) This post offers a look at how augmented reality can have an impact on education.

Blended Reality: Superstructing Reality, Superstructing Selves

http://www.iftf.org/node/2598

(Kathi Vian, Institute for the Future, 4 March 2009.) This in-depth report looks at the impact of augmented reality as it is increasingly integrated into technology and society, focusing specifically on the transformation of sensory perception and its implications culturally.

Collaborative Augmented Reality in Schools

http://ltee.org/uploads/cscl2009/paper236.pdf

(Lyn Pemberton, Marcus Winter, University of Brighton, 2009.) This brief research paper discusses the use of augmented reality for collaboration and learning, and describes a specific collaborative project deploying three AR prototypes.

Delicious: Augmented Reality

http://delicious.com/tag/hz11+augmentedreality

Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report,* including the ones listed here. To add to this list, simply tag resources with “hz11” and “augmentedreality” when you save them to *Delicious.*

How Augmented Reality Apps Can Catch On

http://radar.oreilly.com/2010/10/two-ways-augmented-reality-app.html

(Mac Slocum, *O’Reilly Radar,* 13 October 2010.) This article discusses standards for development of AR applications.

How The New York Times, Others Are Experimenting With Augmented Reality

http://www.poynter.org/how-tos/digital-strategies/e-media-tidbits/99162/how-the-new-york-times-others-are-experimenting-with-augmented-reality/

(Dorian Benkoil, *poynter.org,* 30 October 2009.) This post discusses how *The New York Times* and other publishers are exploring the use and application of augmented reality. The author also suggests how AR can be used in conjunction with other technologies such as the semantic web and smart objects.

GAME-BASED LEARNING

Time-to-Adoption Horizon: Two to Three Years

Game-based learning has gained considerable traction since 2003, when James Gee began to describe the impact of game play on cognitive development. Since then, research — and interest in — the potential of gaming on learning has exploded, as has the diversity of games themselves, with the emergence of serious games as a genre, the proliferation of gaming platforms, and the evolution of games on mobile devices. Developers and researchers are working in every area of game-based learning, including games that are goal-oriented; social game environments; non-digital games that are easy to construct and play; games developed expressly for education; and commercial games that lend themselves to refining team and group skills. Role-playing, collaborative problem solving, and other forms of simulated experiences constitute topics for further research, but are recognized for having broad applicability across a wide range of disciplines.

Overview

Proponents of game-based learning in higher education point to its role in supporting collaboration, problem-solving, and communication, the 21st century competencies needed by American students outlined by Secretary of Education Arne Duncan in late 2010 in the National Education Technology Plan. Advocates also underscore the productive role of play, which allows for experimentation, the exploration of identities, and even failure. Gaming also contributes to the development of a particular disposition well-suited to an information-based culture and rapid change.

Gaming is an expansive category, ranging from simple paper-and-pencil games such as word searches all the way up to complex, massively multiplayer online (MMO) and role-playing games. Educational games can be broadly grouped into three categories: games that are not digital; games that are digital, but that are not collaborative; and collaborative digital games. The first category includes many games already common in classrooms as supplemental learning tools. Digital games include games designed for computers, for console systems like the Nintendo Wii, and online games accessed either through a special game client (like IBM's *Power Up*) or through a web interface (like *Whyville*).

Research into games for educational purposes reveals some interesting trends. Early studies of consumer games helped to identify the aspects of games that make them especially engaging and appealing to players of various ages and of both genders: the feeling of working toward a goal; the possibility of attaining spectacular successes; the ability to problem-solve, collaborate with others, and socialize; an interesting story line; and other characteristics. These qualities are replicable, though they can be difficult to design well, and they can transfer to games featuring educational content.

More recently, the Serious Games movement responded to the desire to unite significant content with play. The games within this genre layer social issues or problems with game play, helping players gain a new perspective through active engagement. While some criticize these games as being too serious, and therefore lacking the fun aspects that can increase engagement, research shows that players readily connect with learning material when doing so will help them achieve personally meaningful goals.

A few years further out, but increasingly interesting, is the creation of massively multiplayer online (MMO) games designed for learning. Like their entertainment- or training-focused counterparts (*World of Warcraft, Everquest, Lord of the Rings Online, America's Army,* and others), games of this type bring many players together to work on activities that require collaborative problem-solving. Games like these are complex, and include solo as well as group content and goals that are collaborative as well as some that are competitive. They are often goal-oriented in ways that tie to a storyline or theme, but the highest levels of interaction and play require outside learning and discovery. What makes MMO games especially compelling and effective is the variety of sub-games or paths of engagement that are available to players — there are social aspects, large and small goals to work towards, often an interesting back story that sets the context, and more. Players dedicate enormous amounts of time on task pursuing the goals of these games. The problem that needs to be solved, and which is being tackled on many fronts today, is that of embedding educational content in such a way that it becomes a natural part of playing the game.

One area in which there is currently a great deal of development is social games, especially those that can be taken along and played anywhere at all using a mobile device. With social games, players are never far from a game environment, whether it be a mobile in a pocket, a desktop or laptop computer, or a networked gaming console. With this kind of ubiquity, games are becoming a pervasive part of everyday life, and our notions of what constitutes a game are changing as fast as the games themselves.

Relevance for Teaching, Learning, Research, or Creative Inquiry

Considering the relevance of gaming within higher education can take one of two admittedly overlapping paths. In the first, gaming is deemed significant as a conceptual practice with outcomes that enable students to gain skills needed specifically in an information-based culture. The second path finds relevance in specific gaming content, which can overlap with course content, helping students learn material in an innovative way.

In the first direction, advocates support the act of gaming. They see value, for example, in creating a disposition or stance that enhances skills in decision-making, innovation, and problem-solving. The ability to identify with experts as one adopts differing identities in games can allow students to experiment with leadership. In MMO games, the "conceptual blending" required in navigating the real world and virtual spaces simultaneously in game play similarly contributes a valuable skill. Finally, gaining an understanding of the "procedural logic" or meta level of game design is also useful, helping students garner a deeper understanding of the systems that drive contemporary culture. In these ways, gaming as an activity contributes to learning broadly.

In the second direction, gaming related specifically to course content helps student gain a fresh perspective on material and can potentially engage them in that content in more complex and nuanced ways. Alternate reality games (ARGs), in which players find clues and solve puzzles in experiences that blur the boundary between the game and real life, offer a clear example in which course content and game play can overlap. Recent examples of large-scale ARGs include the educational games *World Without Oil,* a collaborative and social imagining of the first 32 weeks of a global oil crisis, and *Superstruct,* in which players imagined themselves 10 years in the future, in a world facing daunting environmental, political, and health challenges. *The Tower of Babel,* an ARG designed by the European ARGuing Project, was used in schools as well as by learners of all ages for learning languages other than their own.

Online games for single users are also popular, although they may be used more in informal than formal learning contexts. Examples of single-player online games useful in an educational context include those developed by Persuasive Games, which explores advocacy issues in a format intended to engage players in serious questions related to health, policy, and contemporary topics. Similarly, the Italian design collective Molleindustrial uses gaming to address pressing social needs. *The Free Culture Game,* for example, is described as "a playable theory" and deals with copyright and free culture, while *Oligarchy* considers international oil drilling. The premise behind these games is that while students may read about social issues in a given college course, actively playing through the topics may lend a new perspective and thorough means of involvement.

Open-ended, challenge-based, truly collaborative games have tremendous potential to transform higher education. Games like these, which occur in both massively multiplayer online (MMO) and non-digital forms, can draw on skills for research, writing, collaboration, problem-solving, public speaking, leadership, digital literacy, and media-making. When embedded in the curriculum, they offer a path into the material that allows the student to learn how to learn along with mastering, and truly owning, the subject matter. These games lend themselves to curricular content, requiring students to discover and construct knowledge in order to solve problems. They are challenging to design well, but the results can be transformative.

Research and experience have already shown that games can be applied very effectively in many learning contexts, and that games can engage learners in ways other tools and approaches cannot. As this area continues to expand, and as game designers continue to explore new ways to integrate serious topics and content area in engaging formats, gaming will become more useful and prevalent in higher education.

A sampling of applications of game-based learning across disciplines includes the following:

- **Engineering.** An engineering game called *"Cool It": An Interactive Learning Game for Cryogenics* developed at the University of Wisconsin-Madison teaches students about cryogenics by providing detailed information and feedback based on the engineering decisions they make when designing objects for this field.
- **Music.** *Melody Mixer* is a game developed at the University of Wisconsin-Madison that teaches music students how to read and compose music. It encourages students to experiment with sound and composition to better learn how pieces are constructed.
- **Nursing.** Professor Ann Burgess of Boston College's Connell School of Nursing has developed a game called *Virtual Forensics Lab* that teaches students how to conduct forensics at a crime scene. The virtual game helps students develop critical thinking for solving crimes and piecing together evidence.

Game-Based Learning in Practice

The following links provide examples of how game-based learning is being used in higher education settings.

Ghosts of a Chance

http://www.ghostsofachance.com/

This game allowed visitors to the Smithsonian American Art Museum a chance to decipher codes, follow treasure maps, send text messages, and uncover hidden objects in this multimedia scavenger hunt. The game was held in the fall of 2010.

Global Conflicts

http://www.globalconflicts.eu/

This educational game is designed to help teach concepts in citizenship, geography, and media. Developed by Serious Games International, it has detailed lesson plans and assignments for students.

Mass Extinction

http://shass.mit.edu/research/cms_game

MIT's Education Arcade in the Comparative Media Studies Program is developing a curated game called "Mass Extinction" about climate change. The game will take place in the spring of 2011.

PeaceMaker Game

http://www.peacemakergame.com/game.php

This game is designed to teach concepts in diplomacy and foreign relations. The game allows the player to take on the role of either the Israeli Prime Minister or Palestinian President, trying to find peaceful resolutions to conflicts before the term of office expires.

Simulation Games for Business Students

http://it.uoregon.edu/itconnections/playing-for-a-good-grade

A sports business professor at the University of Oregon has taken a commercial game, *Madden NFL,* and used one of its modes for developing football franchises to help teach students about marketing and business decisions. The approach leverages an off-the-shelf game and uses it for educational purposes.

Sustainability Games — Video Games for Sustainability and Design

http://emergingmediainitiative.com/project/sustainability-games/

Researchers at Ball State University are designing video games for use in teaching landscape architecture and environmental design.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about game-based learning.

Deep Learning Properties of Good Digital Games: How Far Can They Go?

http://www.jamespaulgee.com/node/37

(James Paul Gee, Arizona State University, January 2009.) This study by noted games-based learning researcher James Paul Gee discusses the design and effects of digital games.

Delicious: Game-Based Learning

http://delicious.com/tag/hz11+gamebasedlearning

Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report,* including the ones listed here. To add to this list, simply tag resources with “hz11” and “gamebasedlearning” when you save them to *Delicious.*

Design Outside the Box (video)

http://g4tv.com/videos/44277/DICE-2010-Design-Outside-the-Box-Presentation/

(Jesse Schell, *DICE conference,* 18 February 2010.) Carnegie Mellon professor Jesse Schell gives a compelling talk about the future of gaming and what the world may look like as games get embedded into the fabric of everyday life with sensors and network connections helping to create sophisticated feedback and scenarios.

How Video Games Are Infiltrating—and Improving—Every Part of Our Lives

http://www.fastcompany.com/magazine/151/everyones-a-player.html

(Adam L. Penenberg, FastCompany, 13 December 2010.) This article discusses the prevalence of gaming in everyday life and how this trend will only increase in surprising and interesting ways.

Moving Learning Games Forward (PDF)

http://education.mit.edu/papers/MovingLearningGamesForward_EdArcade.pdf

(E. Klopfer, S. Osterweil and K. Salen, *The Education Arcade,* 2009.) This white paper provides an overview of the field of game-based learning, focusing on K-12 education but is also useful as background for those in higher education.

Reality Is Broken, Game Designers Can Fix It (video)

http://www.avantgame.com/

(Jane McGonigal, Institute for the Future, 2010.) This TED talk features Jane McGonigal, a leader in the design of ARGs, who advocates incorporating principles of game design into the real world to effect social change.

GESTURE-BASED COMPUTING

Time-to-Adoption Horizon: Four to Five Years

Thanks in part to the Nintendo Wii, the Apple iPhone and the iPad, many people now have some immediate experience with gesture-based computing as a means for interacting with a computer. The proliferation of games and devices that incorporate easy and intuitive gestural interactions will certainly continue, bringing with it a new era of user interface design that moves well beyond the keyboard and mouse. While the full realization of the potential of gesture-based computing remains several years away, especially in education, its significance cannot be underestimated, especially for a new generation of students accustomed to touching, tapping, swiping, jumping, and moving as a means of engaging with information.

Overview

It's almost a cliché to say it, but the first exposure to gesture-based computing for many people may have occurred over a decade ago when they saw Tom Cruise in *Minority Report* swatting information around in front of him by swinging his arms. The fact that John Underkoffler, who designed the movie's fictional interface, presented a non-fiction version of it, called the G-Speak, in a TED Talk in 2010, fittingly asserts the growing relevance and promise of gesture-based computing. The G-Speak tracks hand movements and allows users to manipulate 3D objects in space. This device, as well as SixthSense, which was developed by Pranav Mistry while at the MIT Media Lab and uses visual markers and gesture recognition to allow interaction with real-time information, has ignited the cultural imagination regarding the implications for gesture-based computing. This imagination is further fueled by the Kinect system for the Xbox, which continues to explore the potential of human movement in gaming. In short, gesture-based computing is moving from fictional fantasy to lived experience.

The approaches to gesture-based input vary. The screens for the iPhone, iPad and the multi-touch Surface from Microsoft all react to pressure, motion, and the number of fingers used in touching the devices. Some devices react to shaking, rotating, tilting, or moving the device in space. The Wii, for example, along with similar gaming systems, function by combining a handheld, accelerometer-based controller with a stationary infrared sensor to determine position, acceleration, and direction. Development in this area centers on creating a minimal interface, and in producing an experience of direct interaction such that, cognitively, the hand and body become input devices themselves. The Sony PlayStation 3 Motion Controller and the Microsoft Kinect system both move closer to this ideal.

The technologies for gesture-based input also continue to expand. Evoluce has created a touch-screen display that responds to gestures, and is working on a way to allow people to interact with Windows 7 through the Kinect system. Similarly, students at the MIT Media Lab have developed DepthJS, which unites the Kinect with the web, allowing users to interact with the Google Chrome web browser through gestures. Also at MIT, researchers are developing inexpensive gesture-based interfaces that track the entire hand. Elliptic Labs recently announced a dock that will let users interact with their iPad through gestures.

Another direction for technological innovation centers on haptics, which refers to the tactile feedback communicated to a user. At McGill University researchers are developing a haptic feedback system that allows people with visual impairments to get more feedback with fine degrees of touch, and a researcher with the Media Computing Group at RWTH Aachen University, Germany, has created a localized active haptic feedback interface called MudPad for fluid touch interfaces that promises to offer more nuanced ways to interact with screens through touch.

Other researchers are exploring ways to use gestural computing with mobile devices. GestureTek's Momo software, for example, uses two different trackers to detect motion and the position of objects, and is designed to bring gesture-based computing to phones. iDENT Technology's Near Field Electrical Sensing Interfaces is designed to allow mobiles to respond to grip and proximity sensing. A ringing mobile will put the call through if it is picked up and held, but will send it to voice mail if it is picked up and quickly put down again.

While gesture-based computing has found a natural home in gaming, as well as in browsing files, its potential uses are far more broad. The ability to move through three-dimensional visualizations could prove compelling and productive, for example, and gesture-based computing is perfect for simulation and training. Gesture-based computing has strong potential in education, both for learning, as students will be able to interact with ideas and information in new ways, and for teaching, as faculty explore new ways to communicate ideas. It also has the potential to transform what we understand to be scholarly methods for sharing ideas.

Gesture-based computing is changing the ways that we interact with computers, both physically and mechanically. As such, it is at once transformative and disruptive. Researchers and developers are just beginning to gain a sense of the cognitive and cultural dimensions of gesture-based communicating, and the full realization of the potential of gesture-based computing within higher education will require intensive interdisciplinary collaborations and innovative thinking about the very nature of teaching, learning, and communicating.

Relevance for Teaching, Learning, Research, or Creative Inquiry

Gesture-based computing has already proven productive in training simulations that operate almost exactly like their real-world counterparts. Gestural interfaces can allow users to easily perform precise manipulations that can be difficult with a mouse, as the video editing system Tamper makes plain (see the demonstration video at http://www.youtube.com/user/oblongtamper). Gesture-based computing also opens up unparalleled avenues of accessibility, interaction, and collaboration for learners.

Imagine an interface that allows students to determine or change the DNA of a fruit fly by piecing it together by hand, page through a fragile text from the Middle Ages, or practice surgical operations using the same movements a surgeon would. With gestural interfaces, discovery-based learning opportunities like these are likely to be common scenarios. Although these examples are hypothetical, research in the field of gesture-based computing is expanding rapidly and early results show that applications like these are not far-fetched.

While one direction for gesture-based computing attempts to recreate or improve upon existing practices, a more compelling direction for gesture-based computing in the context of learning will move beyond replicating what is already known in order to create entirely new forms of interaction, expression, and activity, along with the metaphors needed to make them comprehensible.

A sampling of applications of gesture-based computing across disciplines includes the following:

- **Art.** The UDraw GameTablet uses the Wii Controller to combine gestures for creating drawings and gaming, indicating directions for using gesture-based technology to expand creative inquiry through gaming and art.
- **Education.** The research agenda for the Media Design Program at Art Center College of Design includes educational technologies that use gesture-based computing, and students focus on creating new interfaces for learning.
- **Music.** The EyeMusic project at the University of Oregon uses eye-tracking sensors to compose multimedia productions based on the movements of the user's eyes.

Gesture-Based Computing in Practice

The following links provide examples of how gesture-based computing is being used in higher education settings.

3Gear Systems

http://www.threegear.com/

A pair of MIT graduate students have created a gesture-based interaction system using off the shelf computer cameras and a pair of Lyvra gloves that would cost $1 to produce.

Auckland Museum's Hybridiser Exhibit (video)

http://vimeo.com/6580702

This innovative project at the Auckland Museum uses touch-screen interfaces to allow visitors to create custom virtual orchids in lifelike detail.

EyeDraw

http://www.cs.uoregon.edu/research/cm-hci/EyeDraw/

This project, being developed at the University of Oregon, uses eye-movement to create drawings on a computer screen. The sensors can track eye motion and give users fine control over the image they compose.

Laterotactile Rendering of Vector Graphics with the Stroke Pattern

http://www.cim.mcgill.ca/~haptic/laterotactile/papers/VL-VH-EH-10.pdf

(Vincent Lévesque1 and Vincent Hayward, Proc. of *Europhaptics 2010, Part II, Kappers, A.M.L. et al. (Eds.), LNSC 6192, Springer-Verlag, pp. 25–30,* 2010.) At the University of British Columbia and the Institut des Systèmes Intelligents et de Robotique, researchers are developing a haptic feedback system that allows people with visual impairments to get more feedback with fine degrees of touch.

Morpholuminescence

http://www.i-m-a-d-e.org/morpholuminescence

Created by students at Ball State University, this project uses body gestures to adjust the light in a room for optimal viewing results. Designed for use in the fashion industry, the system offers an integrated lighting and sensor system, much of it built using the open-source Arduino prototyping platform.

MudPad

http://hci.rwth-aachen.de/mudpad

(Yvonne Jansen, *RWTH Aachen University Media Computing Group,* 2010.) Researchers in the Media Computing Group at RWTH Aachen University are developing a localized active haptic feedback interface called MudPad for fluid touch interfaces in order to offer more nuanced ways to interact with screens through touch.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about gesture-based computing.

7 Areas Beyond Gaming Where Kinect Could Play A Role

http://radar.oreilly.com/2010/12/dancing-with-kinects-future-in.html

(Alex Howard, *O'Reilly Radar,* 3 December 2010.) This post looks at how the gesture-based Kinect System from Microsoft can have broad use beyond its intended use as a gaming platform. Uses include applications in art, health and education.

Controlling Phones With the Body Electric

http://bits.blogs.nytimes.com/2010/02/17/controlling-phones-with-the-body-electric/

(Ashlee Vance, NYTimes.com, 17 February 2010.) At the 2010 Mobile World Congress, technology companies demonstrated technologies that can detect disruptions to electrical fields allowing a smartphone to perform certain functions when this happens, such as answering the phone without a need for pushing a button on the device. Other technology demonstrated includes the use of eye-movements to control computer functions on mobile devices.

Delicious: Gesture-Based Computing

http://delicious.com/tag/hz11+gesturecomputing

Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report,* including the ones listed here. To add to this list, simply tag resources with "hz11" and "gesturecomputing" when you save them to *Delicious.*

Is Apple Considering Next-Gen Tactile Feedback for iOS Devices?

http://www.patentlyapple.com/patently-apple/2010/08/is-apple-considering-next-gen-tactile-feedback-for-ios-devices.html

(Jack Purcher, *PatentlyApple.com,* 2 August 2010) Apple is exploring potential technology that would bring tactile feedback to it's mobile devices, giving users new levels of feedback and interaction aside from just simple touch gestures. A unique feature of this technology provided by Senseg is the lack of mechanical motors, so there are no moving parts to break or wear out.

New Interaction Rituals: Getting the Playful Interfaces We Deserve

http://dma.ucla.edu/events/calendar/?ID=478

In this presentation from 2007, Julian Bleecker asks how we might take an art-technology approach to interface design that is gestural to create more playful experiences.

Point, Click: A Review of Gesture Control Technologies

http://games.venturebeat.com/2010/02/09/point-click-a-review-of-gesture-control-technologies

(Damian Rollison, VentureBeat.com, 9 February 2010.) This article discusses the key developers and platforms working with gesture-based technologies.

LEARNING ANALYTICS

Time-to-Adoption Horizon: Four to Five Years

Learning analytics promises to harness the power of advances in data mining, interpretation, and modeling to improve understandings of teaching and learning, and to tailor education to individual students more effectively. Still in its early stages, learning analytics responds to calls for accountability on campuses across the country, and leverages the vast amount of data produced by students in day-to-day academic activities. While learning analytics has already been used in admissions and fund-raising efforts on several campuses, "academic analytics" is just beginning to take shape.

Overview

Learning analytics refers to the interpretation of a wide range of data produced by and gathered on behalf of students in order to assess academic progress, predict future performance, and spot potential issues. Data are collected from explicit student actions, such as completing assignments and taking exams, and from tacit actions, including online social interactions, extracurricular activities, posts on discussion forums, and other activities that are not directly assessed as part of the student's educational progress. Analysis models that process and display the data assist faculty members and school personnel in interpretation. The goal of learning analytics is to enable teachers and schools to tailor educational opportunities to each student's level of need and ability.

At its heart, learning analytics is about analyzing a wealth of information about students in a way that would allow schools to take action. This information can include student profiles within an institution's database, as well as the interactions of students within course management systems. A long absence from a course's online activities, for example, can trigger faculty intervention. At its best, however, learning analytics goes much further than this, marrying information from disparate sources to create a far more robust and nuanced profile of students, in turn offering faculty members more insight.

Learning analytics need not simply focus on student performance. It might be used as well to assess curricula, programs, and institutions. It could contribute to existing assessment efforts on a campus, helping provide a deeper analysis, or it might be used to transform pedagogy in a more radical manner. It might also be used by students themselves, creating opportunities for holistic synthesis across both formal and informal learning activities.

While EDUCAUSE has announced a major program in partnership with the Gates Foundation, the Hewlett Foundation, and others that identifies learning analytics as one of five key areas for development, it is still very early and most of the work in this area is conceptual. Learning analytics also faces some challenges. It requires combining data from disparate sources, often in different formats. It also carries with it concerns about student privacy and profiling, as well as the sense that students are being reduced to information and numbers. Indeed, learning analytics to date generally falls within the purview of IT departments. For the information and its use to be more productive within curricula and pedagogy, faculty will need both to understand its technical potential, as well its pedagogical usefulness. These challenges will need to be addressed as the work moves forward. The potential for learning is clear, but the technology to deliver that potential is still very young.

Relevance for Teaching, Learning, Research, or Creative Inquiry

Learning analytics in higher education has centered primarily on identifying at-risk students who can then receive attention to avoid failure in a particular course. The Signals project at Purdue University is an exemplary instance of this use. Initiated in 2007, Signals gathers information from SIS, course management systems, and course gradebooks to generate a risk level for students, and those designated as at-risk are targeted for outreach.

The larger promise of learning analytics, however, is that when correctly applied and interpreted, it will enable faculty to more precisely identify student learning needs and tailor instruction appropriately. This has implications not simply for individual student performance, but in how educators perceive teaching, learning, and assessment. By offering information in real time, learning analytics can support immediate alterations, suggesting a model of curriculum that is more fluid and open to change.

There are currently several kinds of tools for learning analytics including those that might be adapted for educational purposes, and those developed specifically to connect with existing educational tools. Commercial applications include Mixpanel analytics, which offers real-time data visualization documenting how users are engaging with material on a website. Similarly, Userfly, designed for usability testing, provides the ability to record the behavior of visitors to websites, and then play it back for analysis. Moving in a different direction, Gephi is a free, open source interactive visualization and exploration platform described as "Photoshop but for data." It is connected to exploratory data analysis.

Among the tools developed specifically for learning analytics is Socrato, an online learning analytics service that generates diagnostic and performance reports. SNAPP (Social Networks Adapting Pedagogical Practice), developed by the University of Wollongong in Australia, is a tool designed to expand on the basic information gathered within learning management systems; this information tends to center on how often and for how long students interact with posted material. SNAPP instead visualizes how students interact with discussion forum posts, giving significance to the socio-constructivist activities of students.

Perhaps one of most compelling aspects of learning analytics centers on collaborations between IT staff and faculty, or those working in computer science and HCI, and those working in non-computational disciplines. At Ball State University, for example, computer science professor Paul Gestwicki and English professor Brian McNely are co-developing software for enhancing collaborative knowledge work. Using current theories of learning, rhetoric, writing, and human-computer interaction, the pair is designing an interactive visualization system with the goal of providing a richer understanding of collaboration and a framework for more effective evaluation of the collaborative process within writing.

The explosion of data has offered access to tremendous amounts of information, and one of the challenges for educational institutions centers on how best to keep pace with the tools used for processing and interpreting this data in the fields of business, marketing, and entertainment. Learning analytics offers one direction, with considerable potential to enhance teaching, learning, and assessment if used with sophistication and in tandem with productive theories of contemporary learning practices.

A sampling of applications of learning analytics across disciplines includes the following:

- **Education.** Students in education programs can utilize learning analytics to incorporate into their pedagogy when they leave the academy. The use and study of analytics in their coursework can better prepare them to be leaders in this emerging area of education.
- **Instructional Technology.** Instructional technologists can use learning analytics to help educators design systems and approaches to better measure student outcomes and faculty development. These approaches can help lead the way to new ways of thinking and new technologies to better track, visualize, and mine data for application in learning analytics.
- **Nursing.** By analyzing the access patterns of students watching online videos captured from class lectures, the College of Nursing at The Ohio State University is able to track who is watching videos, how much they are viewing, and how they are viewing the content.

Learning Analytics in Practice

The following links provide examples of how learning analytics are being used in higher education settings.

Academic Early Alert and Retention System

http://www4.nau.edu/ua/GPS/student/

Northern Arizona University uses a guidance system for students aimed at improving student academic success and retention. The system provides feedback to students in four areas (attendance, grade, academics, and positive feedback). Depending on the feedback given, students are given options and pointed to resources to help them improve.

Learning Analytics — Visualizing Collaborative Knowledge Work

http://emergingmediainitiative.com/project/learning-analytics/

The Visualizing Collaboration Knowledge Work project at Ball State University is designed to visualize collaborative writing processes in order to support stronger formative evaluation.

Scribd Stats

http://blog.scribd.com/2010/11/19/scribd-stats-reading-the-numbers-between-the-lines/

Scribd, a document sharing hub, has created a feature that it describes as "Google Analytics for documents" due to its ability to measure in greater detail how differing documents, presentations, and files are being used.

Signals — Stoplights to Student Success

http://www.itap.purdue.edu/tlt/signals/

The Signals system at Purdue University provides tools for faculty to identify and help students through analytical data mining.

SNAPP—Social Networks Adapting Pedagogical Practice

http://research.uow.edu.au/learningnetworks/seeing/snapp/index.html

The University of Wollongong in Australia uses SNAPP, a software application that visualizes data from discussion forum posts to allow faculty to perceive behavioral patterns.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about learning analytics.

7 Things You Should Know About Analytics

http://net.educause.edu/ir/library/pdf/ELI7059.pdf

(*Educause,* April 2010.) This brief report explains how analytics are used for teaching, learning and assessing student progress.

Academic Analytics: A New Tool for a New Era

http://net.educause.edu/ir/library/pdf/erm0742.pdf

(John P. Campbell, Peter B. DeBlois, and Diana G. Oblinger, *Educause Review,* July/August 2007.) The authors give an overview of learning analytics citing several case studies along with a discussion of the challenges and promise of incorporating analytics into the higher education landscape.

A Case for Nudge Analytics

http://www.educause.edu/library/EQM1047

(Colleen Carmean and Philip Mizzi, *Educause Quarterly Review,* 33, no.4, 2010) Taking a cue from observations of consumer behavior, the authors suggest the nudge principle can be deployed in education to subtly influence learner behavior without taking away freedom of choice.

Delicious: Learning Analytics

http://delicious.com/tag/hz11+learninganalytics

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What Are Learning Analytics?

http://www.elearnspace.org/blog/2010/08/25/what-are-learning-analytics/

(George Siemens, *eLearnspace.org,* 25 August 2010.) George Siemens explains learning analytics and how it can be applied by learning institutions and used much the way other web analysis tools are used to interpret online data.

METHODOLOGY

All editions of the *Horizon Report* series are produced via a carefully constructed qualitative research process that draws on the input of a diverse group of people representing a range of backgrounds, nationalities, and interests. This group, known as the Horizon Project Advisory Board, is reconstituted annually and with each new edition, with at least one third of the group being new to the process each year to ensure a fresh perspective. To date, more than five hundred internationally recognized practitioners and experts have participated in the Horizon Project as a member of an Horizon Project Advisory Board.

With each new edition, the board begins by examining a broad range of primary and secondary references, trend reports, and technological innovations, along with the challenges they pose on college and university campuses. Starting with a broad overview, the board moves systematically toward a final list by examining each technology, trend, and challenge in increasing detail using a modified Delphi process. Using an extensive archive of materials, the board members comment on, and add to, the materials, focusing specifically on higher education and the potential relevance of varying technologies for teaching, learning, or creative inquiry. Conversations emerge within the wiki as participants annotate the materials. RSS feeds from dozens of relevant publications continue to supply up-to-the-minute updates, and ensures that background resources stay current as the project progresses.

Following the review of the literature, each Advisory Board member engages in the heart of the project by answering the research questions that are at the core of the Horizon Project. These questions are tailored to the focus of each edition and are designed to elicit a comprehensive listing of interesting technologies, challenges, and trends from the Advisory Board:

1. *Which of the key technologies catalogued in the Horizon Project Listing will be most important to teaching, learning, or creative inquiry within the next five years?*
2. *What key technologies are missing from our list? Consider these related questions:*
   - *What would you list among the established technologies that some educational institutions are using today that arguably all institutions should be using broadly to support or enhance teaching, learning, or creative inquiry?*
   - *What technologies that have a solid user base in consumer, entertainment, or other industries should educational institutions be actively looking for ways to apply?*
   - *What are the key emerging technologies you see developing to the point that learning-focused institutions should begin to take notice during the next four to five years?*
3. *What trends do you expect to have a significant impact on the ways in which learning-focused institutions approach our core missions of teaching, research, and service?*
4. *What do you see as the key challenge(s) related to teaching, learning, or creative inquiry that learning-focused institutions will face during the next five years?*

Each board member answers these questions systematically, making sure to engage the full range of relevant topics. The *Horizon Report* process then moves to a fast-paced ranking period that uses an iterative Delphi-based methodology to discern consensus. In the first step, the responses to the research questions are systematically ranked and placed into adoption horizons by each Advisory Board member using a multi-vote system that allows members to weight their selections. Each member is asked to also identify the timeframe during which they feel the technology would enter mainstream use — defined for the purpose of the project as about 20% of institutions adopting it within the period discussed. (The 20% figure is based on the research of Geoffrey A. Moore and refers to the critical mass of adoptions needed for a technology to have a chance of entering broad use.) These rankings are compiled into a collective set of responses, and inevitably, the ones around which there is the most agreement are quickly apparent.

The first round of voting reveals the twelve highest-ranked technologies — four per adoption horizon. These twelve are further researched and expanded, with attention to the ways in which the technologies might be used in teaching, learning, and creative inquiry. Significant attention is paid to this research, examining not only existing applications for each area, but also potential uses in the near future.

For every edition, when that work is done, each of these twelve topics is then written up in the format of the *Horizon Report,* in an interim document referred to as the "short list." With the benefit of the full picture of how each topic will look in the report, the twelve items on the "short list" is then ranked yet again, this time in reverse. The six technologies and applications that emerge are those detailed in the *Horizon Report*.

For additional detail on the *Horizon Project* methodology or to review the actual instrumentation, the ranking, and the interim products behind the report, please visit http://horizon.wiki.nmc.org. For more information on the *Horizon Project Navigator,* please visit http://navigator.nmc.org/.

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