

Designing Meaningful Developmental Reform

The Problem

In the United States, 60 percent of recent high school graduates enter community college already behind.¹ These students are required to take remedial or developmental education courses before enrolling in college-level courses; in some cases, students are referred to two, three, or even four semesters of developmental education.

However, recent evidence suggests that this system is not as effective as colleges might hope. While the annual cost of providing remediation to all college students nationwide has been estimated at more than \$7 billion,² many developmental education students never successfully progress to and through college-level courses.

The Opposing Forces

Despite the low success rates for remedial students, those who attempt to reform developmental education often feel their efforts are thwarted by administrators or faculty who seem dead set against change. These innovators tend to dismiss objections to developmental education reform as springing from shortsightedness or obstinacy. In fact, skeptics frequently have legitimate concerns that, if addressed, can lead to more successful reforms.

To delineate the conflicting motivations that shape developmental education reform efforts, CCRC researchers developed an “opposing forces” framework. This framework explicates three sets of tensions—system-wide consistency versus institutional autonomy, efficient versus effective assessment, and supporting student progression versus maintaining academic standards—that often work at cross-purposes and stymie efforts to create a more effective remedial system.³

About This Practitioner Packet

Designing Meaningful Developmental Reform summarizes the issues and concerns underlying each pair of opposing forces, lays out relevant data, and presents a case study for each tension illustrating how a community college has worked to reconcile that particular tension.

By addressing each of these tensions, this review seeks to help colleges embark on a fruitful and effective process of reform. It can serve as a conversation starter and guide, allowing administrators and faculty to speak candidly with one another in a context that allows those involved to bring their concerns out into the open and work through them together.

Once these conversations happen, colleges can develop strategies for developmental reform that are embraced by stakeholders at all levels of the community college system.

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Tension One: Institutional Autonomy Versus System-Wide Consistency

Community Colleges Often Resist Centralized Assessment and Placement Policies

Community college districts and state systems often try to establish consistent, centralized remediation policies that will strongly support student success. However, when it comes to assessment and placement, there is little evidence to support any given policy over another. For example, there is no clear placement exam score above which students reliably perform well in college-level courses and below which students reliably fail. The association between test scores and performance increases in a gentle curve.

The absence of clear-cut answers as to the most effective policies, twinned with the fact that colleges tend to believe they have the best understanding of their own students' needs, often pushes individual community colleges to resist centralized remediation policies—such as centrally mandated cutoff scores—and to instead pursue their own approaches to assessment and placement.

The Case for Autonomy

In decentralized community college systems, individual institutions typically retain the autonomy to choose their own placement exams and cutoff scores, to determine whether developmental education is required or merely recommended, and to design their own developmental education course sequences. Such flexibility may allow each institution to tailor a developmental system that works as effectively as possible for its particular mix of students.

Decentralized systems can create confusion or even inequity through inconsistent standards.

The Case for System-Wide Consistency

However, decentralized systems can create confusion or even inequity through inconsistent standards. A study of one state, for example, found that because of variation in cutoff scores and remediation requirements among colleges, a given individual might have only a 20 percent chance of being placed into remedial classes at one community college but a 90 percent chance at another.⁴

Proponents of consistency argue that differing standards across colleges send a confusing message to high schools about what it means to be college ready. They also point out that a common standard makes it easier for systems to track student performance across colleges and facilitates the process of transfer between colleges.⁵

The Tension

Regardless of how centralized a system is, CCRC research suggests that individual colleges often find ways to exert autonomy over their own developmental policies and programming. If the central policy were objectively correct, then such autonomy would be counterproductive. However, as it stands now—with no consensus or clear understanding of what the optimal policy might be—

enforced consistency across a system may guarantee nothing more than *uniform implementation* of an *ineffective policy*. Until an optimal policy can be established and validated, colleges may feel that resisting consistency and designing their own policies is the only rational strategy.

To overcome this tension and create a single policy that all member colleges feel comfortable enacting, consistency should be created through cross-college collaboration and discussion rather than through an externally imposed fiat. In the following section, we describe how one state, New Jersey, set about creating system-wide consistency.

The Case of New Jersey: Reconciling Autonomy and Consistency⁶

New Jersey's Community Colleges

New Jersey has 19 community colleges that serve about 250,000 credit students annually. The colleges are not part of a centralized system; instead, they work together through a system of “coordinated autonomy,” facilitated by the New Jersey Council of County Colleges. A variety of groups—the presidents’ council, academic affairs officers, and faculty associations—meet periodically to collaborate and make recommendations about policy and practice.

“If it was just the presidents who voted it in, they would go back and have a mutiny...You have to have grassroots buy-in. You have to give everyone time to digest. Then you have to give them opportunity to give feedback. It was the academic officers’ job to go back and make sure that this was showing up in department meetings...The final decision was made at the presidents’ council but not without the complete confidence of the academic officers and faculty.”

– New Jersey community college administrator

Prior to 2008, placement tests and cutoff scores in the state varied widely. The momentum to standardize policies came from two legislative developments in higher education. First, in 2004, a state scholarship program, the New Jersey Student Tuition Assistance Reward Scholarship (NJ STARS), was created to cover full community college tuition for students who met college readiness standards. Community college leaders immediately recognized that their divergent tests and cutoff scores would complicate the scholarship awards process.

Then, in 2007, legislation was passed guaranteeing junior status to community college students who earned an associate degree and were admitted to a public, four-year college. In anticipation of this legislation, the presidents’ council was asked to demarcate a set of transferable courses, and community colleges began a review process to ensure consistent statewide standards. This process further increased awareness of the wide variation in college-level entrance standards across the state.

The Process of Change

The first step in the standardization process was to agree on a single testing instrument. The decision to use the ACCUPLACER assessment, made by the presidents’ council, was a relatively easy one; the College Board agreed to lower the price of ACCUPLACER, which was already widely used, if the test were adopted statewide.

The first step in the standardization process was to agree on a single testing instrument.

After choosing ACCUPLACER, the academic officers formed math and English faculty subcommittees to establish consistent statewide cutoff scores and test exemption policies. The committees consisted of math and English faculty members from each of the community colleges, as well as testing coordinators and institutional researchers who contributed recommendations about testing procedures and follow-up studies.

Standardizing Math

The math faculty committee met twice over the course of one year to decide on the SAT exemption cutoff and the placement exam cutoff that would place students into Intermediate Algebra (the first college-level class at most colleges or the highest remedial course for STEM students at some) or Elementary Algebra (the highest level remedial class). The decisions were based largely on compromise: Faculty selected scores that fell between the lowest and highest SAT and placement exam cutoff scores used by colleges.

There was some discussion of curriculum in these meetings as well. The committee used the ACCUPLACER technical manual to understand how different placement exam cutoffs aligned with algebra competencies and to ensure that the cutoff score they chose represented the dividing line between Elementary and Intermediate Algebra.

In a series of faculty-initiated follow-up meetings, math faculty took a deeper look at their Elementary Algebra curriculum and agreed on 80 percent of the content. The remaining 20 percent was left for faculty at individual colleges to decide on. Math faculty from a majority of the colleges voted to adopt the policies.

Standardizing English

The English committee met numerous times over two years. They first decided on the SAT exemption requirements but disagreed over which parts of the ACCUPLACER to use—the reading comprehension, sentence skills, and/or written essay portions—and whether the essay should be graded by human readers or a computer.

The group eventually agreed that colleges could use the ACCUPLACER essay or a local assessment essay, but that they had to use the ACCUPLACER rubric to grade the essay and had to use a uniform cutoff score.

The English committee attached a stipulation that each college's institutional research office would track students' grades in English Composition for three years in order to assess the score's reliability in predicting student performance in college-level courses. The new policies were approved by the presidents and were implemented by most colleges.

Statewide Adoption and Support

Across the state, there was widespread support for the standardization process. This support stemmed from three factors. First, there was agreement on the need for consistent statewide policies even when there were challenging ramifications: Colleges that increased their cutoffs experienced larger enrollments in developmental coursework, while colleges that decreased their cutoffs saw an increase in introductory college course enrollment.

Second, the process was “bottom-up”: The decisions came straight from faculty on the subcommittees. Academic officers then brought these decisions to departmental meetings to ensure

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broad support from those not directly involved in the process.

Third, since the state is decentralized, institutions continued to exercise their flexibility to make the new policies work for their specific context. For example, although all colleges adopted the math policies, a few larger colleges have supplemented the statewide English assessment with additional assessment measures.

Ongoing Reform

Perhaps the most important outcome of New Jersey's standardization process is that it has enabled administrators and faculty to think more critically about developmental assessment and placement at their colleges. As a result, New Jersey is experiencing a fruitful period of ongoing review and reform.

After the new policies were implemented, many administrators and faculty felt the reforms should have gone further. Some expressed a desire to incorporate multiple measures; others wanted more diagnostic assessments.

Consequently, more changes are on the horizon for the state. A number of New Jersey's community colleges have begun utilizing "decision zones"—a range of scores below the state-agreed-upon cutoff scores within which colleges can use additional measures to determine placement.

The state will track outcomes for the different measures and use their findings to further inform statewide policy improvements. Additionally, the New Jersey Department of Education plans to match high school graduation and college readiness standards. Under this system, students who meet proficiency levels on the state high school exit exam, SAT, ACT, or newly developed end-of-course assessments will be permitted to enroll directly in college coursework.

Resolving the Tension

The new policy served to reconcile the tension between consistency and autonomy by creating a state policy framework that gives colleges autonomy to be responsive to their student body. New Jersey's experience also demonstrates that efforts to create consistent developmental policies can prompt deeper thinking, ongoing discussions, and further reform.

More broadly, it is important to note that consistency across colleges can still allow for flexibility in readiness standards across programs. For example, in the Wisconsin Technical College System, nursing admissions standards are consistent across the state but are different (typically higher) than those for other programs of study.

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Tension Two: Efficient Versus Effective Assessment

The Need for Efficiency Often Results in Ineffective Placement Practices

Community colleges must evaluate the college readiness of thousands of incoming students every year. To do this quickly and inexpensively, almost all use standardized, computer-adaptive placement tests. These exams are extremely efficient in the short term: They can be administered quickly, scored by computer, and almost instantaneously applied to determine the placement for each student. Yet this short-term efficiency goes hand-in-hand with high rates of student misplacement,⁷ calling into question the effectiveness of the exams and ultimately the long-term efficiency of the system.

Two recent CCRC studies⁸—one of a large urban community college system and one of a statewide community college system—confirm that the most commonly used standardized placement tests are not yielding placement accuracy rates that students and administrators might wish for. The two studies found that using test scores alone to make placement decisions resulted in large numbers of “severe placement errors.”

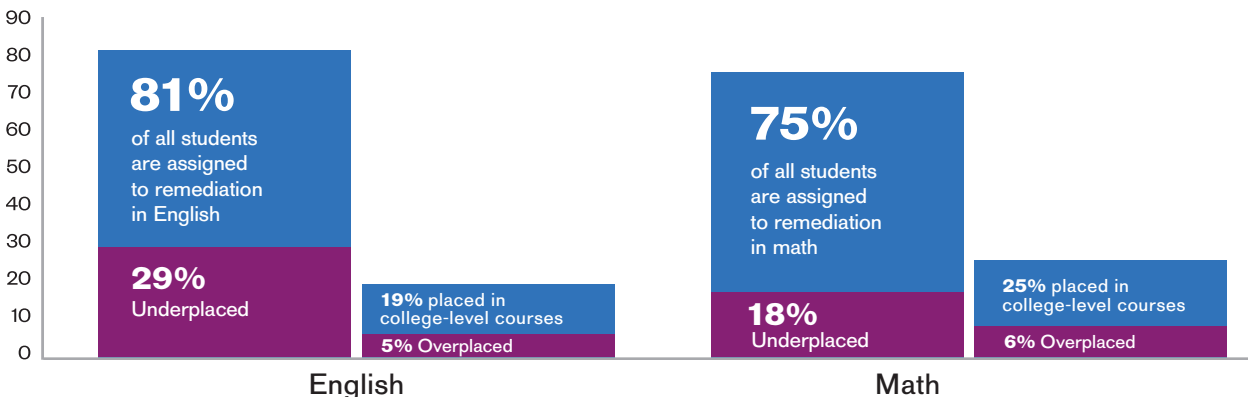
Using test scores alone to make placement decisions resulted in large numbers of “severe placement errors.”

WHAT IS A “SEVERE PLACEMENT ERROR”?	
SEVERE UNDERPLACEMENT	SEVERE OVERPLACEMENT
A severe underplacement signifies placing a student in developmental education who is predicted to get a B or better in a college-level course.	A severe overplacement signifies placing a student in a college-level course who is predicted to fail there.

High Rates of Severe Underplacement Errors

The urban system uses the COMPASS placement test. During the period of study, 81 percent of tested students were assigned to English remediation and 75 percent of tested students were assigned to math remediation based on their COMPASS scores. CCRC’s analysis disaggregated percentages of students predicted to have been underplaced and overplaced. The analysis suggests that a far greater number of students were severely underplaced than overplaced.⁹

Urban System: Tested Students Severely Underplaced and Overplaced¹⁰



High School Grades May Improve Placement Accuracy

Because of the variation in school quality and grading standards, many are skeptical that high school grade point average (GPA) can be used as a standardized measure of college readiness. However, the analyses of both the state and urban system data suggest that including high school GPA as a measure of students' ability could improve placement accuracy.

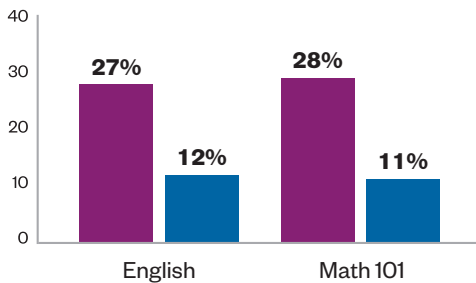
In the state system, where students can take either the ACCUPLACER or COMPASS for placement, up to one third of entering students were severely misplaced (both over- and underplaced) based on English test scores, and more than a quarter of students were severely misplaced based on math test scores. However, using students' high school GPA to make placement decisions was predicted to significantly reduce severe error rates.¹¹

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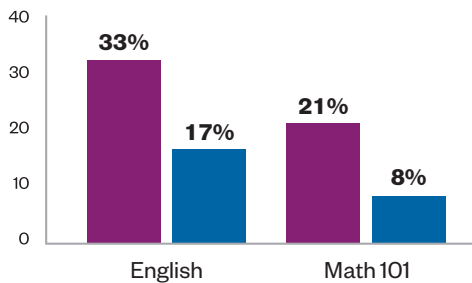
State System: Severe Placement Error Rates Using Placement Test Versus High School GPA¹²

■ Placement Test ■ High School GPA

COMPASS Test vs. High School GPA



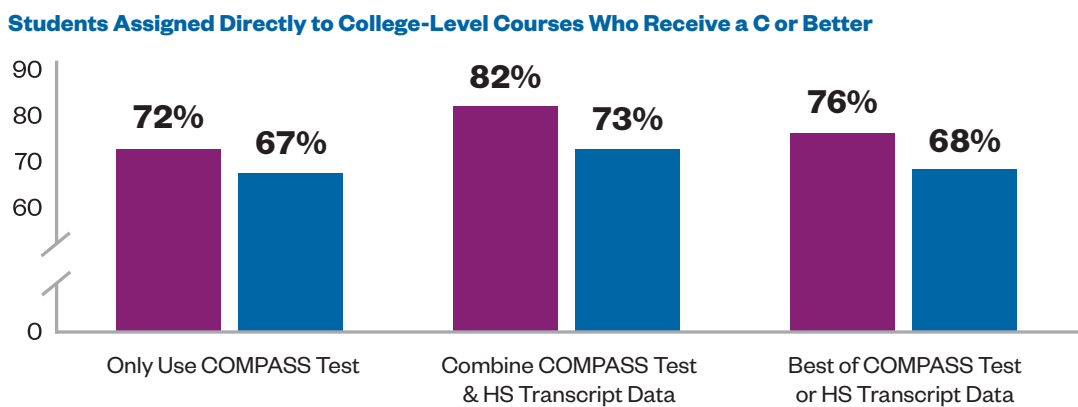
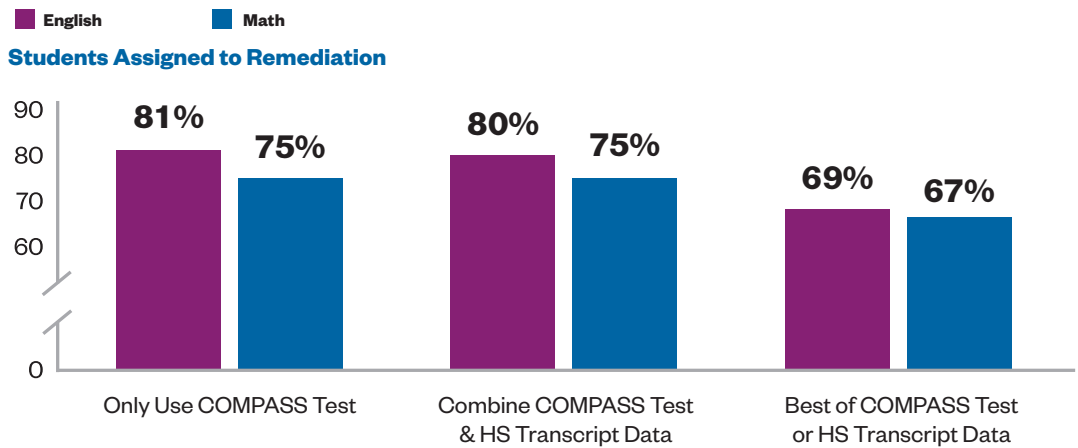
ACCUPLACER Test vs. High School GPA



In the urban system, using high school transcript data (GPA and math/English units completed) alone did not dramatically alter placement errors. However, using high school data combined with test scores was predicted to lower severe placement errors by 3 to 4 percentage points. Using the *best of* either high school transcript information *or* assessment test scores was predicted to lower severe placement errors by up to 5 percentage points.

Using the best of either high school transcript data or test scores was also predicted to significantly lower the rate at which students would be assigned to remediation. Using the best of high school transcript data or test scores would not only send more students immediately into college-level classes, but it would also maintain or increase the success rates of students in those classes.¹³

Urban System: Using Best of Test Scores or High School Transcript Data Reduces Remediation Rates While Maintaining or Improving College-Level Success Rates¹⁴



Why Are the Tests So Weakly Predictive?

Several factors may explain the weak predictive powers of commonly used placement tests. First, the exams are short and are intended to assess only a narrow set of academic skills; they cannot account for motivation, commitment, and other factors that contribute to success in college. High school GPA may be effective in this regard because it is a cumulative measure of student achievement and can signal competencies beyond English and math skills.

Second, students typically do not understand the consequences of scoring below the cutoff. As a result, many students do not prepare for the exam, and their performance may not be an accurate measure of their true level of academic readiness.

Third, the test content is often not aligned with what students need to know to succeed in their first college-level courses. For instance, math placement exams typically include topics that are beyond what students need to know to pass many math courses designed for liberal arts majors.

More broadly, placement tests are not designed to capture the mathematics, reading, and writing skills that students need to succeed in key introductory college-level courses in their area of study, such as history, sociology, and biology. Thus, the tests are likely to be of little use in determining the likelihood of success in introductory-level courses overall.

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The Tension

Community colleges are aware that these standardized tests are imperfect, but the necessity of efficiently assessing and placing so many students at the start of each semester makes them reluctant to explore more effective alternatives. To understand how colleges might approach implementing a more effective exam while preserving short-term efficiency, we examine how the City University of New York (CUNY) community colleges developed and implemented a new writing assessment test.

The Case of CUNY: Reconciling Efficiency and Effectiveness

CUNY's Assessment System

CUNY's six community colleges are part of a larger, centralized system. All colleges use the same tests to assess and place students: the COMPASS for math and reading and, until recently, the CUNY/ACT exam for writing. Overall, the process is extremely efficient. Each year, about 30,000 students are assessed and placed; 75 percent of these students are assigned to one or more remedial courses.¹⁵

CUNY's Old Writing Exam

Among English faculty, there had been widespread discontent with the writing exam. The exam required students to write a persuasive letter to a policymaker endorsing one of two policy options.

Faculty pointed out that the skills necessary for writing the persuasive letter did not align with the skills needed to succeed in introductory English in several ways: (1) The prompts typically had no connection to the students' lives or studies, whereas in a class, students would be asked to write about content they were studying; (2) a typical writing assignment in an English class would permit more rhetorical devices than the exam allowed; and (3) to score well, students had to follow a formulaic approach that did not reflect the approach one must take to write a successful essay in a typical English course.

At CUNY, students have to retake the assessment test and pass it before they can exit developmental education. As a result, instructors felt boxed in. They could "teach to the test" and risk having their students do poorly in college-level English, or they could prepare their students for college-level English and risk having some of them perform poorly on the exit exam.

Because of these problems, the CUNY faculty designed a new CUNY-wide writing exam, the CUNY Assessment Test in Writing, which was recently implemented.

The necessity of efficiently assessing and placing so many students at the start of each semester makes colleges reluctant to explore more effective alternatives.

"These students do just enough to pass that test. So when they get to college-level English and they have to write an expository essay that involves reading and responding to a reading, they are at a loss...But they mastered that little argumentative essay they needed to pass the ACT. So, the students are frustrated again because they say, well, I passed the ACT, so why am I not doing well in college-level English?"

– CUNY English faculty member

The New CUNY Writing Exam

The new exam developed by CUNY’s English faculty addressed several drawbacks of the ACT writing test. First, the exam requires students to respond to a reading—an approach that is similar to the type of writing expected of students in college English. Second, students are allowed to use a wider array of rhetorical devices to respond to the prompt. For example, the previous exam strongly discouraged reflecting on the prompt using personal experience; as a result, this rhetorical tool was typically not taught in developmental writing.

Finally, rather than providing only one holistic score, readers rate several different aspects of writing quality, allowing for a more diagnostic set of results. The new writing exam now yields five separate scores: (1) critical response to writing task and the text; (2) development of writer’s ideas; (3) structure of the response; (4) language use: sentences and word choice; and (5) language use: grammar, usage, and mechanics.

Overall, faculty feel the new writing exam is more effective because it is aligned with the skills necessary to succeed in college-level English, and it provides important diagnostic information about students’ strengths and weaknesses. At the same time, the test has lost nothing in efficiency: Faculty report that it takes only marginally longer to grade than the old ACT writing exam.

Resolving the Tension

CUNY’s new writing exam demonstrates that an exam can remain efficient while incorporating more diagnostic value. However, for these diagnostic exams to be worth the small tradeoff in efficiency, the additional information they provide must be used to provide more effective treatment.

At CUNY, developmental English faculty members are beginning to use students’ scores on the exam to guide instruction. For example, an instructor who finds that a large portion of her class performed well on language use skills but poorly on their critical response to the reading may incorporate more intensive reading comprehension instruction into her course and de-emphasize grammar instruction. Because of its clear alignment with college-level English, faculty use the exam as both the midterm and the final—alternating the readings and questions but grading with the same rubric.

Further, colleges with a diagnostic writing exam could require a lab component for each developmental writing course, in which students receive additional support in identified areas of weakness. Modularized or diagnostic exams could also be leveraged to support differentiated readiness standards and developmental curricula across areas of study, a tactic that North Carolina and Virginia are currently pursuing.

Because of its clear alignment with college-level English, faculty use the new exam as both the midterm and the final.

Tension Three: Supporting Student Progression Versus Maintaining Academic Standards

Efforts to Uphold Standards Often Trump Supporting Progression

Nationwide, there is an ongoing push to improve college completion rates. Community college faculty and administrators support this effort to help more students graduate; they want their students to succeed. However, they are concerned that in order to meet institutional completion goals, they may be pressured to inflate student grades and “pass through” underachieving students.

Assessment and placement policies indicate that in practice, trying to maintain standards often trumps supporting progression. Research on placement exam accuracy finds that cutoffs are set such that many more students are underplaced than overplaced.¹⁶

This tendency to underplace students suggests that college administrators and practitioners would rather try to uphold standards by setting relatively high cutoff scores than risk overplacing students and having to maintain standards in a classroom of students with a wider range of skills.

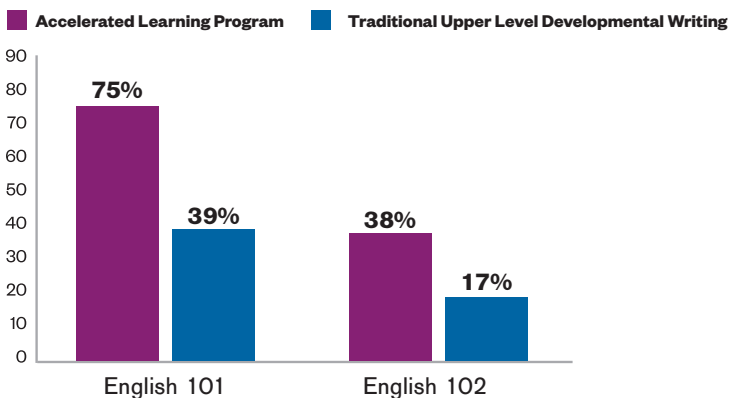
Supporting Student Progression: The Model of Acceleration

Colleges often feel ambivalent about implementing changes that might improve student progression but could possibly undermine academic quality. Mounting evidence suggests, however, that accelerated developmental models—such as shortening developmental sequences and mainstreaming upper level developmental students into college-level courses with mandatory supports—lead to improved outcomes for these students.

For example, a CCRC study of the Community College of Baltimore County’s (CCBC) Accelerated Learning Program (ALP)—which mainstreams upper level developmental writing students into college-level courses and simultaneously enrolls them in a mandatory support course taught by the same instructor—tracked ALP students for up to four years and found they were far more likely to complete English 101 (the first college-level composition course) and English 102 (the second college-level course) than similar students who enrolled in the traditional upper level developmental writing course.¹⁷

Mounting evidence suggests that accelerated developmental models lead to improved outcomes for students.

College-Level Course Completion Rates at CCBC¹⁸



Other CCRC studies of acceleration strategies have found positive results across both math and English for students with a range of developmental needs.¹⁹

The Tension

Community college faculty members are generally passionate about student success and willing to experiment with promising ways to improve it. However, some faculty members are wary of acceleration strategies because they are concerned that students will not learn as much in a shortened developmental sequence, or that students mainstreamed into college-level courses will struggle to keep up. Either approach, they fear, could force instructors to make an uncomfortable choice: Relax standards, or fail large numbers of students.

How can colleges reconcile these seemingly conflicting goals and concerns? In the next section, we review an accelerated English alternative at Chabot College in California to see how the college worked to implement a system that both supports student progression and upholds standards in college-level courses.

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The Case of Chabot College: Reconciling Standards and Progression

Developmental English at Chabot

Chabot College, a suburban community college in northern California, is part of the California Community College System. It uses ACCUPLACER to assess incoming students for their remedial reading and writing needs. In fall 2011, 74 percent of tested students were assigned to remedial English.²⁰

Chabot's English department offers two pathways to students who test below the cutoff required to enroll in the first college-level English course, English 1A. Students may choose either a two-semester remedial sequence or an accelerated alternative that teaches similar content compressed into one semester.

Integrated Reading/Writing and Core Principles

The formation of Chabot College's current developmental English offerings began in the early 1990s, when a grant provided the opportunity and resources for the department to design a curriculum that integrated reading and writing in all English courses.

English faculty undertook the redesign of their curriculum by separating into working groups that investigated various approaches to reading and writing integration. The working groups met over two quarters and developed the new curriculum in the third quarter. Over the course of these meetings, faculty members identified a series of core principles—or “articulated assumptions”—to guide the curriculum across the department.

These principles state that remedial students should practice the same reading, writing, and thinking skills they encounter at the college level. Consequently, students in remedial English read and write in response to complex, full-length texts, and instructors engage students in a whole language rather than a hierarchical sentence-to-paragraph approach for reading and composition.

Faculty members developed clear goals for college-level English courses and worked backward to align remedial learning objectives with these goals.

“Our thinking was the best way to prepare them for college-level English was to give them college-level English experiences. We wanted to give them lots of practice, and as much time as they needed. So we were focused on a top-down approach. We called it whole-language or holistic, but it wasn’t grammar versus immersion. It was about bringing in reading and writing, as well as all the communication skills.”

– Chabot College English faculty member

Aligned Learning Goals

To ensure continuity across English courses, faculty members developed clear goals for college-level English courses and worked backward to align remedial learning objectives with these goals. While instructors have flexibility in choosing reading and writing assignments, the common goals and core curricular and pedagogical principles drive the design and instruction of individual courses.

Critically, the department has continuously supported ongoing faculty review of the goals and core principles. These are subject to regular scrutiny and are updated and adjusted to improve instruction.

Introduction of the Accelerated Pathway

The one-semester remedial English course was developed originally as part of a learning community. Remedial English students who were not in a learning community were still required to complete a two-semester sequence.

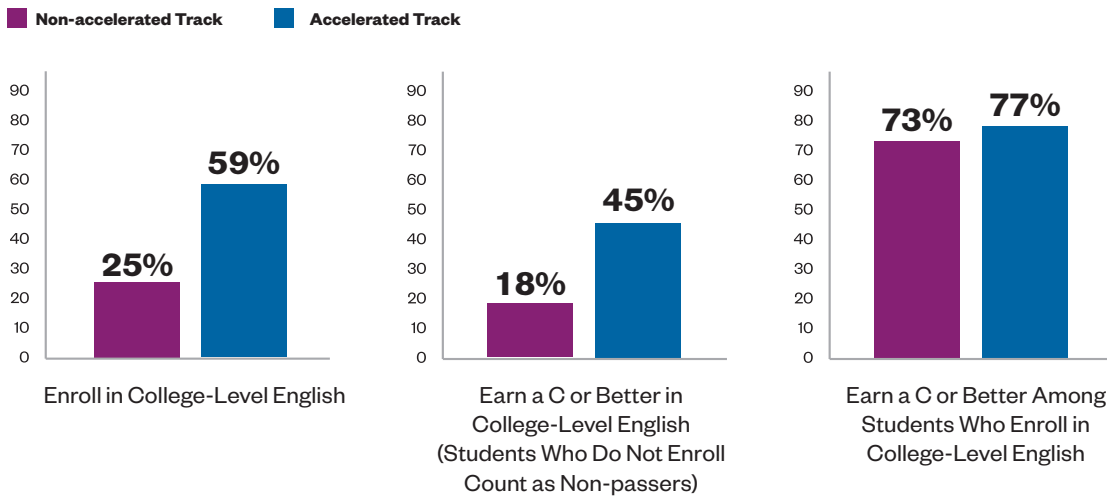
In 1996, faculty members proposed that the college offer an accelerated developmental reading and writing course to all students. Because of the college’s previous experience with a one-semester model, the proposal did not meet strong resistance. Many faculty members felt confident that the department’s established core principles would ensure that standards would be upheld for accelerated students.

However, some faculty believed that certain students would need more time to develop their reading, writing, and “college knowledge” skills, and that these students would benefit from the two-semester course. Accordingly, both options were made available to students.

The accelerated pathway officially appeared on Chabot’s course schedule in fall 1997. CCRC research indicates that those who chose the accelerated pathway were more likely to complete developmental English, enroll in college-level English (English 1A), and pass English 1A than students who chose the non-accelerated pathway.²¹

The higher success rates for accelerated students in college-level English were driven by two factors: Accelerated students were more than twice as likely to enroll in college-level English in the first place; and among students who enrolled in college-level English, they were more likely to earn a C or better.

College-Level English (1A) Enrollment and Pass Rates for Accelerated and Non-accelerated Students One Year After End of Intervention²²



Students at Chabot have the freedom to self-place into the one-semester course or the two-semester option. The accelerated pathway has demonstrated broad appeal to students, and the majority of Chabot’s developmental English students now enroll in the accelerated alternative.

Resolving the Tension

The Chabot example demonstrates the importance of establishing clear learning goals and shared core principles when implementing accelerated remediation models. Because Chabot’s English department had explicitly discussed their assumptions about literacy learning and had studied the available research on best practices in both remedial and college-level courses, faculty members felt confident that standards would be maintained under the accelerated approach.

Acceleration may be even more effective when the curriculum of accelerated developmental classes is tailored to the skills students need to succeed in their program of study. For instance, in Washington State’s Integrated Basic Education and Skills Training (I-BEST) program, basic skills and career-technical instructors co-teach classes that integrate basic skills instruction into a particular program of study. Students participating in this program have demonstrated higher levels of persistence, college credit accrual, and degree attainment.²³

Acceleration may be even more effective when the curriculum of accelerated developmental classes is tailored to the skills students need to succeed in their program of study.

Endnotes

1. Bailey (2009).
2. Scott-Clayton, Crosta, & Belfield (2012).
3. Jaggars & Hodara (2011).
4. Bettinger & Long (2003).
5. Hughes & Scott-Clayton (2011).
6. Hodara, Jaggars, & Karp (2012).
7. Hughes & Scott-Clayton (2011).
8. Belfield & Crosta (2012); Scott-Clayton (2012).
9. Scott-Clayton (2012).
10. Urban system math estimation sample represents 6,100 entrants from 2004–2007. English estimation represents 9,100 entrants from 2004–2007.
11. Belfield & Crosta (2012).
12. State system estimation sample represents student entrants from 2008 and 2009—3,461 students who took ACCUPLACER math, 2,431 who took COMPASS math, 3,333 who took ACCUPLACER English, and 4,780 who took COMPASS English.
13. Scott-Clayton (2012).
14. Scott-Clayton (2012).
15. Jaggars & Hodara (2011).
16. Scott-Clayton (2012).
17. Cho, Kopko, & Jenkins (2012).
18. CCBC data from a sample of 6,137 students who took ENGL052 (the highest level of developmental writing) for the first time from fall 2007 to fall 2010. Analysis controlled for student characteristics including race, gender, age, socioeconomic status, enrollment status in first term, and placement test scores.
19. Jaggars (2012).
20. Data retrieved from Chabot College Office of Institution Research, “English and Math Assessment for New Students: Fall 2011.”
21. Edgecombe, Xu, Barragan, & Jaggars (2012).
22. The Chabot sample consists of 9,824 first-time students who took developmental English during or after the summer of 1999 until fall 2010. The analysis controlled for student characteristics including race, gender, age, socioeconomic status, academic background, and intervention semester information (such as prior credits, GPA, and full- or part-time status).
23. Zeidenberg, Cho, & Jenkins (2010).

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