

Report to Connecticut Community College Stakeholders on the Efficacy of Connecticut Public Act No. 12-40

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Office of Research and System Effectiveness
Connecticut State Colleges and Universities

Background

Passed at the conclusion of the 2012 legislative session, *Connecticut Public Act No. 12-40: An Act Concerning College Readiness and Completion* (hereafter referred to as PA 12-40) aimed to increase the rate of gateway course completion, speed time to completion and reduce the cost of completion for the developmental student population, thereby eliminating the progress and success gaps between developmental and college-ready students. The Connecticut Community Colleges (CCCs) implemented PA 12-40 across all 12 colleges in the Fall 2014 term after a limited pilot program that took place during the Fall 2013 and Spring 2014 semesters.



Not later than the start of the fall semester of 2014 and for each semester thereafter, if a public institution of higher education determines, by use of multiple commonly accepted measures of skill level, that a student is likely to succeed in college level work with supplemental support, the public institution of higher education shall offer such student remedial support that is embedded with the corresponding entry level course in a college level program.

--Section 1(b) of Connecticut Public Act No. 12-40

As implemented, PA 12-40 modified the traditional, prerequisite remedial Math and English curricula by placing the lowest achieving students in “transitional” courses, which aimed to raise students’ math or English skills to high school levels at no cost¹ in tuition and, importantly financial aid. Furthermore, PA 12-40 placed the highest-level developmental students in “embedded” courses. These courses are in fact college-level courses that either A) incorporate an additional faculty member or B) require a supplemental workshop to aid borderline college-ready students’ progress towards college readiness.²

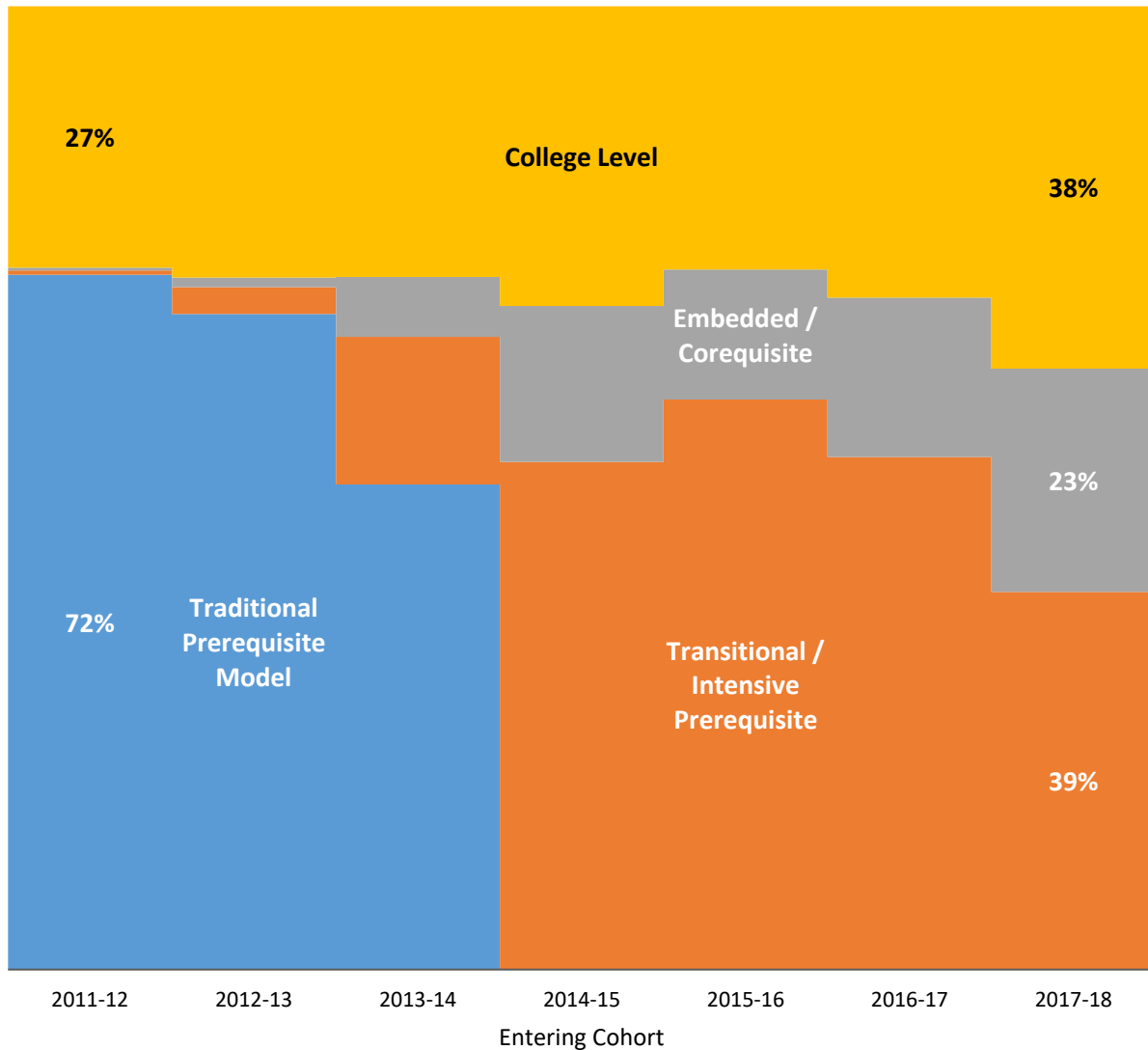
The majority of prerequisite remediation continues to take place in “intensive” courses that most closely resemble the traditional developmental model (in that they are paid courses and are not creditable towards graduation).

¹ One exception here is Naugatuck Valley Community College which, in the Fall and Spring terms, pairs a transitional workshop with a paid intensive-level developmental course for the lowest-testing students.

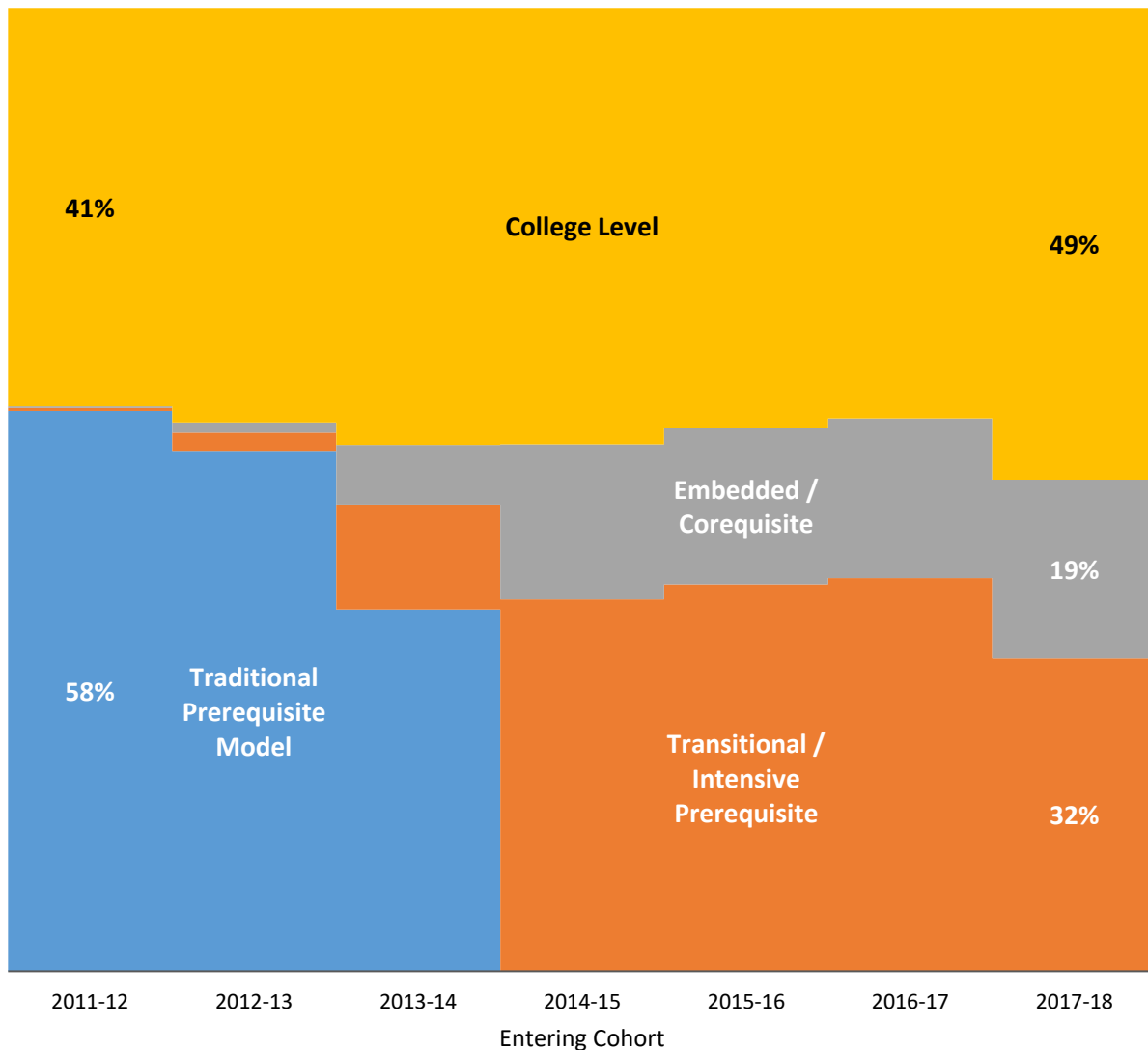
² In this report, the term “embedded” will be used to represent borderline college-ready students in either an embedded or corequisite developmental course, unless otherwise noted.

Since the implementation of PA 12-40 through the 2017-2018 academic year, over 30,000 students have taken embedded/corequisite, intensive or transitional courses in Math and/or English at a Connecticut Community College. The developmental subgroup comprises just over 60% of the associate's-degree-seeking, first-time student population.

Math Placement by Entry Cohort
 First-time, Associate's-seeking Students



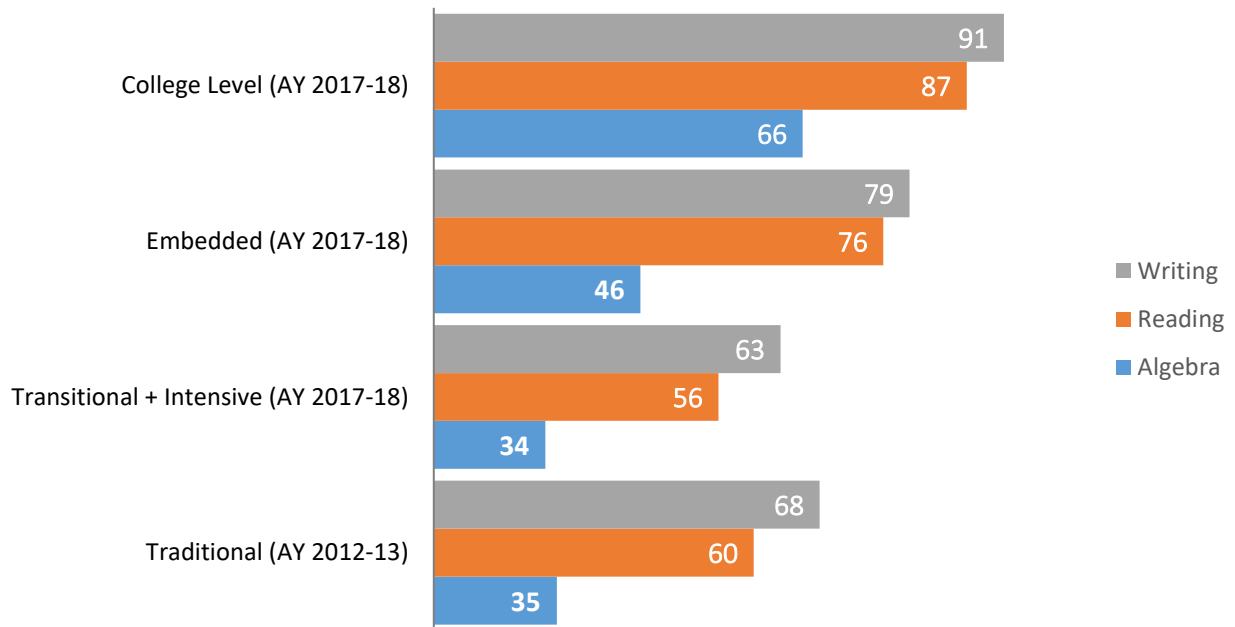
English Placement by Entry Cohort
 First-time, Associate's-seeking Students



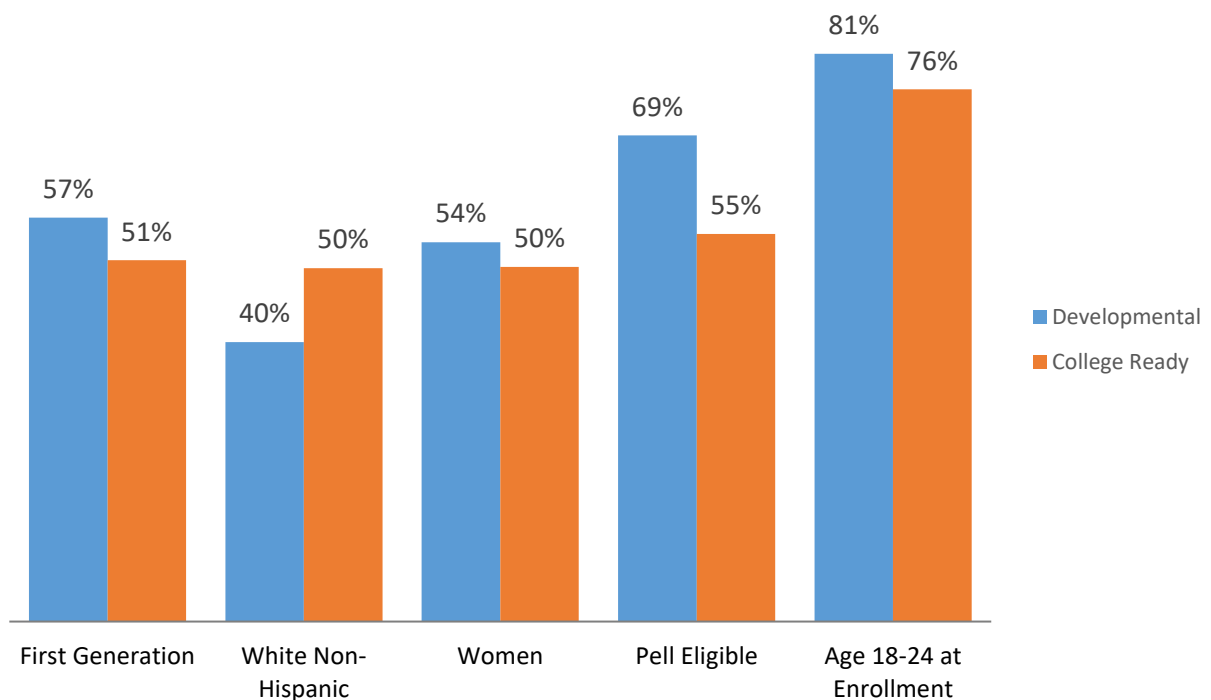
On average, developmental students comprise a more vulnerable cross-section of the at-large student population. Developmental students score nearly 20 points (out of 100) lower than their college ready peers on their algebra placement exams and 11 points (out of 100) lower on their reading and writing placement exams.

Fifty-seven percent of developmental students identified themselves as first generation students versus 51% of the college-ready population. Sixty percent of the developmental population are racial or ethnic minorities versus 50% of the college ready population. Sixty-nine percent of the developmental population qualified for low-income Pell Grants versus 55% of the college-ready population.

Mean Accuplacer Test Scores by Subject and Placement
 First-time, Associate's-seeking Math or English Students
 Scale of 20 to 120



Student Background by Placement
 First-time, Associate's-seeking Math or English Students

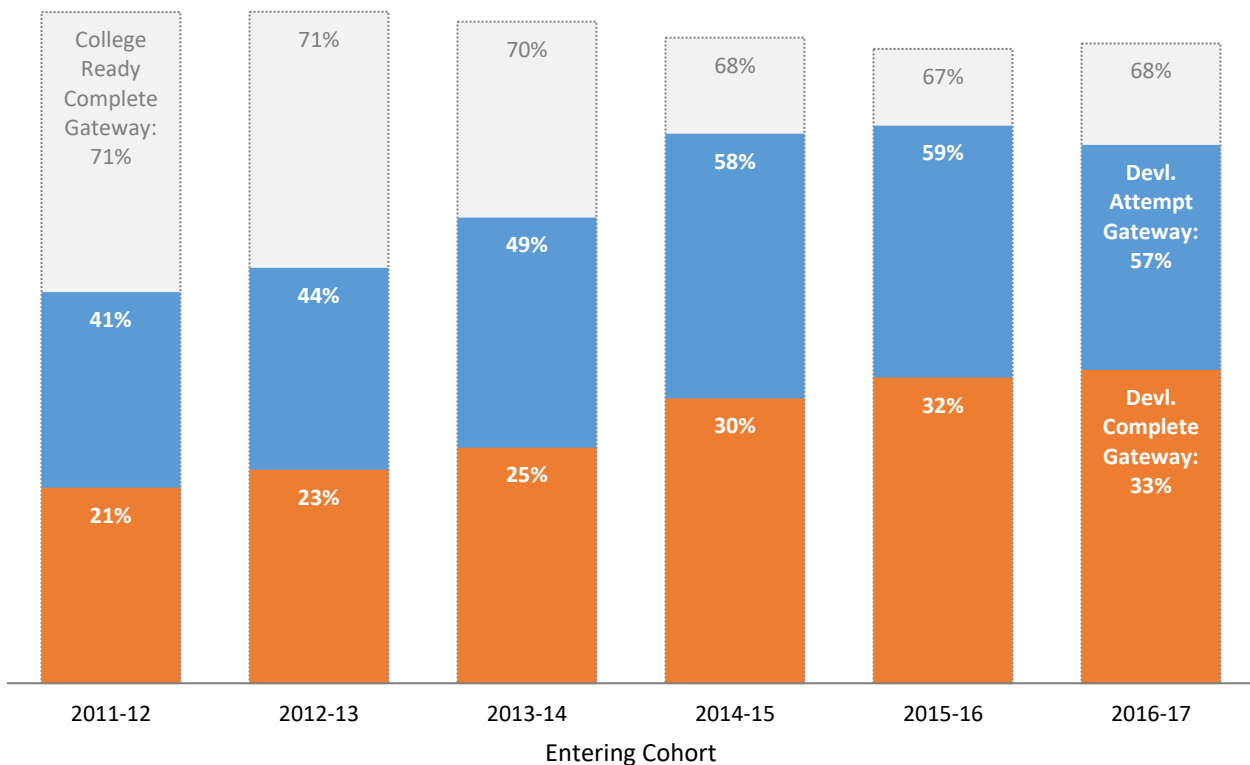


Trends in Course Progression

Gateway course progression rates are up since the implementation of PA 12-40. The share of developmental Math students who enroll in the gateway course within three years of their first credit-bearing, college-level semester has increased from 41% in AY 2011-12 to 57% in AY 2016-17.³ The percentage of developmental students who completed their Math requirement on time⁴ has increased from 21% to 33%. For comparison, college-ready students' gateway course completion rates declined from 71% to 68% during the same period.

Gateway Math Attempt and Course Completion Rates

All First-time, Associate's-seeking Developmental Students
(College-ready Course Completion Rates for Comparison)



³ The most recent cohort is excluded from these charts. The more recent the cohort is, the more likely it is someone who will eventually attempt or complete gateway Math and/or English is not counted, making the complete-on-time, time-to-attempt and time-to-complete numbers artificially low.

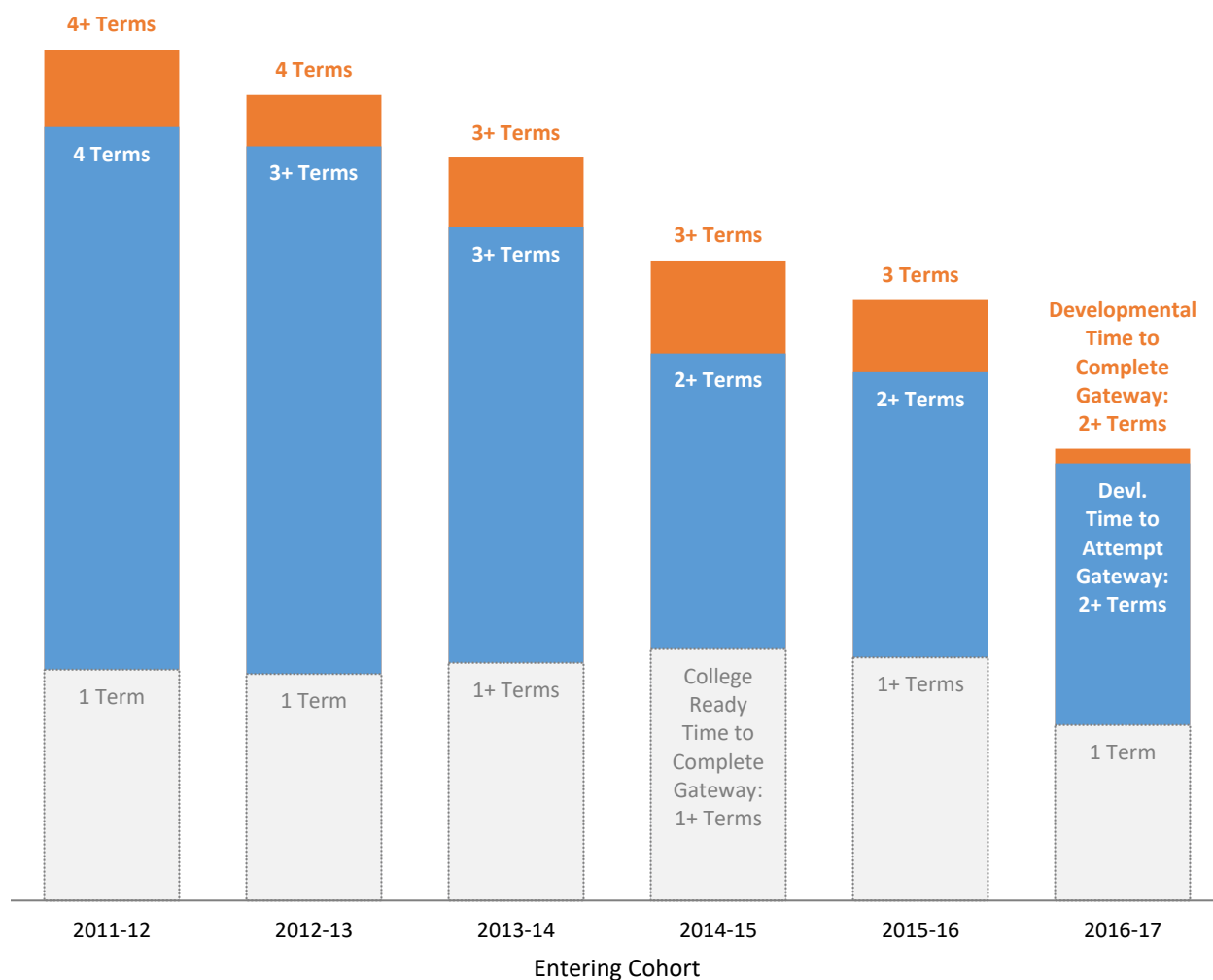
⁴ For the purposes of this analysis, college-ready and embedded students are allowed one half year to complete "on-time," all other students one year.

Gateway course progression times are down under PA 12-40. Among developmental Math students who enroll in the gateway course, the average time it takes to do so has declined from four terms in AY 2011-12 to just over two terms in AY 2016-17.⁵ For those who complete their college Math requirements, the average time it takes to do so has declined from just over four terms to just over two. Over the same period, the time it takes college-ready students to complete the gateway has remained steady at about one term.

Time to Attempt and Complete Gateway Math

First-time, Associate's-seeking Developmental Students

(College Ready Time-to-Completion for Comparison)



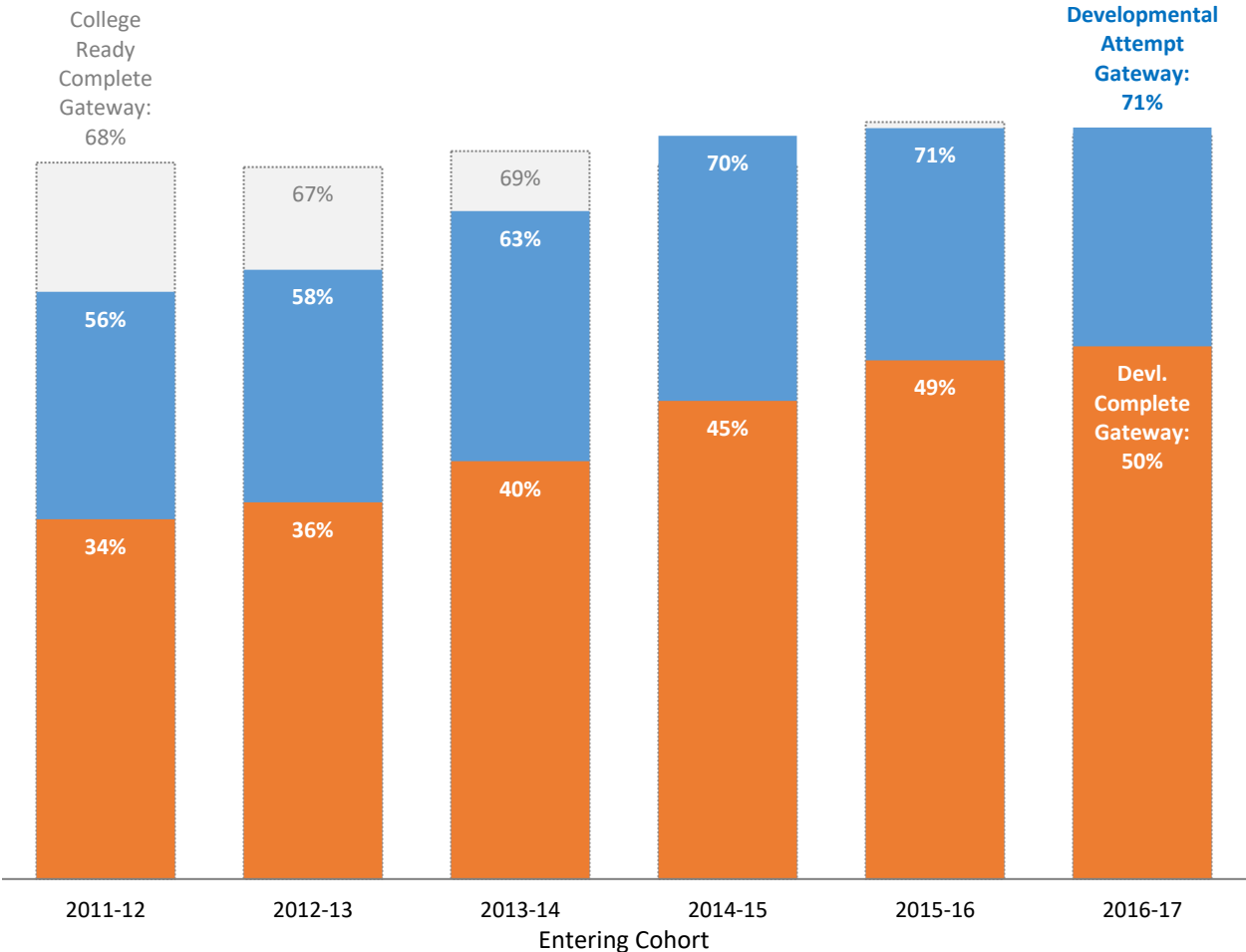
⁵ Assuming four terms in one academic year, a student who completes the gateway in the same semester in which she enrolls is calculated to have completed the requirement in 0 terms. A student who completes the gateway in the term after which she enrolls is calculated to have completed the requirement in one term.

The share of developmental English students enrolling in the gateway course has increased from 56% in AY 2011-12 to 71% in AY 2016-17. The percentage of developmental English students who complete gateway English on time has increased from 34% to 50%.

Over the same period, the rate at which college-ready English students complete their gateway course on time has increased from 68% to 70%.

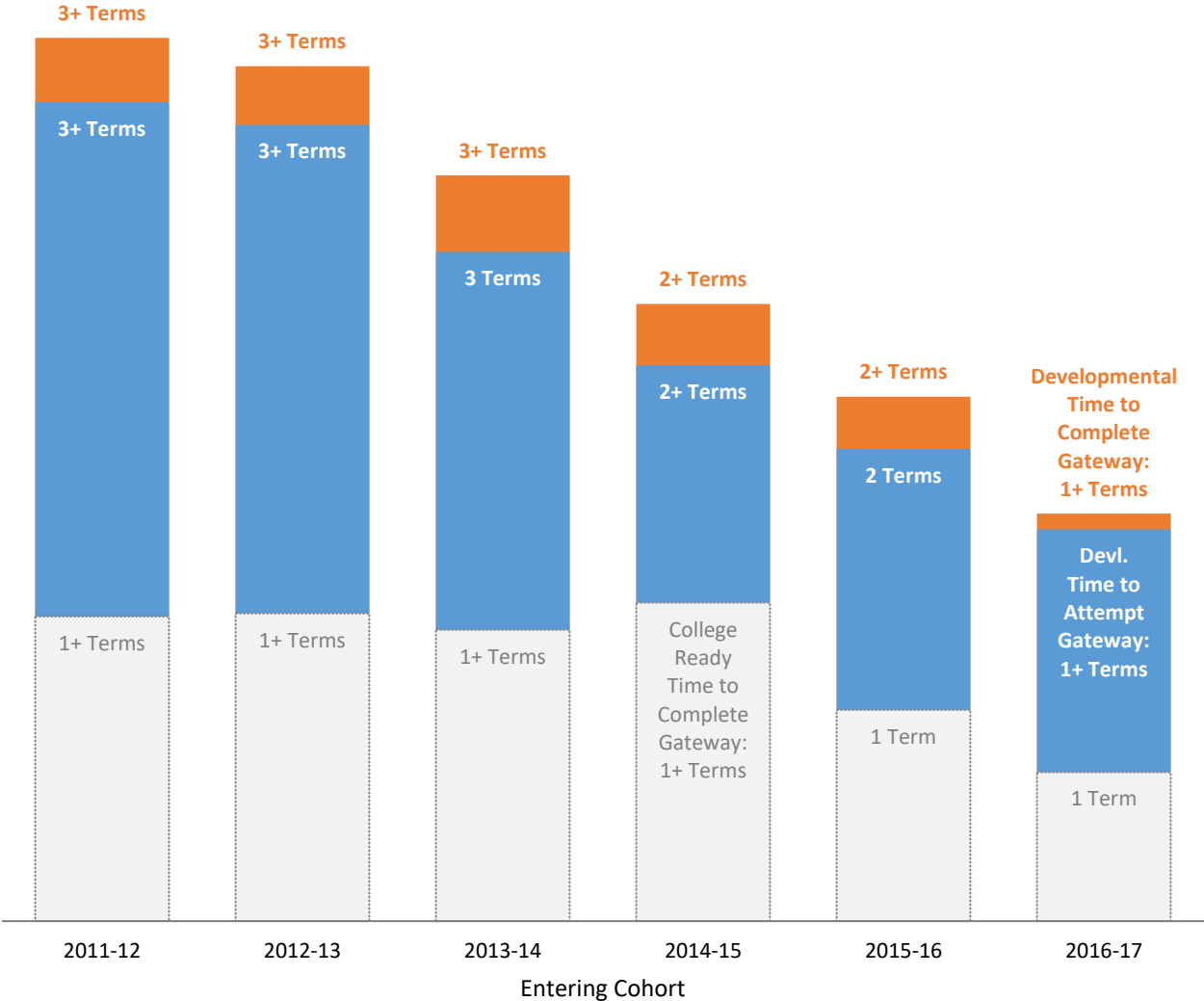
Gateway English Attempt and Course Completion Rates

First-time, Associate's-seeking Developmental Students
(College Ready Course Completion Rates for Comparison)



The time it takes for a developmental English student to attempt the gateway course has declined from just over three terms in AY 2011-12 to just over two in AY 2016-17. The time it takes for a developmental English student to complete their gateway has declined from nearly four terms to nearly two. For comparison, over the same period the time it takes for college-ready English students to complete their gateway course has declined from just over one term to about one term.

Time to Attempt and Complete Gateway English
 First-time, Associate's-seeking Developmental Students
 (College Ready Time-to-Completion for Comparison)



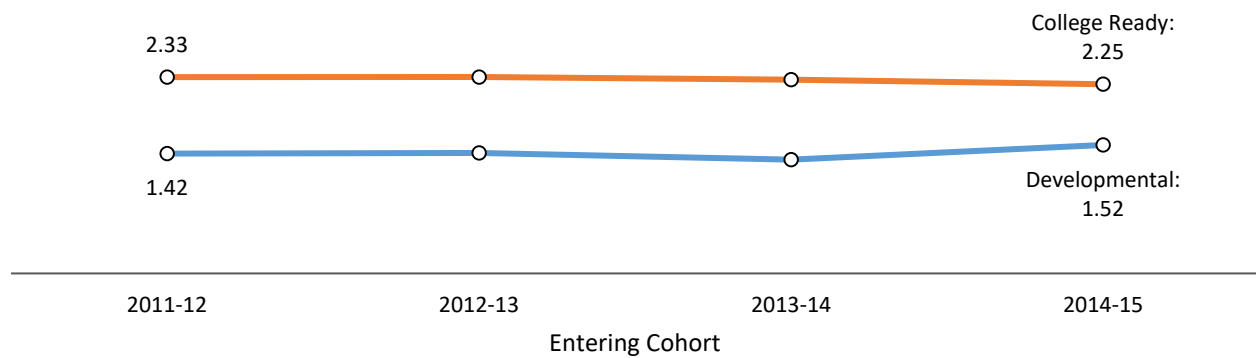
Trends in Downstream Effects

The picture is mixed when it comes to so-called “downstream” effects, that is, how developmental students progress beyond their gateway course.

Cumulative institutional grade point average for developmental students is up slightly against a backdrop of declining GPAs for the general student population.⁶ First-year retention is essentially unchanged (and actually higher among developmental, associate’s seeking, first-time English and Math students versus their college-ready counterparts).

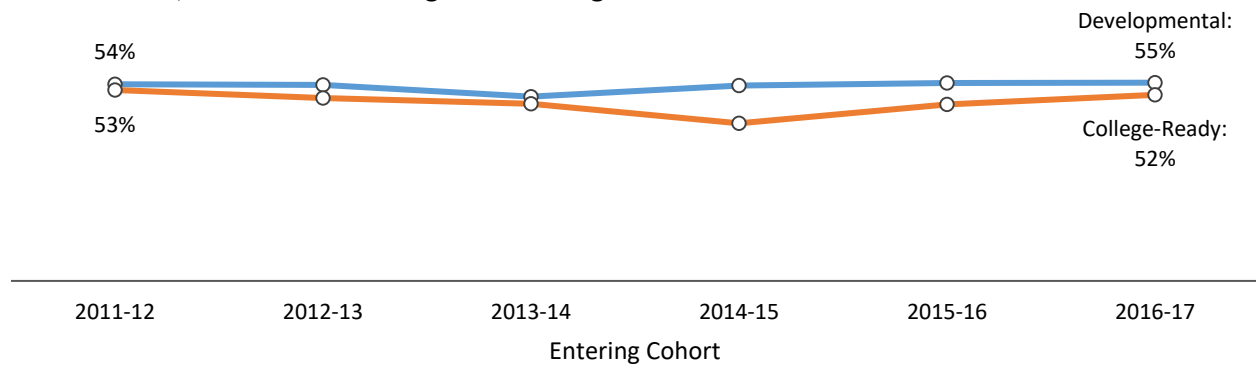
Cumulative Institutional Grade Point Average

First-Time, Associate's-seeking Math or English Students



One-Year Retention Rate

First-Time, Associate's-seeking Math or English Students

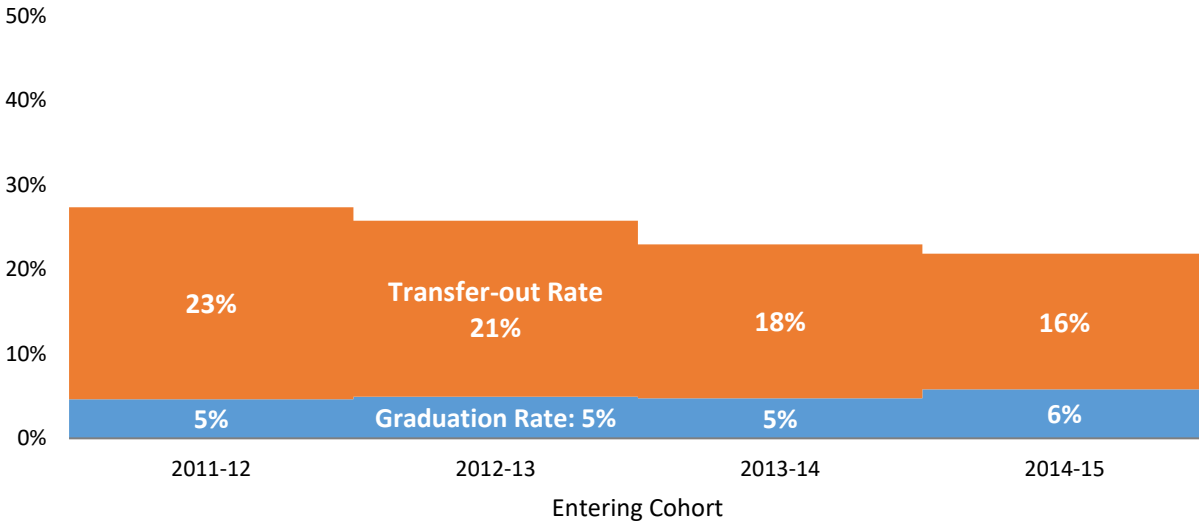


⁶ In this study, we tracked students for up to three years, counting students that withdrew without earning a grade as 0.00.

Three-year graduation rates are up slightly for developmental students, while 150% transfer-out rates are declining (but not as quickly as the 150% transfer-out rate for college-ready students).⁷

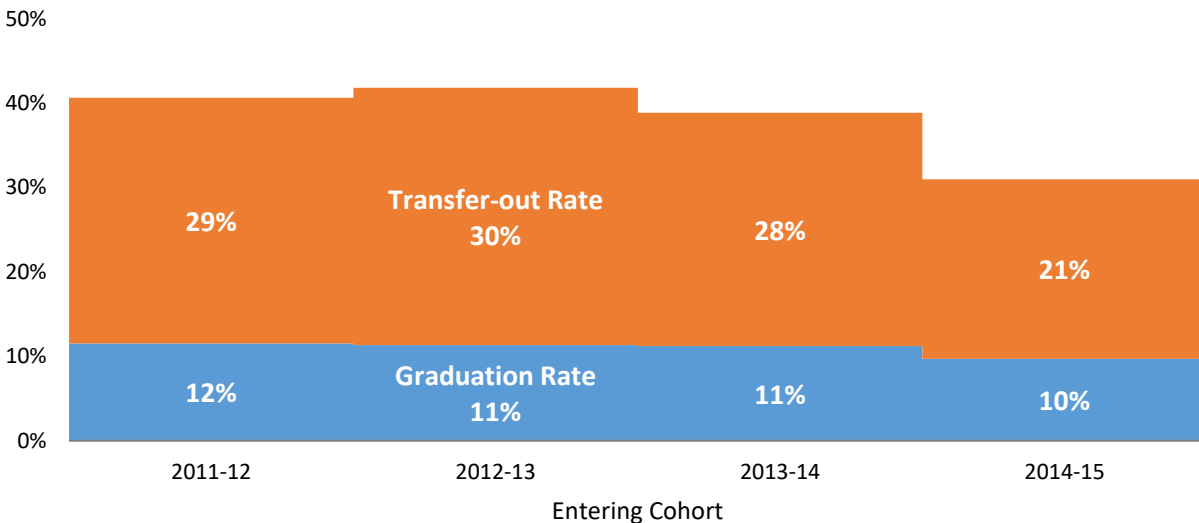
Three Year Success Rates: Developmental

First-Time, Associate's-seeking Math or English Students



Three Year Success Rates: College-ready

First-Time, Associate's-seeking Math or English Students



⁷ Only the fourth graduation cohort (AY 2014-15) includes developmental students that took courses solely during the PA 12-40 epoch. Further study of PA 12-40 is required to determine whether these trends will continue.

Results of a Controlled Study

In order to conclude whether improvements in performance indicators under PA 12-40 were a “real” change, not the result of random fluctuation or shifts in the quality or background of the CCC student body, the Office of Research and System Effectiveness conducted a controlled study comparing similar students who took developmental courses before and after the implementation of PA 12-40.

We matched students in terms of test scores, racial and ethnic background, family income (as implied by Pell status), gender and whether the student was a first generation college student. We also limited the study cohort to two semesters of new, associate’s-seeking students in Fall 2011 and Fall 2014. We chose these years to be able to track students up to three years without the two samples overlapping, and to give the PA 12-40 group enough time to demonstrate improvements in graduation and transfer-out rates.

We narrowed the sample to the middle 60% of placement test takers, in order to eliminate two potentially complicating subgroups: transitional students who enrolled in non-credit, informal workshops that are not included in college databases⁸ and college-ready students who opted to place into embedded courses for the added support those courses confer.

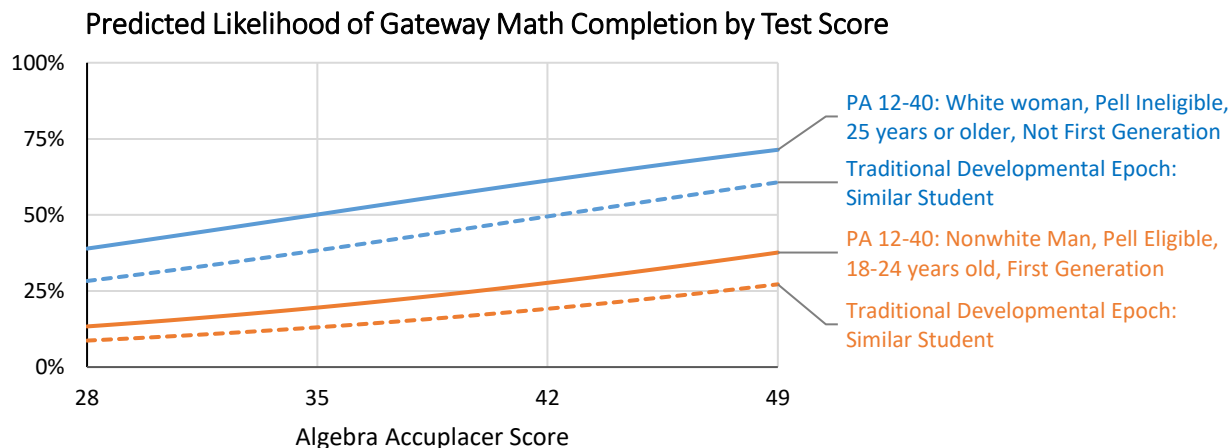
Controlling for test scores and student background, developmental students were 1.3 times more likely to enroll in gateway Math and English under the PA 12-40 model, and 1.4 times more likely to complete their college Math and English gateway courses on time. The time to completion of these courses declined nearly a full term, all else being equal.⁹

To put these numbers in real world terms, consider two hypothetical personalities: the first is a white woman, not Pell Grant eligible (her reported income is not low enough), 25 years of age or older. At least one of her parents went to college. On her Accuplacer Algebra placement test, she scored a 49. Under the traditional developmental regime, this student (and others with similar characteristics) would

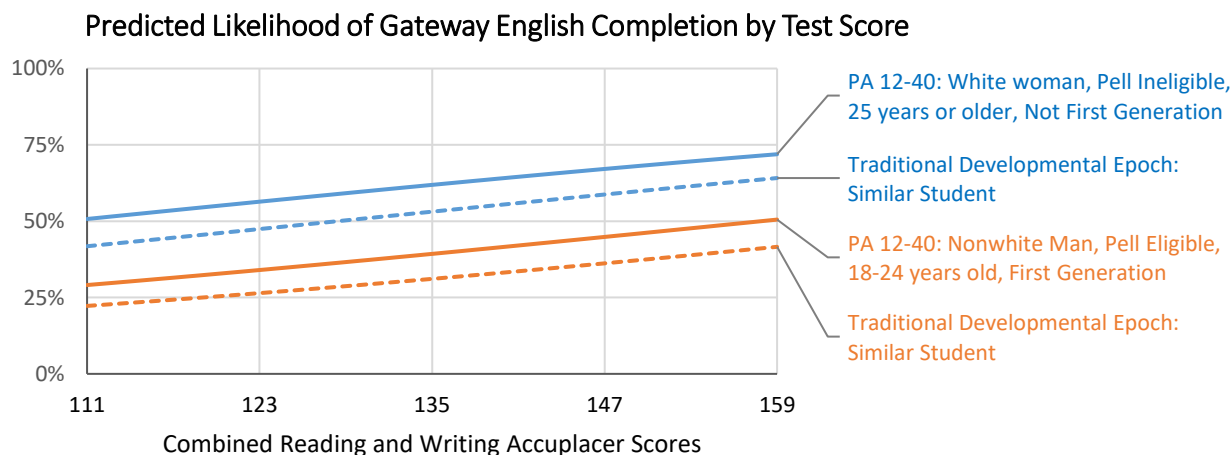
⁸ Many transitional courses take the form of informal workshops or online courses offered by outside contractors such as Khan Academy. Until recently, these courses were infrequently catalogued. Those that were catalogued often lack lists of student enrollment. This means that current databases of developmental students may be misclassifying “transitional” students as “intensive,” and may be missing some transitional students altogether. This is why transitional and intensive placement is conflated in this study, and why the controlled study excludes the lowest-testing developmental students entirely.

⁹ Despite positive findings in course progression, there were no statistically significant differences in grades, retention or graduation rate.

have had about a 60% chance of completing gateway Math in just over three terms. Under PA 12-40, her chance of completing the Math requirement is greater than 70% and her expected time to completion drops to just more than two terms.



The second personality is a nonwhite man. He is eligible for a Pell Grant (due to his income), aged 18 to 24 years-old, the first in his family to attend college. On his Accuplacer Reading and Writing placement exams, he scored a combined 159. Under the traditional system, his chances (and those of similar students) of completing gateway English were about 40%. Under PA 12-40, the likelihood of his completing gateway English is 50%. We can expect him to complete his gateway course in two terms, compared to the just short of three terms we would expect for a similar student in the traditional developmental system.



Questions of Equity

The findings of our controlled study confirm that PA 12-40 has had a positive impact on course progression for students of all backgrounds. However, these results also show that demographic factors retain a significant influence on student progress.

Background factors such as race and ethnicity, gender, age, household income (as measured by Pell Grant eligibility) and legacy status (first generation or otherwise) continue to have an impact on outcomes. Students in the 18-24 year old age bracket tend to underperform in Math gateway enrollment and completion versus 25+ year-olds by 30-40%. First generation students are only 90% as likely to enroll in gateway Math as legacies. Women are 30-40% more likely to enroll and complete gateway Math, or to complete gateway English, than men. Pell eligible students are only 80% as likely to complete gateway Math and English as their ineligible peers.

Relative Impact* of Variables on Developmental Student Outcomes

Odds ratios. Ex: 1.4 = 40% more than 1.0; 0.6 = 60% as much as 1.0.

| Variable | College Level Math | | College Level English | |
|-----------------------------|--------------------|------------|-----------------------|------------|
| | Enrollment | Completion | Enrollment | Completion |
| PA 12-40 | 1.4 | 1.4 | 1.3 | 1.4 |
| Test Score† | 1.0 | 1.1 | 1.0 | 1.0 |
| Age Bracket‡ | 0.7 | 0.6 | - | - |
| First Generation | 0.9 | - | - | - |
| Race/Ethnicity ⁱ | 1.4 | 1.6 | 1.2 | 1.3 |
| Gender | 1.3 | 1.3 | - | 1.4 |
| Pell Eligibility | - | 0.8 | - | 0.8 |

* Effect on dependent variable in standard deviations. The effects of age on gateway English outcomes, first generation status on Math completion and English outcomes, gender on English enrollment and Pell status on Math and English enrollment are statistically insignificant.

† One standard deviation change in Accuplacer placement test score

‡ Membership in 18-24 age bracket or other

ⁱ White, non-Hispanic or other

Race and ethnicity continue to have the biggest outcome on gateway course progression for developmental students, bigger than the impact of test score and in many cases more important than the implementation of PA 12-40. Students who identify as White, non-Hispanic are 40% more likely to enroll in gateway Math, 60% more likely to complete gateway Math, 20% more likely to enroll in gateway English and 30% more likely to complete gateway English.

Emphasis on Embedded Study

Both simple descriptive analysis and controlled statistical analysis indicate gains for developmental students under PA 12-40 in the area of student progression. Most of these benefits have accrued to the “embedded” population.

Of the 30,000+ students that have enrolled in developmental courses under the PA 12-40 regime through AY 2017-18, about 5,000 Math and 6,000 developmental English students were diverted upward into embedded modes of instruction. While completion rates and times have improved for transitional and intensive students, embedded students are the most obvious beneficiaries.

Math: Progress in Attempting and Completing Gateway Course

| Epoch | AY | Placement | N | Attempt Gateway* | Complete on Time† | Time to Attempt* | Time to Complete† |
|-------------|---------|--------------------------|--------------|------------------|-------------------|------------------|-------------------|
| Traditional | 2011-14 | Developmental | 20,190 | 42% | 22% | 4 Terms | 3+ Terms |
| PA 12-40 | 2014-18 | Transitional / Intensive | 15,316 | 47% | 25% | 3+ Terms | 3 Terms |
| " | " | Embedded | 5,018 | 87% | 52% | 1+ Terms | 1 Term |

English: Progress in Attempting and Completing Gateway Course

| Epoch | AY | Placement | N | Attempt Gateway* | Complete on Time† | Time to Attempt* | Time to Complete† |
|-------------|---------|--------------------------|--------------|------------------|-------------------|------------------|-------------------|
| Traditional | 2011-14 | Developmental | 17,546 | 57% | 36% | 3+ Terms | 3+ Terms |
| PA 12-40 | 2014-18 | Transitional / Intensive | 14,002 | 58% | 38% | 2+ Terms | 3 Terms |
| " | " | Embedded | 6,155 | 98% | 70% | 1 Term | 1 Term |

* Denominators only include students who attempted gateway courses. While all embedded students take college-level courses, those who withdraw from the course before the close of the semester are considered having not attempted the gateway. Thus, embedded attempt rates may be less than 100%.

† Denominators only include students who completed gateway courses. Embedded students are allowed one half year from enrollment to complete their gateway course “on time”; all other students are allowed a full year.

*† Assuming four terms in one academic year, a student who completes the gateway in the same semester in which she enrolls is calculated to have completed the requirement in 0 terms. A student who completes the gateway in the term after which she enrolls is calculated to have completed the requirement in one term.

Recommendations

Based on the above findings, we recommend continuing to offer and support embedded and co-curricular Math and English courses for developmental students. At present, it is clear that PA 12-40 has had a positive initial impact on course progression, that these gains are real and not random fluctuations or the result of a shifting demographic base, and that CCCs have taken a meaningful step beyond the inefficacious, self-perpetuating, resource-draining cycle of traditional remedial education.

Future research will continue to monitor improvements in course progression and look for impacts on student success. Continued investigation is necessary to measure the impact on newer graduation cohorts and to study systematically the impact of PA 12-40 on cohorts beyond AY 2014-15, when the new policy was emergent and its implementation variegated.

It is also appropriate to investigate more deeply the relative impacts of the different types of embedded and corequisite instruction models that the CCCs have implemented. While no implementation has proven unsuccessful—the gains discussed here are present at all twelve schools—the diversity of approach is a valid topic of future inquiry.

Finally, we recommend investigating the extension of corequisite and embedded modalities further down the testing ladder. Our controlled study showed that students who test in the intensive range (the majority of students in the sample) were more like to progress—and did so faster—when they enrolled in embedded or corequisite courses. While this may be an artifact of placement by sound professional judgement at the institutional level, it is worth investigating whether lower-testing students could succeed in an embedded or co-curricular modality, assuming there was ample financial support for staffing the necessary additional course sections.

Such changes would require further consultation with faculty, validity testing of placement indicators, following the existing, successful models that the CCCs have so far established. This would also require a greater commitment of financial support from the state government than exists at present.

The story of PA 12-40 has been one of incremental, yet substantial, improvement. With additional research—and support from stakeholders—we can build on these gains.