Academic Transformations: Redesigning College Remedial Courses to Achieve Equity

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Many students, particularly those that are minority or low-income, enter postsecondary education underprepared to complete entry-level college courses (Green & Forster, 2003; Rath, Rock, Laferriere, 2013; The Executive Office of the President, 2014). To address this preparation gap, many colleges offer remedial courses in math, English, and writing that underprepared students are encouraged or required to take before enrolling in college-level courses.[1] Remedial education at the postsecondary level simply refers to classes that are offered below college level (Calcagno & Long, 2008). The courses impose significant costs on both students and states because students pay tuition for remedial courses as if they were college-level and may use (public) financial aid to cover the costs, but students do not receive college credit for the course and so do not make progress to a college degree (Bautsch, 2013).

This brief describes one set of efforts by Maryland higher education leaders to smooth students' passage through remedial courses so that they can successfully transition into credit-bearing courses. Specifically, leaders from the different Maryland two- and four-year colleges and universities worked with faculty to redesign a set of remedial courses in an effort to move more students toward an on-time degree and reduce the economic burden that remediation places on students and the state. The first section examines remediation issues from the national perspective, and then uses Maryland data to outline state-specific issues. Next in the brief are two Maryland case studies of remedial courses that have undergone course redesign. The paper concludes by discussing the future of academic transformation in Maryland and providing recommendations for policy.

Remedial Course Burden on Students

The need for postsecondary credentials has become more important as college degrees have become increasingly necessary to secure reliable middle-class employment (Stetser & Stillwell, 2014). The National Center for Education Statistics (NCES) recently reported that the overall high school graduation rate was 80%, the highest ever (Stetser & Stillwell, 2014). However, many students who successfully complete high school and enroll in college do not graduate with a degree. Of those students that begin college, approximately 43% do not earn a degree after six years (U.S. Department of Education, National Center for Education Statistics, 2010). Often, inadequate academic preparation contributes to this lack of success when it means that students have to take remedial coursework. It can be costly and time consuming for students to complete remedial coursework when they are required to do so before enrolling in necessary college-level courses. In one academic year (2007-2008), students spent

approximately $3.6 billion on remedial education (Alliance for Excellent Education, 2011). This spending is even more concerning because only 17% of high school graduates requiring at least one remedial reading course and 27% requiring at least one remedial math course earn a bachelor's degree (Wirt et al., 2003). Moreover, less than half of students enrolled in remedial courses complete all of the recommended remedial sequence (44% for students in remedial reading and 31% for remedial math) and less than a quarter of students requiring remediation at community college earn a certificate or degree within eight years (Bailey, 2009).

Enrollment in remedial courses also creates opportunity costs for students (in the form of foregone earnings) and states (as lost tax revenue). Students requiring remedial courses before enrolling in credit-bearing courses may have to add semesters and additional tuition costs to their college experience—reducing the amount of time students can work to earn money. Nationally, on average, 60% of students are enrolled in remedial courses for less than a year, 35% are enrolled for a year and 5% are enrolled for longer than one year (Parsad & Lewis, 2003). Additionally, in Maryland, on average, students requiring remediation take 4 months longer to graduate at public two-institutions and 8.4 months longer at public four-year institutions (Complete College American, 2012). This lost time and money can have a negative impact on students if they are seeking to earn a college degree as a pathway to higher potential earnings (Alliance for Excellent Education, 2011). Baum, Ma, and Payea (2013) found that individuals with some college (no degree) earned 14% more than high school graduates, individuals with associate degrees had 27% higher median earnings than those with only a high school diploma, individuals with a bachelors degree had a lifetime earning median that is 65% higher than the median earnings of high school graduates, and individuals with an advanced degree

earned 90% more than those with a high school diploma. These figures highlight the economic implications of time and lost earnings, but also point to the social justice issues that arise when students are unable to reach higher earning as a result of not earning a certificate or degree.

Remedial Course Burden on States

Remediation is not only a costly and time-consuming for students, states incur costs as well (Alliance for Excellent Education, 2011; Strong American Schools, 2008). It is estimated that during the 2007–2008 school year, remediation cost the nation an estimated $5.6 billion (Alliance for Excellent Education, 2011). Remedial coursework often places a double burden on taxpayers—once when students are taught material in high school, and again when they are taught similar material in college—and creates inefficiencies in the use of time and state resources. Maryland could potentially save $72 million dollars if entering college students were college ready (Alliance for Excellent Education, 2011).[2]

States also lose tax revenue from individuals whose degree receipt and entry into the workforce is delayed by remedial coursework. It is estimated that Maryland could see approximately $44 million dollars in additional tax revenue if students in the remediation pipeline earned an associate's degree.[3]

Who Needs Remediation?

The task of providing remediation falls unequally across institutions. Students enrolling in two-year institutions are more likely to need remediation than students enrolling in four-year institutions (Sparks & Malkus, 2013).[4] Table 1 details the differences between enrollment in remedial courses at two- and four-year institutions (not all students assessed as needing remediation enroll in remedial courses). Public institutions enroll more students who require remediation than private

institutions, and two-year public institutions enroll more than four-year public institutions (24.0% versus 21.0% in 2007-08).

Table 1. Percent of first-year undergraduate students enrolled in college who reported taking remedial courses, by institutional control, level, and year

Institutional control & level	1999-00	2003-04	2007-08
Public Institutions			
Two-year	30.4	23.4	24.0
Four-year	25.0	18.2	21.0
Private Institutions			
Not-for-profit, four-year	16.2	13.3	15.1
For-profit, less than two-year	5.1	7.5	5.5
For-profit, two-year or more	16.2	11.4	11.0

Source: U.S. Department of Education, National Center for Education Statistics, 1999-00, 2003-04, & 2007-08; National Postsecondary Student Aid Studies (NPSAS: 2000, 2004, & 2008).

Minority students—particularly Black and Hispanic students—are more likely to require remediation than white students (Sparks & Malkus, 2013). As illustrated in Table 2, there is evidence of a significant preparation gap between these populations of students. Throughout the 2000's, Black and Hispanic students were enrolled in remedial courses at much higher rates than white students. For example, in 2007-08, 19.9% of white students compared to 30.2% of Black and 29.0% of Hispanic students reported taking remedial courses.

Similar patterns of preparation gaps are apparent in remedial enrollment rates by socioeconomic status (SES). Economically disadvantaged college students are more likely to need remedial education than students who come from more advantaged families; approximately 63% of students from the bottom income quintile enroll whereas only

25% of students from the top quintile enroll (Wirt et al., 2004).

There are a variety of reasons why we might see these patterns. Low-income students are less likely to take a core curriculum that involves high levels of rigor and advanced math courses in high school and are less likely to meet readiness benchmarks on college entrance exams (ACT, 2013). A rigorous curriculum that prepares students for college-level work is a key factor in college success (Adelman, 1999). In particular, a student's level of math preparation is highly correlated to college success and completion. Adelman's (2006) seminal research found that 83% of 12th-graders who had taken or were taking a calculus course had graduated college within eight years verses 40% who stopped with Algebra II. Additionally, Adelman (2006) found that only 44% of students in the lowest SES quintile attended a high school that offered calculus compared to 72% of students in the highest SES quintile. Adelman (2006) estimates that intensifying academic rigor in high school would increase college completion for the lowest socioeconomic quintile—from 40% to 59% if the curriculum was in the top 40% of the academic intensity index and students completed math courses beyond Algebra II.[5]

Table 2. Percent of first-year undergraduate students attending public institutions who reported taking remedial courses, by selected student characteristics and year.

Student characteristics	1999-00	2003-04	2007-08
White	24.3	19.7	19.9
Black	37.7	27.4	30.2
Hispanic	37.8	26.8	29.0
Asian/Pacific Islander	34.9	20.1	22.5

Source: U.S. Department of Education, National Center for Education Statistics, 1999–2000, 2003–04, and 2007–08 National Postsecondary Student Aid Studies (NPSAS: 2000, 2004, & 2008).

In an attempt to better prepare disadvantaged students for college work, many state education

agencies and educational organizations are also emphasizing programs like dual enrollment and Advance Placement (AP) courses. Researchers have found that students who participate in AP courses earned higher grades in college (Mattern, Shaw, & Xiong, 2009) and were more likely to graduate (Dougherty, Mellor, & Jian, 2005).

Remediation in Maryland

Inequity in college preparation is also apparent in Maryland, where large numbers of college students require remediation. In total, roughly 58% of students at Maryland's community colleges and 24% of students at Maryland's four-year institutions enrolled in at least one remediation course in 2007 (Complete College America, 2012). While Maryland's four-year institutions tend to have a lower percentage of students requiring some form of remediation, it is important to note that three of Maryland's four Historically Black Institutions have a higher percentage of students requiring remediation than other four-year institutions in the State—over 60% of students at Bowie State University, Coppin State University, and University of Maryland Eastern Shore require some form of remediation. This is especially concerning when only 10.1% of students that originally enrolled in remedial courses at Coppin State University, for example, progress to a college-level credit-bearing course (Complete College America, 2012; Maryland Higher Education Commission, 2011).

Complete College America (2012) provides Maryland remediation data disaggregated by race, ethnicity, and SES. The data, presented in Table 3 shows that Black, Hispanic, and low-income students in Maryland are more likely to enroll in remedial courses than white students at both two-year and four-year colleges and universities. It is important to note that the percentages in Table 3 are higher in some instances, than the percentages from Table 2. Data in Table 2 and Table 3 were collected in different ways—Table 2 via student reporting and Table 3 by institutional reporting. Nevertheless, the percentages in Table 2 may also be lower in some instances than those in Table 3 because being assessed as needing remediation does not mean that students will enroll in a remedial course. In some states, students can enroll in college-level credit-bearing courses even if scores on assessment tests indicate they need remediation.

Table 3. Percent of all students enrolling in at least one remediation course in Maryland public two- and four-year institutions, fall 2007

Race/Ethnicity/SES	Two-year	Four-year
Black (non-Hispanic)	73.0	52.1
Hispanic	66.5	16.1
White (non-Hispanic)	55.3	9.3
Other	49.8	10.3
Low-income	73.8	45.9

Source: Complete College America, 2012

Many students who enroll in a remedial course in Maryland do not complete those courses, and even when they do, many do not enroll in a college-level course. Of the 24% of students at a four-year Maryland public institution that enrolled in at least one remedial course in fall 2007, 70% completed it. At Maryland community colleges, 40% of the 58% of students that enrolled in at least one remedial course in fall 2007 completed it (Complete College America, 2012). Of the 70% who completed at least one remedial course from a four-year public institution in Maryland, about 40% went on to complete a college-level credit-bearing course (Complete College America, 2012). Of the 40% who completed at least one remedial course from a Maryland community college, only 25% went on to complete a college-level credit-bearing course (Complete College America, 2012). Lastly, while fairly low percentages of students who enrolled in at least one remedial course go on and persist through the remainder of college post remediation (40% at four-year institutions and 25% at community colleges), the overall time to degree is not

significantly longer than their non-remedial peers. Table 4 details the time to degree for students enrolled in at least one remedial course at two- and four-year public institutions in Maryland. This negligible time difference is attributable to a subset of students enrolled in at least one remedial course who completed college.

Table 4. Time to degree for remedial students enrolled in Maryland public two- and four- year institutions

Institution type	All students	Remedial students
Two-year	3.8 years	4.1 years
Four-year	4.3 years	5.0 years

Source: Complete College America, 2012

Maryland's Big Goal

To address the economic downturn, ensure that there are well-prepared workers to fill new jobs, and help Maryland thrive in an increasingly competitive international economy, more Marylanders need to graduate with credentials and degrees from the state's higher education institutions. In 2010, Governor Martin O'Malley challenged the leaders of Maryland's postsecondary institutions to create a double-digit increase in the proportion of the state's total college-age population earning college degrees. The state's goal is to increase the completion rate from 44% to 55% by 2025 (O'Malley, 2010). That goal will require that Maryland's higher education institutions graduate an additional 13,000 students every year (Maryland Higher Education Commission, 2012). Increasing graduation rates requires both getting more people into higher education and ensuring that those who enter earn degrees. Course redesign is one strategy that Maryland higher education leaders have adopted in recent years to increase college attainment and reduce costs to students and the State.[6]

Course Redesign

Why Course Redesign? Beginning in 2003, leaders from the University System of Maryland (USM) began work on improving academic effectiveness and efficiency though course redesign after seeing results from the National Center for Academic Transformation (NCAT). NCAT worked with six large public systems of higher education across 43 institutions to complete and fully implement 76 redesigned courses between 2006-2013 (National Center for Academic Transformation, 2014). Of these projects, 63% saw improved student learning outcomes and 98% reduced instructional costs by an average of 38% (National Center for Academic Transformation, 2014).[7] Other outcomes included accommodating more students without requiring additional resources; freeing up faculty members to offer other courses and programs of study that were in demand; meeting goals for student achievement; decreasing time to graduation by shortening the course sequence; improving consistency and quality across multiple course sections; and using state and student tuition dollars more efficiently.

The goal of course redesign is to provide faculty and staff with the knowledge they need to help students transform themselves from passive education consumers into active learners who are responsible for their own success. Faculty are given tools to increase collaboration with other faculty, integrate technology into teaching, and provide daily support to students to help them succeed. Table 5 details the academic changes that course redesign seeks to achieve.

In addition to the academic changes noted in Table 5, remedial course redesign shortens the remedial course-taking sequence by moving from a traditional remedial course delivery sequence (e.g., one to two semesters of remedial courses prior to enrolling in college-level credit-bearing courses) to a modular

Table 5: Academic changes as a result of course redesign

From:	To:
• Lectures and note taking, passive learning	• Active learning and student responsibility
• Weeding out students	• Cultivating success
• Memorization of rules and data	• Concept mastery and problem solving
• Isolated faculty doing what works for them	• Broad range of faculty redesigning courses and new staffing models to help students succeed
• Limited office hours	• On-demand help
• Large classes	• Simulations, labs, peer support, and individualized assistance
• Technology as an underutilized resource used as a platform for communications, but not integrated into coursework	• Technology integrated into instruction so that faculty are active and interactive
• Publish or perish	• Innovate and individualize instruction

Source: University System of Maryland, 2012

delivery system (e.g., co-requisite model) where a remedial course is taken at the same time as a college-level credit-bearing course and the remedial material is individualized to the student's skill level (e.g., students only study topics requiring remediation, not all topics).

How is a Course Selected for Redesign? The first step in redesigning a course is to assemble a campus team to carry out the course redesign work. This team should include all faculty teaching the course (i.e., all the instructors teaching the same multi-section course), and would likely include individuals serving in the following roles: a) the department chair/dean, b) academic vice president/provost, c) staff from the registrar's office, and d) technology staff. The diverse team ensures institution-wide support for the work and provides assistance with scheduling or technical components of a redesigned course. Following the formation of a campus team, the next step is deciding what academic issue to address. Examples of academic issues include: a) high withdraw, dropout, or failure rate by students in the course, b) course drift (i.e., multiple sections of the same course with different learning outcomes and different material being taught), or c) lack of success by students in subsequent courses.

Course redesign occurs in two phases—pilot and full implementation. After the initial planning phase (i.e., getting faculty and administrator buy-in for the project and forming a campus redesign team), there is a semester-long pilot phase where one section of a redesigned course is run in conjunction with the remaining traditional sections that were not redesigned. The results from the pilot sections are compared with results from the traditional sections to identify changes in student learning outcomes and course completions. After the one semester pilot, the redesign moves to full-implementation where all sections of the course are taught in a redesigned format. The course-redesign case studies described later in the brief all followed a similar process.

Seed Funds and Timeline for Maryland Course Redesign Initiatives: In 2003, the USM started a system-wide effort to redesign introductory college classes that most entering college students are required to take (University System of Maryland, 2006). The initial 2003-2006 pilot funded the redesign of 10 courses at 10 USM institutions in response to a USM Regents' initiative to improve academic effectiveness and efficiency. Between 2010-2014, another 70 courses were redesigned. Additionally, in collaboration with the Lumina

Foundation, 19 courses were redesigned between 2010-2013 in institutions outside the USM (e.g., Morgan State University, St. Mary's College of Maryland, Maryland community colleges, and Maryland independent institutions).

The work to focus specifically on remedial math course redesign across the State began in 2012-13. Using lessons from the Lumina Foundation funded project, the Maryland Higher Education (MHEC), with a grant from Complete College America, funded 16 course redesign projects that focused on remedial math courses. This focus was chosen because the inability to complete a remedial mathematics course negatively affects students' ability to make progress toward earning a degree in Maryland (Maryland Higher Education Commission, 2011).

Course Redesign Faculty Fellows: Course redesign is a prime example of an effort where faculty lead the work and connect with administrators and their faculty colleagues to use data in new ways and solve real problems on campus. Research has shown that networks of faculty advocates created under initiatives like course redesign facilitate the spread and replicate of innovative solutions across a campus (Rogers, 2003). For the 2003-2006 USM course redesign initiative, USM administrators selected a coterie of course redesign Faculty Fellows. These Fellows provided peer support for other faculty interested in redesigning a course. The course redesign Faculty Fellows trained and disseminated information about course redesign (e.g., what it is, how it is done) to interested faculty across Maryland through workshops and one-on-one training. The goal of this process was to build a core of faculty expertise, which can sustain and expand course redesign beyond the life of external funding.

Lessons from the Remedial Redesigns

The case studies described in the following section highlight academic (e.g., improved student learning and outcomes in sequent courses) and structural changes (e.g., modularized course offerings) that occurred as a result of course redesign in Maryland.

Towson University: Towson University faculty collaborated to redesign courses in remedial math and intermediate algebra that enrolled students with low SAT and weak placement test scores. Before course redesign, these courses included 35 sections with close to 850 students and were taught by adjunct faculty in traditional lecture format. The courses posed numerous challenges for faculty, including how to direct course material toward the diverse skill levels students brought to the classes, and the need for individualized attention for students who did not move through the subject matter at the same pace as other students. Student challenges included high withdrawal/failure rates and lack of academic success in sequent courses.

Under the guidance from Faculty Fellows, faculty replaced one hour of lecture in each of the two classes with at least one mandated hour in an open computer lab that used interactive learning software with tutorials and thousands of practice problems. The lab provided a self-paced learning environment with immediate feedback. Undergraduate teaching assistants and some graduate teaching assistants and instructors staffed the lab and provided students with individualized, on-demand guidance. Some initial implementation challenges included the reluctance among a large proportion of the adjunct faculty to adopt the changes, a few technology issues, and an initial lack of space for an open computer lab.

The project produced positive results. These included: a) shorter time to course and degree completion; b) higher pass rates in both

remedial math (from 77% to 85%) and intermediate algebra (from 62% to 65%); c) more positive student experiences as measured by course evaluations; d) increased faculty enthusiasm; and e) approximately $27,000 in institutional cost savings, which is about 18% of the total cost of $150,000 per year, per course.

Howard Community College: Howard Community College (HCC) redesigned two of its developmental math courses—basic algebra & geometry and elementary algebra. Sixty-seven percent of new students are placed into developmental mathematic courses. With approximately 42% of first year students placing into these two courses, the redesigned course had a large impact on a large proportion of students.

Both of these courses had high failure-withdraw rates. During a five-year period preceding the redesign work, both courses averaged a 45% failure-withdraw rate. The redesign course combined the two original courses into one six-credit course with six modules. Repeated topics were eliminated and topics similar to both courses were combined. Students met for four hours in the computer lab and two hours of class meetings each week. Class meetings were offered throughout the day on the various topics. Students could choose which class meetings they needed to supplement their computer-based instruction.

The redesigned course offered many advantages over the previous delivery model. For one it shortened the remedial sequence. Howard Community College typically loses 24% - 31% of its students as they transition from one remedial course to the next. By decreasing the number of courses a student needs to complete, Howard Community College was able to increase the completion percentage of its remedial students. Additionally, the modular redesign allowed students to repeat only the material they do not master—they did not have to repeat an entire four-credit course because

they failed one exam. In addition, students could repeat any module they failed immediately. The computer-based instruction supplemented with class meetings, allowed students to master one topic before moving on to another. This process helped to promote a better understanding of the course's objectives and to better prepare students for their next course.

In general, the redesigned courses at Howard Community College showed increased pass rates (from 51% to 57%); many students were able to complete all remedial work in one semester as oppose to the year-long sequence of remedial courses required in the old model. Additionally, the increased completion rates and shortened time spent in remedial courses translated into tuition savings for students and institutional savings in instruction time, which can be used for tutorial assistance to further improve pass rates.

Implications of Course Redesign

Taken as a whole, course redesign helped achieve the same or better academic and student outcomes at a lower cost than traditional remedial courses, helping Maryland move closer to its goals of helping more students move toward timely graduation. During the 2012-2013 remedial math course redesign efforts, there was an increase in the level of student pass rates (relative to non-redesigned courses) from 54.9% completing to 63.6% (Maryland Higher Education Commission, 2014).[8] Overall, course redesign has proven to be an effective strategy to improve the learning experiences of Maryland students, providing more personalized attention, deeper practice and exploration of concepts, and support when its need. This solution is helping students do better in school and stay in school. Course redesign is also helping faculty change how they teach, converting stand-and-deliver lectures to problem-based learning and discussions, and

using technology in more-effective ways to increase learning.

The Future of Academic Transformation in Maryland

There is no doubt that this is both an exciting and disruptive time in higher education. Colleges and universities are facing requests to show increased accountability, evidence of return on investment, and enhanced creative solutions to address difficult problems. At the same time, students are entering college with unequal levels of preparation, a mix of learning styles, and increased educational expectations from policymakers and the public that challenge higher education leaders to adapt and change. In an era where there are multiple sources of education—MOOCs, Khan Academy, and for-profit institutions—colleges and universities need to focus not only on demonstrating that a degree from their institution leads towards a greater likelihood of a good job, but contributes to a good life.

A number of forward-thinking initiatives over the last decade, like course redesign, have positioned Maryland as a national leader in academic transformation. Building on this work, higher education leaders in Maryland are better positioned to create further change in the academic experience of students moving through postsecondary education in the State. New efforts include the creation of the USM's Center for Academic Innovation, the nation's first system-specific center focused on the research, coordination, and sharing of academic innovations across the USM. This new undertaking includes a focus on scaling up and sustaining a culture of academic innovation by building awareness, engaging stakeholders, addressing capabilities, creating opportunities, and disseminating results. It is opportunities like this that will continue to keep Maryland at the forefront of postsecondary innovation.

Conclusion and Recommendations for Policy

The path to a secure economic future for individuals is increasingly one that requires some form of postsecondary education, yet few of our nation's economically disadvantaged students are adequately prepared to travel along that path. In the United States, a child born into a family in the highest income quartile has a roughly 85% chance of earning a college degree, whereas a child born into a family in the lowest income quartile has less than an 8% chance of earning a degree (Organisation for Economic Co-operation and Development, 2012). If the "American Dream" signifies hope—that a person's status at birth is not supposed to determine his or her status throughout life—then this hope is merely a dream for far too many. Lack of rigorous academic preparation may be contributing to a permanent economic underclass.

The purpose of this brief was to detail one strategy used to address remediation. The redesign of remedial courses has proven to be an effective strategy in Maryland—in both two- and four-year colleges and universities—in helping students move toward successful degree completion. While it is a strategy that should be continued, the recommendations provided below have the ability to create change and promote equity.

1. Provide more resources to postsecondary institutions to redesign remedial courses and shorten the course sequence since, on average, student pass rates improve in redesigned courses.
2. Scale and spread course redesign to high school courses that have low levels of student learning and poor student performance in subsequent courses. Encourage and fund faculty from postsecondary institutions to work collaboratively with high school teachers and administrators to redesign these courses.

3. More research is needed on how to address the learning needs of high school students who are assessed as not being college ready.[9] This includes research on the implications of transition courses for low-income and minority students.

4. Offer transition/preparation courses for adults trying to re-enter postsecondary education after a spell of non-enrollment, so financial aid can be used to pay for college-level credit bearing courses rather than remedial courses.

5. Encourage and fund more professional development activities between *college faculty and high school teachers* to promote active and engaged teaching practices and foster the development of communities of practice around effective instructional practices.

6. Encourage and fund more professional development activities between *secondary school and elementary teachers* to promote active and engaged teaching practices and foster the development of communities of practice around effective instructional practices.

7. Ensure that elementary and secondary school districts have a curriculum that is rigorous and college and/or career preparatory in nature to strengthen the pipeline of academically prepared students.

8. Change the promotion and tenure reward structure of postsecondary institutions so faculty are rewarded for creating the kinds of experiences that matter to student success and they have safe spaces for experimenting with innovative instructional practices.

By acting on these policy changes, education leaders will be better suited to move on an urgent and compelling part of the complete agenda—social equity.

ENDNOTES

[1] The terms "developmental" and "remedial" are often used interchangeably and refer to the same thing. For the remainder of this brief we will use the term "remedial."

[2] Remediation savings were estimated by multiplying the cost of one course by the number of students who take at least one remedial course. Due to limitations in data availability, remediation savings are not an annual figure, but rather estimates of the combined remediation costs attributed to students enrolled during the 2007–08 school year that were accrued at any time prior to and including that school year (Alliance for Excellent Education, 2011).

[3] To calculate additional earnings, the salary difference between students who attend "some college" and students who earn a two-year degree was multiplied by the number of students who are expected to have graduated if they do not need remedial courses (potential new graduates) (Alliance for Excellent Education, 2011). The number of potential new college graduates was calculated by multiplying the remedial student count for each state by 28%, the difference in completion rates between those who enroll in remedial courses (29%) and those who do not (57%) (Strong American Schools, 2008). This potential new graduate count was then multiplied by the difference in average earnings between individuals with "some college" and an "associate's degree" in each state (Alliance for Excellent Education, 2011).

[4] Many students whose assessment test scores reveal they need additional academic preparation prior to enrolling in college-level credit-bearing courses do not end up enrolling in the recommended developmental courses. In some states, students can enroll in college-level credit-bearing courses even if scores on assessment tests indicate that remediation is needed, so enrollment is often voluntary.

[5] Adelman (2006) developed an academic intensity index based on the number of Carnegie units taken in particular subject areas to evaluate students' secondary academic experience.

[6] Institutional savings are included in this.

[7] Includes reduced faculty cost (e.g., through a reduction in number of faculty who taught the redesigned courses) and reduced facilities cost (e.g., through a reduction in campus utility use because the redesigned courses required fewer face-to-face meetings).

[8] Letter grade of C or better.

[9] Curricula for transition courses consists of modules, online tutorials, or other educational experiences offered no later than 12th grade to students who are at risk of being placed into remedial mathematics, reading, or writing when they enter college (Kannapel, 2012).

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The Maryland Equity Project seeks to improve education through research that supports an informed public policy debate on the quality and distribution of educational opportunities. It conducts, synthesizes, and distributes research on key educational issues in Maryland and facilitates collaboration between researchers and policymakers. The Maryland Equity Project is a program in the Department of Teaching and Learning, Policy and Leadership in the College of Education at The University of Maryland.

The University System of Maryland (USM) comprises 12 institutions, two regional higher education centers, and a system office. With innovative academic models, expansive partnerships, and ongoing cost containment, USM works to increase Maryland's college completion rate by providing access to hundreds of affordable undergraduate, graduate, and professional degree and certificate programs.

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