Remedial Coursework in Postsecondary Education:

The Students, Their Outcomes, and Strategies for Improvement

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Introduction

Recently the state of Missouri, through the Missouri Department of Higher Education, has started to work toward the goal of having 60 percent of state residents hold some type of postsecondary credential. This goal aligns with similar initiatives in other states as well as President Obama's objective for the nation. In order to reach this ambitious target, improvements in postsecondary education will need to be made in a number of areas.

One such area is remedial education. Remedial education (sometimes also described as developmental education) refers to courses taught within postsecondary education that cover content below the college level. Students who require remediation upon entering postsecondary institutions may face adverse consequences. First, these students may be less likely to complete their course of study and more likely to stop out or drop out. Second, it may take these students longer, both in terms of the number of courses taken and number of years enrolled, to complete their studies.

It is therefore in the best interests of Missouri that it address and improve remedial education at the postsecondary level. If the state can devise and implement programs and policies that both reduce the need for remediation and improve the way it is taught, Missouri will produce more graduates and do so more efficiently.

To this end, this report examines remedial education from several angles. It first investigates the extent of remedial coursetaking in postsecondary education both nationally and in Missouri. It then explores remedial students' persistence and attainment compared with the persistence and attainment of nonremedial students. The report concludes by describing the various approaches to remedial education that have been adopted throughout the country. The Appendix Table summarizes where these different approaches have been implemented.

Participation: Who Enrolls in Postsecondary Remedial Courses and at What Rates?

Nationally, half of all first-time 2003–04 postsecondary students took at least one remedial course (figure 1).[1] Remedial students (students who took a remedial course) enrolled in a median number of two remedial courses. Fifteen percent of remedial students never passed a remedial course, and 7 percent repeated at least one remedial course.

Math was the most common subject requiring remedial coursework. Forty-two percent of all first-time postsecondary students took a remedial math course, while only 12 and 10 percent enrolled in a remedial English or reading course, respectively.

Remedial coursetaking also varied by institution type (measured as the first type of institution attended). More than two-thirds of public two-year college students took some type of remedial course, while the percentage was closer to one-third at other key types of institutions. A similar pattern by institution type is observed for specific types of remedial courses. Participation is consistently most common at public two-year colleges, with other types of colleges exhibiting lower, generally more comparable participation rates. In considering these results, it is important to keep in mind that institutions vary in their admissions requirements and the students they serve. Four-year colleges tend to admit students with greater academic preparation than more open-access public two-year institutions, and this affects the extent to which students at these institutions need remedial education.[2]

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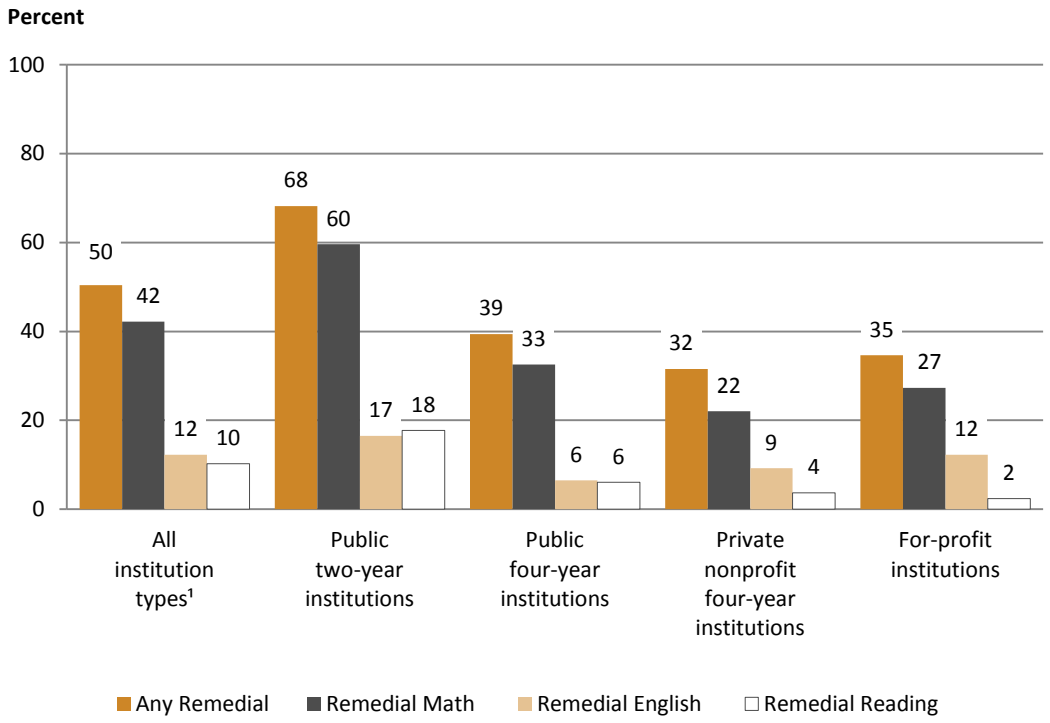
[1] Throughout this report, national data come from the U.S. Department of Education's 2003–04 Beginning Postsecondary Longitudinal Study (BPS:04/09). This nationally representative study examines students who first began their postsecondary education at some point during the 2003–04 academic year and follows them for six years, through 2009. Students were considered to have participated in remedial education if they took a remedial course at some point during these six years according to their postsecondary transcript(s). Courses listed on transcripts were coded as remedial based on transcript notations indicating the course as remedial, the course numbering system, the course description, and/or the number of credits awarded for the course. For more information about the methodology in BPS:04/09, see http://nces.ed.gov/pubs2008/2008184.pdf.

[2] For more information about the characteristics of first-time students at different types of institutions nationally, see tables 1.1A, 1.1C, and 1.1D in Skomsvold, Radford, & Berkner (2011).

Figure 1. Percentage of National First-Time Undergraduates Participating in Remedial Education, by Institution Type

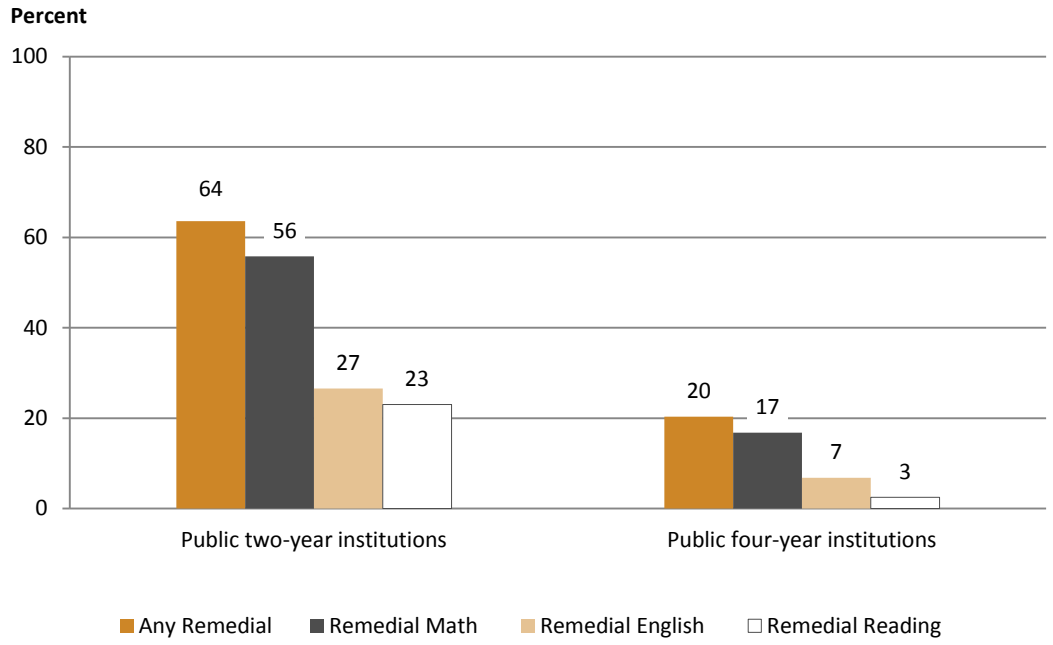


[1] Includes public less-than-two-year and private not-for-profit less-than-four-year institutions.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09) and the 2009 Postsecondary Education Transcript Study (PETS:09).

Missouri data on first-time undergraduate students who enrolled in public two-year and public four-year institutions slightly later show similar patterns (figure 2).[3] Remedial math was the most common type of remedial course students took and participation in remedial coursework of all types was more common at public two-year than at public four-year institutions.

[3] Missouri data differ from national data in a few ways. First, the Missouri participation rates noted in this chapter are based on a more recent cohort: first-time undergraduate students who entered in the fall of 2011. Second, remedial participation was based just on remedial coursetaking that took place during the first academic year of enrollment. Third, students were considered to have participated in remedial education if their institution reported to the state that they enrolled in a remedial, developmental, or "preparatory" course. Preparatory courses are not officially considered developmental but they do not count toward general education requirements. They thus reflect a kind of sub-college-level course much like remedial or developmental courses. (National results may or may not include these preparatory courses depending on whether and how they were described on transcripts.) Finally, coursework designed for non-native English speakers was not included as remedial in the Missouri data but was counted as remedial in the national data.

Figure 2. Percentage of Missouri First-Time Undergraduates Participating in Remedial Education, by Institution Type



SOURCE: Missouri Department of Higher Education, Fall 2011 Cohort.

Nationally, students with certain characteristics were more likely to participate in remedial education than students at large (table 1). Specifically, those starting in associate's degree programs or who were black or Hispanic had significantly higher rates of participation on all four remedial education measures. Those not enrolled in any degree program as well as those whose highest math course in high school was Algebra II or lower were also more likely to take some type of remedial course and specifically a math remedial course. Students who had been out of high school for more than one year also participated in some type of remedial course and specifically an English remedial course at higher rates than students overall.

Table 1. Percentage of National and Missouri First-Time Undergraduates Participating in Remedial Education, by Student Characteristics

	National (2003–04 cohort)				Missouri (fall 2011 cohort)			
	Any	Math	English	Reading	Any	Math	English	Reading
Total	**50.4**	**42.2**	**12.2**	**10.2**	**42.4**	**36.7**	**16.9**	**13.0**
Degree or certificate program, 2003–04								
No degree or certificate	57.9	50.7	12.4	14.0	*	*	*	*
Certificate	35.8	26.7	13.5	4.1	54.0	44.0	25.5	19.1
Associate's degree	66.9	58.7	16.9	16.3	64.5	56.8	26.7	23.1
Bachelor's degree	35.5	27.3	7.1	4.8	18.0	15.3	4.7	1.2
Major field of study when first enrolled								
Health	53.4	46.6	14.7	12.6	38.6	33.5	14.6	8.9
Business/management	54.9	44.9	14.6	10.7	30.8	25.0	10.5	6.0
STEM	43.0	34.1	9.5	7.3	21.9	17.9	7.6	3.5
Social sciences and humanities	50.2	41.5	9.4	8.8	56.1	50.0	23.1	20.2
Education	55.5	46.2	10.7	9.5	39.8	34.3	14.7	8.8
Undeclared	50.9	43.2	13.3	11.2	38.3	31.8	14.3	8.1
Race/ethnicity[1]								
White	46.0	39.4	7.7	6.9	39.4	34.6	13.3	8.8
Black	60.2	51.6	25.1	18.2	71.1	59.9	39.6	38.3
Hispanic	61.5	49.5	18.9	15.0	42.0	35.3	19.7	14.3
Asian	46.7	31.2	12.1	13.3	30.2	23.8	13.8	10.6
Highest education attained by either parent[2]								
Less than high school	62.3	51.4	23.8	16.6	64.1	55.3	32.7	26.2
High school	55.8	46.6	15.7	12.4	54.3	46.6	22.9	18.1
College or beyond	45.9	38.8	9.2	8.5	38.5	33.8	14.1	10.5
Recent high school graduate[3]								
Yes	46.6	39.0	10.2	9.8	39.1	33.9	15.4	11.6
No	56.5	47.2	15.5	11.0	59.5	51.4	24.7	20.2
Highest level of math taken in high school[4]								
None of the following	67.5	58.2	17.6	17.3	*	*	*	*
Algebra II	62.6	55.6	14.5	14.4	*	*	*	*
Trigonometry/Algebra II	49.3	40.1	10.3	8.2	*	*	*	*
Pre-calculus	39.5	31.1	9.1	7.5	*	*	*	*
Calculus	22.3	13.5	5.7	3.4	*	*	*	*

* Missouri data not available.

[1] Black includes African American and Hispanic includes Latino.

[2] National data on parents' education were based on student responses to the Beginning Postsecondary Students Longitudinal Study (BPS) interview unless they were unavailable or unknown, in which case Free Application for Federal Student Aid (FAFSA) records were used. Students who did not have an interview or a FAFSA, who chose other/unknown on the FAFSA, or who selected vocational or technical training in the interview were not included in the parents' education categories. Missouri data were based only on FAFSA records. Students who did not have a FAFSA or who chose other/unknown on the FAFSA were not included in the parents' education categories.

[3] Students who had completed high school within a year of starting their postsecondary education are considered recent high school graduates.

[4] Only includes first-time undergraduates under age 24.

NOTE: The national data in this table come from students attending all institution types while the Missouri data come only from students attending public two-year and public four-year institutions.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09), the 2009 Postsecondary Education Transcript Study (PETS:09), and Missouri Department of Higher Education, Fall 2011 Cohort.

A few groups, however, had lower rates of remediation than students at large. Nationally, those who started with a major in a science, technology, engineering, or mathematics (STEM fields) or who took calculus in high school were less likely to participate in some type of remedial course as well as a math remedial course specifically. Asians were significantly less likely to need math remediation than students at large, while whites were significantly less likely to need reading or English remediation.

A similar pattern emerged in Missouri. Compared with Missouri students at large, Missouri students who were enrolled in certificate and associate's degree programs; studied social sciences or humanities; were black; had parents who had less than a high school degree or who had a high school degree; or had not recently graduated from high school had higher participation rates than students overall on all four of the measures of remedial coursetaking presented in table 1.

Some Missouri students were less likely to take remedial courses than Missouri students at large. Those who enrolled in bachelor's degree programs; were white; had a parent with a college degree or higher; graduated recently from high school; or were pursuing health, business, STEM, education or had not declared their field of study had lower rates of participation on all four of the remedial measures displayed. Asian students were also significantly less likely than students at large to participate in all of the remedial measures presented except for remedial reading.

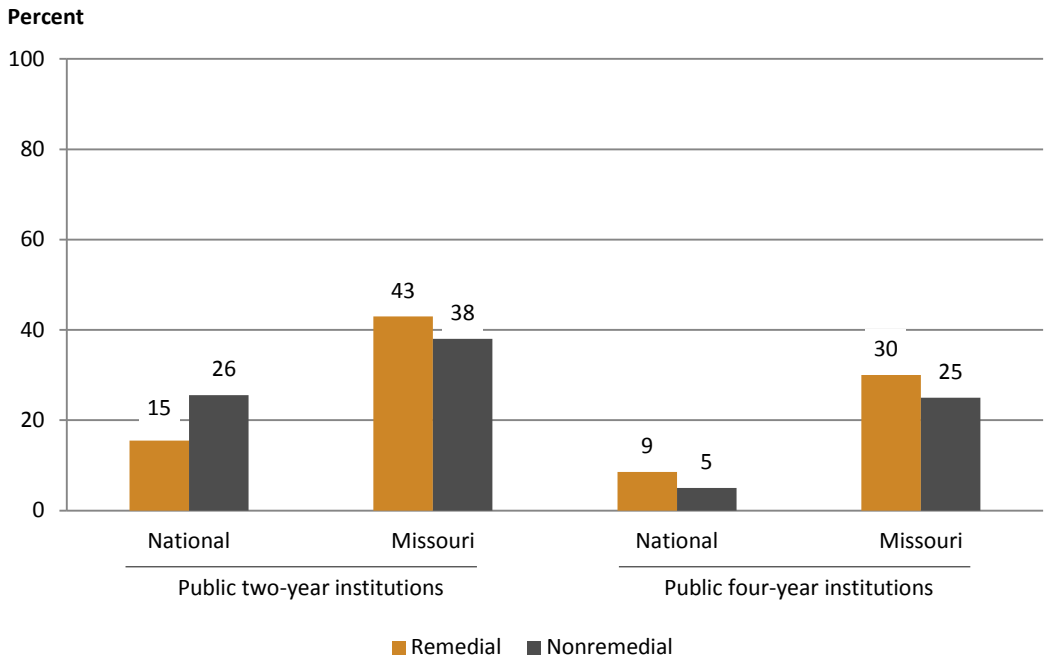
Outcomes: How Do Remedial Students Fare Compared with Nonremedial Students?

Some have raised concerns that students in remedial education have poorer outcomes than their nonremedial peers. The first set of figures in this chapter examines whether first-time undergraduates left postsecondary education by the end of their second year and did not re-enroll by their sixth year. The second set of figures investigates six-year persistence and attainment. The results at some institutions may be surprising.

Focusing first on the national results, by the end of year two, remedial students at public two-year colleges were about 11 percentage points *less* likely to leave college than their counterparts who did not take remedial education (figure 3). The same relationship occurred at for-profit institutions (of all levels), with 15 percent of remedial students dropping out compared with 35 percent of nonremedial students (figure 4). This somewhat counterintuitive pattern, with remedial students appearing to have more positive outcomes than nonremedial students, has also been observed elsewhere in terms of transfer rates (Dougherty & Kienzl, 2006) and level of commitment to completing a program of study (Horn, 2009). It has been suggested that students who undergo remedial education may be more motivated to achieve success than their peers who do not take remedial classes (Dougherty & Kienzl, 2006).

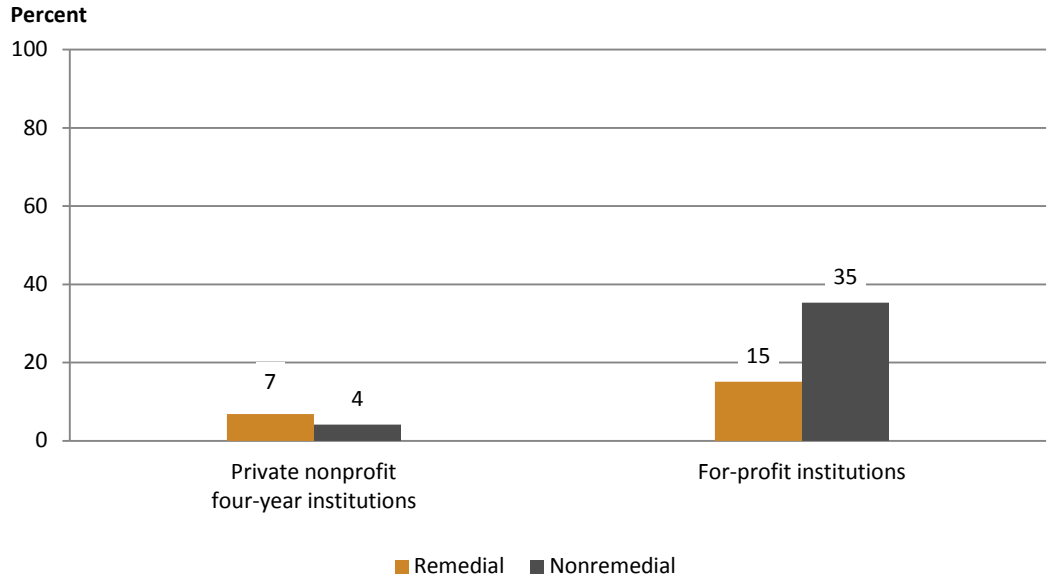
At public four-year and private nonprofit four-year institutions, the results are consistent with what one might expect in terms of the outcomes of remedial and nonremedial students. Remedial students at public four-year colleges were about 4 percentage points *more* likely than nonremedial students to have left postsecondary education, and remedial students at private nonprofit four-year institutions were roughly 3 percentage points more likely to do so (though this difference was not statistically significant). As indicated earlier, students in both public four-year and private nonprofit four-year colleges were much less likely to take remedial courses than their peers in public two-year colleges. Here we see that both remedial and nonremedial students at these two types of four-year colleges were also less likely than their counterparts in public two-year colleges to drop out during their first two years of enrollment.

Figure 3. Percentage of National and Missouri First-Time Undergraduates Who Left Postsecondary Education Without a Degree Within Two Years of First Enrolling and Had Not Returned as of 2009, by Location, Institution Type, and Remedial Education Status



NOTE: National results include first-time undergraduates who had enrolled at some point during the 2003–04 academic year. Missouri results include first-time undergraduates who had enrolled in the fall of 2003.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09), the 2009 Postsecondary Education Transcript Study (PETS:09), and Missouri Department of Higher Education, Fall 2003 Cohort.

Figure 4. Percentage of National First-Time Undergraduates Who Left Postsecondary Education Without a Degree Within Two Years of First Enrolling and Had Not Returned as of 2009, by Institution Type and Remedial Education Status



NOTE: These national results include first-time undergraduates who enrolled at some point during the 2003–04 academic year.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09) and the 2009 Postsecondary Education Transcript Study (PETS:09).

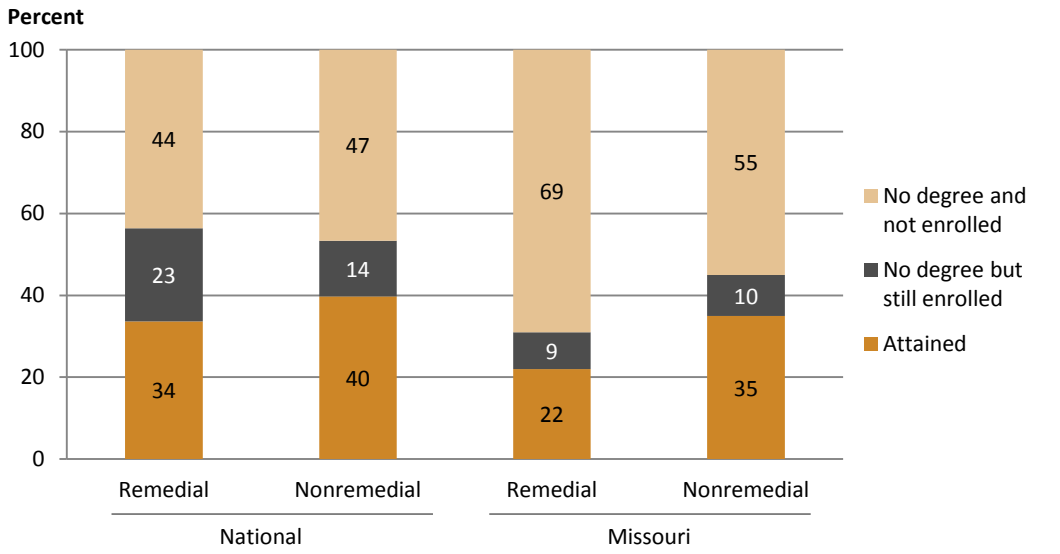
Missouri's two-year departure rates among remedial and nonremedial students at public two-year and public four-year colleges follow the same, more expected pattern. As figure 3 indicates, remedial students were significantly more likely than nonremedial students to have left without a degree.[4]

By year six of first-time undergraduates' postsecondary careers, attainment as well as persistence differences can be examined. Again starting with the national results, remedial students starting at public two-year, public four-year, and private nonprofit four-year institutions were significantly less likely than nonremedial students to have attained a degree or certificate (figures 5, 6, and 7). That said, the proportion of remedial students still

[4] While the national data for this chapter and the previous chapter come from the same cohort, use the same definition of remedial education, and include the same set of institutions, the Missouri data used in this and the prior chapter differ slightly in these respects. First, in order to examine two-year and six-year persistence and attainment, the Missouri data presented here were based on first-time undergraduates who entered in the fall of 2003 rather than the fall of 2011. Second, preparatory course information was not collected for the 2003 cohort and therefore was not included in determining remedial status. Finally, although the University of Missouri System and Truman State were included in the remedial results in the previous chapter, this chapter does not include these institutions.

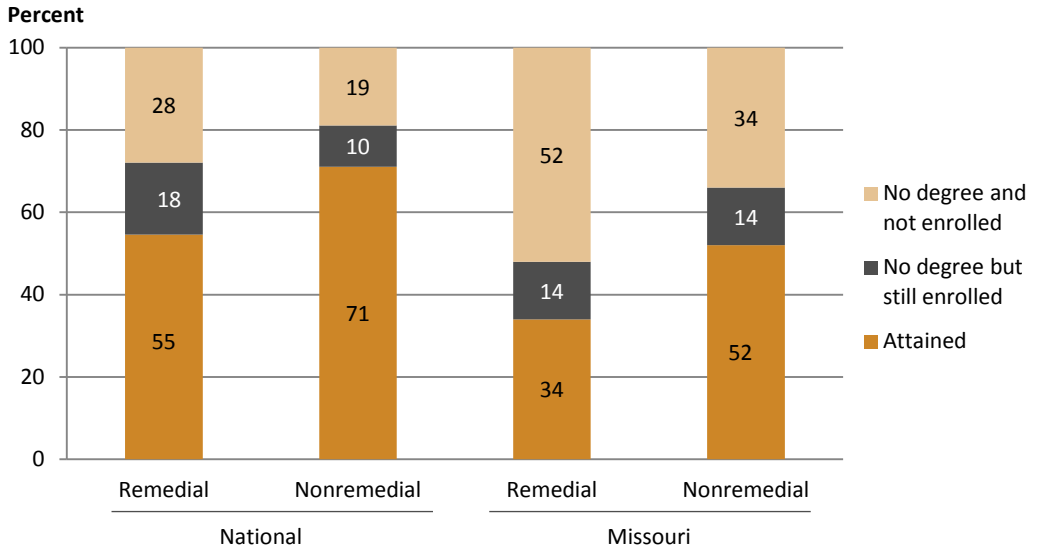
enrolled was higher, suggesting that many remedial students may simply have been taking more time to attain a degree. (Because remedial courses do not count toward degrees or certificates, they can lengthen completion time.) At public two-year institutions, the percentage of remedial students who dropped out did not significantly differ from their nonremedial counterparts, though at public four-year and private nonprofit four-year colleges, remedial students were significantly more likely to have left without a degree.

Figure 5. Persistence and Attainment Status as of 2009 for National and Missouri First-Time Undergraduates Who Started in Public Two-Year Institutions, by Remedial Education Status and Location



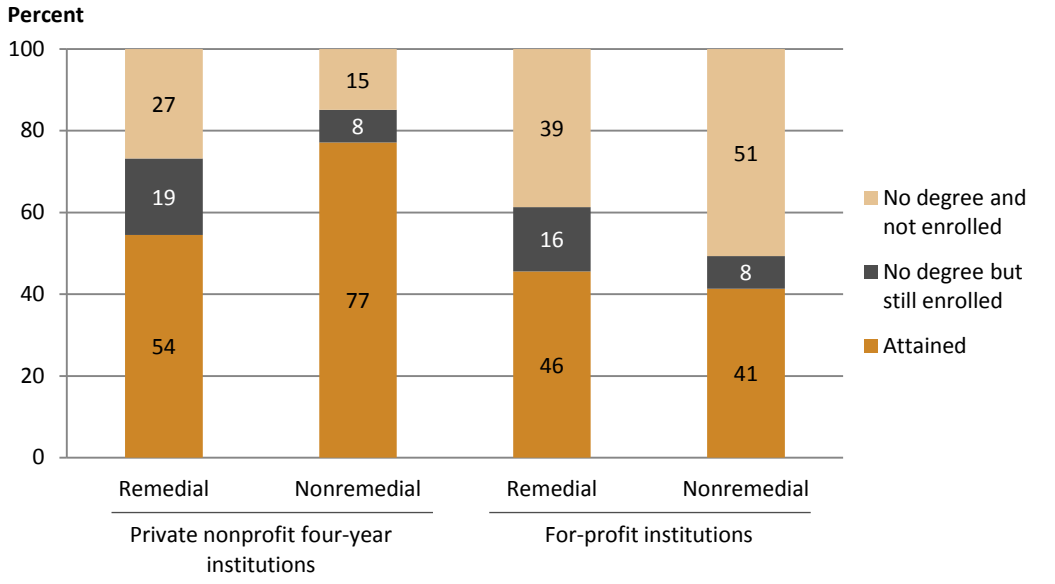
NOTE: National results include first-time undergraduates who enrolled at some point during the 2003–04 academic year. Missouri results include first-time undergraduates who enrolled in the fall of 2003.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09), the 2009 Postsecondary Education Transcript Study (PETS:09), and Missouri Department of Higher Education, Fall 2003 Cohort.

Figure 6. Persistence and Attainment Status as of 2009 for National and Missouri First-Time Undergraduates Who Started at Public Four-Year Institutions, by Remedial Education Status and Location



NOTE: National results include first-time undergraduates who enrolled at some point during the 2003–04 academic year. Missouri results include first-time undergraduates who enrolled in the fall of 2003.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09), the 2009 Postsecondary Education Transcript Study (PETS:09), and Missouri Department of Higher Education, Fall 2003 Cohort.

Figure 7. Persistence and Attainment Status as of 2009 for National First-Time Undergraduates, by Remedial Education Status and Institution Type



NOTE: These national results include first-time undergraduates who enrolled at some point during the 2003–04 academic year.
SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003/04 Beginning Postsecondary Students Longitudinal Study, Second Follow-up (BPS:04/09) and the 2009 Postsecondary Education Transcript Study (PETS:09).

A different pattern emerged at for-profit institutions nationally. Attainment rates did not differ between remedial and nonremedial students, and remedial students continued to exhibit *lower* dropout rates than their nonremedial peers. Just as at other institutions, remedial students at for-profit institutions were more likely to still be enrolled without a degree than nonremedial students. In considering these results, it is important to note that students attending for-profit institutions were much less likely to be enrolled in remedial education than students at public two-year colleges. In fact, the remedial education participation rate at for-profit institutions was more like that at four-year colleges. For-profit institutions may teach remedial education differently or employ other strategies with their remedial students that help prevent them from having lower attainment rates and higher dropout rates than their nonremedial peers.

Turning to the Missouri results, the patterns are more expected. Figures 5 and 6 reveal that at public two-year and public four-year institutions, remedial students were significantly less likely than nonremedial students to attain a degree or certificate. Remedial students were also significantly more likely to have dropped out without earning a degree or certificate. Nevertheless, no significant differences were found in the percentage of remedial and nonremedial students still enrolled without a degree at these two types of institutions.

High School Interventions

Early Assessment Programs

What are they?

In early assessment programs, students typically take local community college placement tests during their junior or senior years of high school. Those whose scores indicate that they are underprepared for college-level work receive interventions or services to help them become ready by high school graduation.

Specific Approaches and Outcomes

The California Early Assessment Program was designed to inform high school juniors whether they were academically prepared for college-level work at the California State University system. Under this program, supplemental college-readiness questions were added to a statewide test for 11th graders. Score reports then sent to schools and students indicated whether students were underprepared. An evaluation found the Early Assessment Program reduced students' probability of needing remediation at California State Universities by six percentage points in English and four percentage points in math (Howell, Kurlaender, & Grodsky, 2010).

In a similar program, El Paso Community College and the University of Texas-El Paso collaborated with 12 local school districts to implement a protocol that helped students prepare for the ACCUPLACER college entrance exam. Specifically, students attended an exam orientation and took the exam while still in high school. Underprepared students met with high school counselors to discuss ways to address their skill deficiencies. In the first two years of implementation, entering El Paso Community College students who took the ACCUPLACER just before postsecondary enrollment placed into college-level courses at a higher rate than entering students in previous years. The proportion of students who placed into higher level developmental courses also increased, meaning that students were a step closer to taking college-level courses than they had been in the past (Kerrigan & Slater, 2010).

Finally, Florida recently launched the statewide Postsecondary Education Readiness Test, which will be used to place college students into courses, measure how well high schools are preparing students for postsecondary education, and inform high school students about their readiness for college-level work (Burdman, 2011).

Dual Enrollment Programs

What are they?

Students participating in dual enrollment programs take college courses while still enrolled in high school. Once limited to high-achieving students, such programs are increasingly seen as a way to increase college-readiness for a range of students. Advocates of dual enrollment view it as a strategy to reduce remediation by exposing a broad range of students to college-level material and experiences (Bailey, 2008).

A Specific Approach and Outcomes

College Now, a dual enrollment program at the City University of New York, specifically targeted disadvantaged and academically underprepared students who took classes either on college campuses or from specially trained high school instructors. Students whose placement test scores were at the remedial level had the opportunity to take developmental courses while still in high school, offering them the chance to improve their fundamental skills before leaving. An internal evaluation found that College Now participants earned more credits during their first year of postsecondary enrollment (not including any dual enrollment credits awarded) and were more likely to persist into the third semester than their peers who had not participated in the program (Michalowski, 2007). Note these positive outcomes applied to students enrolled in College Now whether or not they took developmental courses.

Postsecondary Interventions

Increased Placement into College-Level Courses

Researchers have compared students who score just below and above placement test cut-score levels to examine whether placing underprepared students directly into college-level courses rather than remedial courses might improve their academic outcomes. The studies' conclusions have been mixed. Placement into developmental courses had no consistent, sizeable positive or negative effect on outcomes such as persistence, passing college-level courses, earning additional credits, or attainment (Boatman & Long, 2010; Calcagno & Long, 2008; Martorell & McFarlin, 2011; Bettinger & Long, 2005).

Summer Bridge Programs

What are they?

Colleges sponsor bridge programs to improve the academic and college-readiness skills of graduating high school seniors the summer before they begin college. The programs, which typically last four to six weeks, allow students to complete the developmental course sequence before their first term so they can start their postsecondary careers in college-level courses.

Specific Approaches and Outcomes

In 2007, the Texas Higher Education Coordinating Board funded 22 colleges to establish developmental summer bridge programs. The programs provided intensive developmental instruction in math, reading, and/or writing and college-readiness information to students underprepared for college-level work. Students who completed the summer bridge program were more likely to enroll in and pass college-level math and writing courses than students in a control group (Wathington et al., 2011).

The California State University system recently enacted a policy requiring all students who place into developmental education to enroll in a summer bridge program. The Early Start program is designed to offer students an opportunity to begin the developmental course sequence early (Lambert, 2012). Outcomes of the program have yet to be reported.

Traditional Remedial Courses Combined with Supplemental Services

What are they?

In these programs, developmental education is delivered in a traditional way, but support services, such as additional tutoring, counseling, mentoring and college-readiness instruction, are typically included as well.

Specific Approaches and Outcomes

Tutoring

In a national study designed to assess the efficacy of developmental education programs, researchers found that remedial students who received the help of trained tutors passed developmental English at higher rates and earned higher first semester GPAs than remedial students who did not receive tutoring (Boylan, Bliss, & Bonham, 1997). Generally, research on the effects of tutoring programs is fairly limited and has demonstrated mixed results (Rutschow & Schneider, 2011).

Advising

The Beacon Mentoring program at South Texas College recruited and trained college employees to make classroom presentations to students about the services available on campus, such as advising and tutoring and other academic support services. These college employees worked with faculty to identify struggling students and provide them with additional academic support. Developmental students in Beacon Mentoring classrooms were less likely to withdraw from their remedial math courses and earned more credits in other developmental courses than students in a control group (Visher, Busher, & Cerna, 2010).

Lorain Community College and Owens Community College in Ohio implemented an enhanced advising program for both remedial and college-level low-income students. These students were expected to meet with their advisor at least twice a semester for two semesters. They also received a modest stipend. Participating students registered for second semester classes at a higher rate and earned more credits in their second semester than nonparticipating students. The desired effect, however, appeared to be temporary. After the program ended, participants did not earn significantly more credits than nonparticipants (Scrivener & Weiss, 2009).

The Math Advising initiative at Zane State College in Ohio encouraged students placed into developmental courses to take the courses during their first quarter of college and provided additional dedicated math advising services to monitor and help foster students' progress

through their developmental coursework. The college recently expanded the additional advising to include all developmental education students. As a result of the program, first-year completion in developmental math increased by 21 percentage points, developmental English by 24 percentage points, and developmental reading by 13 percentage points (Times Staff, 2012).

Student success courses

Student success courses are supplemental classes designed to help students improve their study skills and overcome personal obstacles to success. Topics covered might include college expectations, goal setting, time and stress management, communication skills and an overview of learning styles. In a large-scale study in Florida, researchers found that developmental students who completed a college success course were more likely to complete a credential within six years than those who did not complete such a course (Zeidenberg, Jenkins, & Calcagno, 2007). Similarly, in a recent study of community college students in Virginia, researchers found that developmental math students enrolled in a success course were more likely to earn credits during the first year of college than those who were not enrolled. Additionally, upper-level developmental math students who took a success course were more likely to persist to their second year (Cho & Karp, 2012).

Integrated Instruction

What is it?

Integrated instruction combines developmental-level skills instruction with college-level academic or technical content within a single course. Remedial instruction uses content relevant to students' interest and goals. For example, building trades students might learn how to solve math problems within the context of their career area. In an academic class, developmental instruction might focus on science or history content.

Specific Approaches and Outcomes

Integrated developmental and *occupational* content: Implemented at Washington State's 34 community colleges, the Integrated Basic Education and Skills Training (I-BEST) program combines basic reading and math instruction with occupational content. The program is designed to increase the rate at which adult basic education and English as a Second Language students make a transition into and complete postsecondary credentials. Basic skills instructors and college-level technical faculty work together to develop and co-teach courses that integrate basic math and reading instruction with college-level technical content. Students enrolled in I-BEST were more likely than students enrolled in traditional adult

basic education to take additional credit-bearing courses, earn credits toward a credential and obtain occupational certificates (Jenkins, Zeidenberg, & Kienzl, 2009).

In another study, researchers found that California community college students enrolled in 10 different occupationally focused pre-algebra courses were more likely than students who participated in conventional remedial math to both pass developmental math and their subsequent occupational courses (Wiseley, 2011).

Integrated developmental and *academic* content: In a study of a 10-week community college developmental English course integrating content from science textbooks, researchers found that students improved their abilities to summarize college-level science material (Perin, Bork, Peverly, Mason, & Vaselewski, 2012).

An anonymous four-year college developed a remedial reading class that taught students using chapters from college-level textbooks from a range of fields. Results indicated that participating students scored higher than students in a comparison group on a statewide standardized reading test and received higher grades in the college-level history courses they took subsequently (Caverly, Nicholson, & Radcliffe, 2004).

Modularized Courses

What are they?

Modularized courses divide traditional developmental courses into smaller units designed to address a particular skill or set of skills, allowing students to focus on the course content in which they are underprepared and to proceed at their own pace until they master the material. These courses provide the opportunity for some students to progress through developmental education more quickly. The modularized course model has been applied most often in developmental math courses (Rutschow & Schneider, 2011).

Specific Approaches and Outcomes

Online modules or the emporium method: This approach allows students to progress at their own pace through online developmental course modules. Several institutions participating in the Tennessee Board of Regent's Developmental Studies Redesign Initiative have implemented the emporium method. One such program, Survive, Master, Achieve Review, Transfer (SMART) Math at Jackson State Community College, delivered course content through 12 online instructional modules developed through a grant with the National Center for Academic Transformation. Students also received supplemental assistance from instructors in a math lab center. The students completed modules at their own pace, with the possibility of completing all three levels of the developmental math

sequence within a single semester. The percentage of students completing the redesigned developmental math course sequence was 20 percentage points higher than students in previous cohorts who took conventional remedial education. The program's cost per student was also 20 percent lower than the traditional developmental model (Bassett, 2009). Virginia also recently implemented a modularized developmental math design. By the spring of 2013, courses will be taught as a series of one-credit modules, with students taking only the modules covering the content in which they underperformed in the placement test (Asera, 2011).

Online, paper-based, and classroom-based modularized courses: The Math My Way program at Foothill Community College in California divided developmental math students into groups by skill level. Each group met with an instructor for 10 hours each week to master specific concepts through self-paced drills and games, which were offered both online and on paper (Rutschow & Schneider, 2011). The program periodically retested and regrouped students based on their progress. Evaluation results indicated that students who participated in the Math My Way program had a 20 percent higher success rate in college-level math courses than did previous remedial student cohorts (Epper & Baker, 2009).

Accelerated Learning Models

What are they?

Developmental education programs often face criticism about the amount of time that students spend in remedial courses before making a transition to college-level work. Below we describe a range of program models that institutions have created to accelerate students' progress through the developmental course sequence.

Specific Approaches and Outcomes

Taking a single course that covers the content of two developmental courses: Some institutions offer programs designed to shorten the duration of developmental course sequences. The FastStart Program at the Community College of Denver and the Fast-Track Math program at Mountain Empire Community College in Virginia have allowed students to take more than one remedial or developmental math class within a semester. Internal evaluators found that students in these programs were more likely to pass developmental math courses than students who were not enrolled. Students at the Community College of Denver's compressed program were also more likely than those not enrolled to pass college-level math courses (Bragg, 2009).

Taking a single course that covers the content of both a developmental and a college-level course: At the University of Maryland-College Park, high-level developmental math students took an accelerated remedial course for the first five weeks of the semester and then retook the placement test. Those with passing scores could then take an intensive version of the college-level course for the remainder of the semester and thus not get behind their peers who had directly entered college-level math. A study found that nearly all students in the accelerated remedial course placed into college-level math and then went on to perform in college-level math at comparable levels as their peers who did not take a developmental course (Adams, 2003).

Similarly, in the CUNY College Transition Initiative, students who placed into developmental math were able to enroll in an accelerated remedial math course and then retake math placement tests mid-semester. Students who scored at the college level at this point were able to enroll in an accelerated college-level course (Hinds, 2011).

Integration of developmental and non-developmental course content: Developed by the Carnegie Endowment of the Advancement of Teaching, the Statway program is a year-long course sequence that combines developmental math with college-level statistics. Students learn the math skills they need to pursue college-level math while they receive credit for college-level statistics.

Simultaneous enrollment in developmental and college-level courses: The Accelerated Learning Program at the Community College of Baltimore County in Maryland placed developmental-level students with non-developmental students in a college-level English composition course. Developmental-level students in the course also enrolled in a supplemental remedial course taught by the same instructor. An initial evaluation indicated that developmental students in the program were more likely than students in conventional developmental education to pass college-level English within one year and to pass the next college-level composition course in the sequence. The per pupil cost of the program was also 14 percent less than a traditional remedial English course sequence (Jenkins, Speroni, Belfield, Smith Jaggars, & Edgecombe, 2010).

Learning Communities

What are they?

In learning communities, students enroll together as a cohort in two or more courses that are linked through integrated themes and curricula. This model is designed to help students see connections between disciplines and develop deeper, more supportive relationships with peers and faculty.

Specific Approaches and Outcomes

Learning community plus simultaneous enrollment in both a developmental and a college-level course: Multiple community colleges have adopted learning communities where students enroll simultaneously in a developmental and a college-level course focused on the same subject. For example, readings in a developmental course would come from the same field as the students' college-level course. Evaluators found that participating students at Merced, Houston and Queensborough community colleges in California, Texas, and New York, respectively, attempted and passed more developmental courses in either English or mathematics in their first semester of program participation (Weissman, Cullinan, Cerna, Safran, & Richman, 2012; Weissman et al., 2011). At Kingsborough Community College in New York, students attempted more courses generally and earned more credits during the first semester compared with students in a control group (Scrivener et al., 2008). That said, the impact of learning communities on participants' persistence after the program concludes has either been nonexistent or mixed (Scrivener et al., 2008; Weiss, Visher, & Wathington, 2010; Weissman et al., 2012; Weisman et al., 2011).

Learning community plus enrollment in a combined developmental/college-level course: Students in the Academy for College Excellence program, founded at Cabrillo College in California enroll as a cohort in a two-week foundational course focusing on self-awareness and communication skills, followed by a semester of accelerated academic courses integrating remedial and college-level content. An initial evaluation found that students earned more first semester credits and the program had a positive impact on one-semester persistence rates (Jenkins, Zeidenberg, Wachen, & Hayward, 2009). The program also had a positive effect on self-reported self-efficacy, motivation, and study skills (Farr, Rotermund, Ho, Radwin, & Robles, 2011). This research included ACE programs implemented at colleges in California, Pennsylvania, and Virginia.

Conclusion

National data suggest that half of all 2003–04 first-time undergraduates took a remedial course. The rate was higher at public two-year colleges (68 percent) and lower at other colleges (32, 35, and 39 percent at public four-year, private nonprofit four-year, and for-profit institutions, respectively). More recent Missouri data on fall 2011 first-time undergraduates at public institutions also reveal a difference by institution type. Sixty-four percent of Missouri students enrolled in public two-year colleges enrolled in remedial coursework compared with 20 percent of those attending public four-year colleges.

Both nationally and in Missouri, remedial participation rates were higher among those with certain student characteristics. Those who were enrolled in associate's degree programs, were black, and had not recently attended high school were especially likely to take remedial courses. National and Missouri data also indicate that remedial students' persistence and attainment outcomes are sometimes, but not always, as positive as their peers who do not participate in remedial education.

Yet there is also some good news. Strategies to reduce students' need for remediation at the postsecondary level and improve remedial students' educational outcomes are being developed and implemented around the county. As this report has highlighted, some policies focus on addressing gaps in students' education before they enroll in college. Other interventions occurring at the postsecondary level include limiting the number of students placed in remedial classes, providing additional supports to students in conventional remedial courses, revising traditional remedial courses to include college-level content, allowing students to accelerate their progress through remedial courses and quickly move on to college-level courses, and adopting several of these approaches while students journey through their classes as a cohort.

While more research is needed on the long-term effectiveness of different policies and practices, there are clearly many options that Missouri can consider as it seeks to address remedial education within the state.

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Appendix Table: Research Evaluations of Remedial Education Interventions

Program Name (State)	Publically Available External or Internal Evaluation
Early Assessment Programs	
Early Assessment Program (CA)	✓
El Paso Community College and University of Texas El Paso College Readiness Protocol (TX)	✓
Postsecondary Education Readiness Test (FL)	
Dual Enrollment Programs	
College Now (NY)	✓
Summer Bridge Programs	
Developmental summer bridge programs (TX)	✓
Early Start (CA)	
Traditional Remedial Courses Combined with Supplemental Services	
Beacon Mentoring program (TX)	✓
Enhanced guidance at Lorain and Owens Community Colleges (OH)	✓
Math Advising Initiative (OH)	✓
Student success courses (FL and VA)	✓
Integrated Instruction	
I-BEST (WA)	✓
Modularized Courses	
SMART Math (TN)	✓
Modularized developmental math course design (VA)	
Math My Way (CA)	✓
Accelerated Learning Models	
FastStart (CO)	✓
Fast-Track Math (VA)	✓
Developmental math at the University of Maryland-College Park (MD)	✓
CUNY College Transition Initiative (NY)	
Statway (various)	
Accelerated Learning Program (MD)	✓
Learning Communities	
Learning communities with simultaneous enrollment in developmental and college-level courses (various)	✓
Academy for College Excellence (various)	✓