The Traditional Approach to Developmental Education: Background and Effectiveness

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The Traditional Approach to Developmental Education: Background and Effectiveness

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A significant challenge in higher education is to narrow the educational attainment gap between academically prepared and unprepared students. To this end, developmental or remedial education is intended to improve the academic skills and knowledge of students who are unprepared for undergraduate coursework, particularly in the areas of mathematics, reading, and writing. Arguably, developmental education may also serve a broader purpose, "to provide the minimum levels of reading, writing, and math skills deemed essential for functional participation in a democratic society and individual sustainability in a free economy" (Bahr, 2008, p. 211). Whether remedial education is effectively achieving these goals, however, has been a matter of considerable debate (Bailey, Jaggars, & Scott-Clayton, 2013; Goudas & Boylan, 2012). On the one hand, only 20% of community college students referred to developmental math and 37% of students referred to developmental reading complete a college-level course in the corresponding subject within three years (Bailey, Jeong, & Cho, 2010).[1] Moreover, despite high rates of enrollment in developmental education, large gaps in achievement and degree completion persist (Ross et al., 2012). In California community colleges, 71% of college-ready students eventually complete a credential or transfer, compared to 41% of academically unprepared students (California Community Colleges, 2013). On the other hand, a simple comparison of success rates may not accurately portray the effectiveness of developmental education since "it is possible that developmental students would have even weaker outcomes if these services were not available" (Bailey, 2009, p. 15). Seemingly low rates of success among developmental students may be at least partly attributable to low levels of academic preparation and motivation (Bettinger, Boatman, & Long, 2013).

This brief seeks to portray some of the difficulties that arise in conceptualizing remedial success rates and determining the effectiveness of developmental programs. First, the organization and cost of developmental education in the United States are described. Second, remedial enrollment rates are estimated by institutional type and various demographic attributes. Third, variation in success rates is demonstrated by categorizing students according to referral and enrollment status, course

[1] The average rates of student success in developmental education can be misleading since such factors as student intentions and differences in program requirements are rarely taken into account (Bahr, 2011). For example, low rates of completing college-level math courses may have occurred, in part, because many students enrolled in vocational programs that did not require mathematics coursework.

subject, severity of skill deficit, and academic intentions. Fourth, research on the effectiveness of the traditional approach is summarized, focusing on the effects of remedial assignment, enrollment, and completion. Finally, several policy implications are offered.

Organization of Developmental Education

Nearly all public two-year colleges and 75% of public four-year institutions offer remedial instruction.[2] Although developmental curricula and policies for course placement vary widely (Asmussen, 2014; Bailey, 2009; Education Commission of the States, 2014; Hodara et al., 2012; Parsad & Lewis, 2003), there are some common structural attributes. Developmental curricula are typically structured as one-semester courses in sequences that precede a "gateway" college-level course in English or mathematics. Public institutions have an average of two to three levels of remediation in math, reading, and writing, though some have four or more levels (Parsad & Lewis, 2003).[3] For instance, two-year colleges in California generally offer four levels below college math: arithmetic, pre-algebra, beginning algebra, and intermediate algebra or geometry (see Bahr, 2012).

Standardized test performance is typically the method that determines placement into remedial courses. Nationally, the two most commonly used placement exams at community colleges are the ACCUPLACER by the College Board and the COMPASS by ACT (Primary Research Group, 2008). Students who earn a test score above a predetermined value are deemed "academically prepared" for the subject matter and placed into a college-level course; the remaining students are referred to developmental courses. Developmental course placements may be one or more levels below college-level, depending on predetermined cut-off scores for each level. However, cut scores used for student placement differ across colleges due to varying definitions of "college-ready" (Fields & Parsad, 2012).

Once students are referred, most colleges and universities require remedial course enrollment,

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[2] The authors' analysis of 2013 IPEDS data showed that 99% of public 2-year colleges and 75% of public 4-year institutions offered remedial services. In contrast, 51% of private not-for-profit two-year colleges and 63% of private not-for-profit four-year institutions offered remedial services. (The analysis was restricted to U.S. institutions with undergraduate students.)

[3] There is a limit on the level of academic under-preparedness that colleges can address. Federal law (34 CFR 668.20) disallows students from receiving federal financial aid for any developmental courses for which the level of instruction is below the secondary level (except English as a second language). Colleges usually refer students who have developmental needs below the secondary level of instruction to Adult Basic Education programs.

yet some institutions recommend but do not require enrollment (Bailey, 2009; Parsad & Lewis, 2003).[4] Parsad and Lewis (2003) found that while only 1% of institutions prohibit remedial students from taking any college-level courses, over 80% of institutions have some restrictions on college-level course registration (e.g., "cannot take courses for which the remedial courses are a prerequisite"). Finally, it is noteworthy that remedial course enrollment generally qualifies for financial aid but does not satisfy credit requirements for degree completion (Parsad & Lewis, 2003).[5]

Cost of Developmental Education

The private and public costs of addressing academic deficiencies at the postsecondary level are substantial. Students must pay tuition and fees for remedial enrollment and delay enrollment in college-level courses that count towards degree credit requirements. Taxpayers also incur a significant cost. According to the Alliance for Excellent Education (2011), the cost of remediation in public institutions nationwide was $3.6 billion for students who entered college during 2007-08. This amount constituted 5% of the $69 billion in state and local higher education appropriations in 2007 (NCHEMS, 2014). The cost of remedial education ultimately must be weighed against the potentially higher costs of limiting access to postsecondary credentials (Bettinger, Boatman, & Long, 2013), such as lower tax revenues and greater spending on Medicaid and corrections (Prince & Choitz, 2012).

Enrollment Rates in Developmental Education

Nearly half of all undergraduate students take at least one remedial course, though rates of enrollment vary considerably by institutional type (see Table 1). Given their open admissions policy, enrollment in developmental education courses is particularly high at public two-year colleges, where 67% of students took at least one remedial course. In contrast, 49% of students who initially enrolled at a public non-doctorate, four-year institution took at least one developmental course, though some four-year college students complete their developmental coursework at two-year colleges.[6] Developmental course referral rates are likely even higher than enrollment rates (Asmussen, 2014; Bailey, 2009). Bailey's (2009) analysis of 83 community colleges revealed that 21%

[4] In 2000, 71% to 84% of public institutions mandated enrollment for referred students (Parsad & Lewis, 2003). More recently, Florida enacted a law that prohibits colleges from mandating developmental coursework (Fain, 2013).
[5] 78% to 87% of public institutions grant credit for developmental education (Parsad & Lewis, 2003).
[6] The BPS study did not identify where students actually enrolled in developmental courses. In recent years, some states have taken actions that restrict developmental education courses primarily to community colleges (Jacobs, 2012).

of students referred to developmental math and 33% of students referred to developmental reading did not enroll in developmental coursework. High referral and enrollment rates in remedial education are consistent with research demonstrating that less than 40% of high school graduates are "college-ready" (ACT, 2013; Chen, Wu, & Tasoff, 2010; Fields, 2014).[7]

Table 1. Percentage of 2003-04 Undergraduate Students who Enrolled in at least One Remedial Education Course Over Six Years.

First institution attended (2003-04)	Ever enrolled in remedial…				
	Any subject	Math	English	Reading	Other
Total	49	41	12	10	6
Public less-than-2-year	36	22	n/a	n/a	18
Public 2-year	67	58	16	17	6
Public 4-year nondoctorate-granting	49	41	10	9	3
Public 4-year doctorate-granting	34	27	5	n/a	4
Private not-for-profit less than 4-year	64	54	n/a	n/a	n/a
Private not-for-profit 4-yr nondoctorate-granting	35	25	9	4	6
Private not-for-profit 4-year doctorate-granting	23	16	8	3	n/a
Private for-profit less-than-2-year	27	19	12	3	9
Private for profit 2-years or more	41	33	12	n/a	n/a

Source: Authors' analysis of BPS2009 transcript study with a nationally-representative sample.

Table 2 indicates that enrollment in remedial education varied by age, ethnicity, and income, particularly among students at four-year institutions. Only 36% of 19 year-old students who initially enrolled at a four-year institution took at least one remedial course, compared to 50% of 20 to 23 year-old students and 64% of 24 to 29 year-old students. A larger proportion of Black and Hispanic

[7] College-ready is defined as meeting all four ACT benchmarks, meeting NAEP academic preparedness standards, or taking high-level coursework during high school, including "4 years of English; 3 years of mathematics (including at least 1 year of a course higher than algebra II); 3 years of science (including at least 1 year of a course higher than biology); 3 years of social studies (including at least 1 year of U.S. or world history); and 2 years of a single non-English language" (Chen et al., 2010, p. 2).

students took at least one remedial course than did White students at both two- and four-year institutions. Differences in family income were most salient at four-year institutions. Approximately 52% of four-year college students at or below poverty enrolled in remedial education, compared to 26% of students in the highest income category. Notably, the disparities in remedial enrollment by ethnicity and income mirror the achievement gaps observed in the PK-12 sector. For instance, only 19% of 8th grade low-income students attained proficiency in reading on the National Assessment of Educational Progress, compared to 48% of higher-income students (NAEP, 2014).[8]

Table 2. Percentage of 2003-04 Undergraduate Students who Enrolled in at least One Remedial Education Course Over Six Years by Income, Race/Ethnicity, and Age

	2-yr institutions	4-yr institutions
Total	65	37
Age first year enrolled		
18 or younger	67	33
19	66	36
20-23	68	50
24-29	64	64
30 or older	56	54
Race/ethnicity		
White	61	33
Black or African American	72	56
Hispanic or Latino	71	54
Asian	69	27
American Indian or Alaska Native	64	n/a
other	68	26
Income as percent of poverty level		
At or below poverty	65	52
101-200%	70	48
201-600%	63	34
601-1000%	61	26

Source: Authors' analysis of BPS2009 transcript study with a nationally-representative sample.

[8] Low-income is defined as being eligible for free lunch through the National School Lunch Program.

Success Rates in Developmental Education

Estimates of success rates in remedial education greatly depend upon how students are categorized and how success is defined. For example, rates of successful remediation are relatively lower for students who are non-White, male, older, or of lower socioeconomic status (Bahr, 2010b). As summarized in Table 3, remedial students can also be categorized according to referral and enrollment status, course subject, severity of skill deficit, and academic intentions. Student success has been most commonly defined as completion of the assigned remedial sequence, passing a college gatekeeper course, and earning a postsecondary degree.

Referral vs. enrollment.

Among students referred to developmental courses, a majority do not complete their remedial sequence. Bailey, Jeong, and Cho (2010) found that only 33% of students referred to developmental math ultimately completed their course sequence (27% never enrolled), and only 46% of students referred to developmental reading completed their remedial sequence (30% never enrolled). Moreover, few students referred to developmental education ultimately pass the corresponding college-level course: 20% of students referred to developmental math pass college-level math, and 37% of students referred to developmental reading pass college-level English (Bailey, Jeong, & Cho, 2010).

The depiction of remedial success rates improves somewhat when examining only those students who *enroll* in a developmental course. Approximately 45% of referred students who had enrolled in developmental math completed their sequence, and 66% of referred students who had enrolled in developmental reading completed their remedial sequence. However, only 33% of students who had enrolled in developmental math passed college-level math, and 51% of students who had enrolled in developmental reading passed college-level English (Bailey, Jeong, & Cho, 2010).

Severity of skill deficit.

Rates of remedial student success partly depend on the depth and breadth of skill deficits across math, reading, and writing (Adelman, 2004; Bahr, 2010a; Bahr, 2012). For example, Bahr (2007) analyzed data on 55,000 students who had enrolled in 107 California community colleges and found that only 8% of the students who had been placed into Basic Arithmetic (four levels below college math) successfully completed math remediation, compared to 54% of the students who had been

placed into Intermediate Algebra and Geometry (one level below college math). Success rates are lower among students who face the double jeopardy of needing remediation in both reading and math (Asmussen, 2014; Bahr, 2007).

Lower rates of course completion naturally result in lower degree completion rates. Adelman (2004) found that 60% of students who took no remedial courses earned an Associate or Bachelor's degree by age 30, compared with 55% who took one remedial course, 45% who took two remedial courses, and 35% who took three or more remedial courses that included reading.

Academic intentions.

Students' academic intentions may influence whether they ultimately complete a remedial course sequence, particularly in the case of math remediation. In his analysis of community colleges in California, Bahr (2011) illustrated that success rates in remedial math varied by whether students were classified as drop-in, experimental, noncredit, vocational, transfer, and exploratory.[9] For example, 57% of remedial students who had demonstrated an intention to transfer and earn a baccalaureate degree passed the first college-level math course. In contrast, only 27% of remedial students who were exploring possible interests in a transfer or technical credential passed the first college-level math course. Even fewer remedial students who had concentrated on earning a technical certificate completed a college-level math course (12%). In fact, some career/technical programs do not require students to complete any math courses. Finally, less than 1% of experimental remedial students who seemed to be just "trying out" college successfully completed a college-level math course.

[8] Bahr derived his typology from course enrollment and success patterns. Because program requirements and prerequisites vary among states and institutions, these patterns may be different in other settings. For example, some Minnesota community colleges allow non-STEM transfer students to avoid taking math coursework if they complete a logical reasoning course.

Table 3. Depictions of Success Rates in Remedial Education

Student group	Success definition	Success rate
Referral vs. Enrollment in Math Remediation (Bailey, Jeong, & Cho, 2010)		
All students referred to math remedial education	Completed remedial sequence	33%
	Completed college gatekeeper course	20%
Referred students who enrolled in math remedial education	Completed remedial sequence	45%
	Completed college gatekeeper course	33%
Referral vs. Enrollment in Reading Remediation (Bailey, Jeong, & Cho, 2010)		
Students referred to reading remedial education	Completed remedial sequence	46%
	Completed college gatekeeper course	37%
Referred students who enrolled in reading remedial education	Completed remedial sequence	66%
	Completed college gatekeeper course	51%
Severity of Skill Deficit (Adelman, 2004)		
Enrolled in 1 remedial course	Earned postsecondary degree	55%
Enrolled in 2 remedial course	Earned postsecondary degree	45%
Enrolled in 3 or more remedial courses (including reading)	Earned postsecondary degree	35%
Academic Intentions (Bahr, 2011)		
Transfer: Remedial math students who transferred from a 2- to 4-year institution	Completed college gatekeeper course	57%
Exploratory: remedial math students undecided between transfer and technical programs	Completed college gatekeeper course	27%
Vocational: remedial math students focusing on occupational coursework	Completed college gatekeeper course	12%
Experimental: remedial math students trying out college	Completed college gatekeeper course	Less than 1%

The Effect of Developmental Education on Persistence and Achievement

An examination of success rates among remedial students might suggest that developmental education is categorically ineffective. The estimated effect of developmental education on student outcomes, however, must be differentiated from the effects of other potentially confounding attributes, particularly academic preparation and motivation (Bettinger, Boatman, & Long, 2013). In order to measure the effectiveness of remedial education, researchers have used sophisticated statistical methods to examine the impact of remedial placement, enrollment, or completion on student persistence, college-level course enrollment or completion, and degree completion. Interestingly, the effect of remediation on academic achievement in the first college-level course has not been widely examined (e.g., Boatman & Long, 2010), even though "the most essential purpose of remedial courses is to prepare students to be successful in the college curriculum" (Boylan & Saxon, 1999).

Overall, research has yielded mixed results for estimates of the average effect of developmental education (Bailey, Jaggars, & Scott-Clayton, 2013; Bettinger & Long, 2009; Melguizo, Bos, & Prather, 2011),[10] which may stem from differences in methodology,[11] the type of institution and state system studied, the subject of remediation, the accuracy of student placement, and variation in program quality. A major source of confusion in many studies regards the interpretation of null effects in relation to student persistence, wherein remedial students persist at similar rates as non-remedial students after accounting for confounding influences. Some researchers have implied that a null effect can be interpreted as evidence that developmental education is ineffective (e.g., Martorell & McFarlin, 2011). Conversely, others have suggested that a null effect demonstrates that developmental education does not hinder student persistence and therefore reveals some degree

[10] Studies were selected for this review if a rigorous statistical analysis was employed to minimize the influence of confounding factors, including regression discontinuity, propensity score analysis, and traditional regression with key covariates. Although these studies do not provide the same level of confidence in causal attribution as do experimental designs, they currently provide our best estimates of program effectiveness.

[11] The appropriate methodology partly depends upon the research question, but viable methods are rarely without limitations. For example, in order to examine the effect of student placement, researchers frequently use a statistical technique termed regression discontinuity, wherein the outcomes of students who barely pass the placement test are compared with the outcomes of those who barely fail. This method is based on the notion that students clustered near the cut-off score for a placement test do not significantly differ from each other on potentially confounding attributes. However, the results from such studies can only be generalized to students with scores that approximate the cut-off point.

of effectiveness (e.g., Bahr, 2010a). This review adopts the latter more conservative view insofar as the direct effect of remedial coursework may be limited mainly to academic achievement in the first college-level course. Nonetheless, remedial coursework should not decrease persistence relative to mainstream coursework, and thus negative effects should be viewed as evidence that developmental education is ineffective. Positive and null effects would then imply that remedial education is effective or at least not deleterious to student persistence.[12]

The effect of remedial assignment or enrollment.

Research examining the average effect of student placement or enrollment in remedial education has revealed negative, positive, and null results (Attewell et al., 2006; Bettinger & Long, 2009; Calcagno & Long, 2008; Lesik, 2007; Martorell & McFarlin, 2011; Scott-Clayton & Rodriguez, 2012). In one of the few studies using a propensity analysis with a national sample of recent high school graduates, Attewell et al. (2006) found that remedial enrollment decreased the probability of earning a degree by seven percentage points among four-year college students, but remedial enrollment had no effect on degree completion among two-year college students. Furthermore, among students who completed a bachelor's degree, enrollment in three or more remedial courses increased time to degree by four months. Calcagno and Long (2008) compared Florida community college students who were just below or above the cutoff point for remedial assignment (i.e., students had essentially identical scores). They observed that assignment to reading (but not math) remediation reduced the likelihood of degree completion. In contrast, Bettinger and Long's (2009) instrumental variable study of students at public institutions in Ohio revealed that enrollment in English or math remediation increased the likelihood of bachelor's degree completion.

More recent studies have failed to detect any effect of remedial enrollment or assignment on degree completion. Martorell and McFarlin (2011) found that remedial enrollment had no effect on the likelihood of graduation at two- and four-year institutions in Texas. Similarly, an analysis of student outcomes at six community colleges demonstrated that students assigned to remedial education were just as likely to persist and graduate as similar students who were allowed to enroll in a college-level course (Scott-Clayton & Rodriguez, 2012).

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[12] Long-term developmental education systems that include certain forms of academic and social support utilization may have a defensible objective of *increasing* persistence.

The effect of remedial completion.

Studies on the completion of remedial education rather than mere assignment or enrollment have revealed mainly null or positive effects (Attewell et al., 2006; Bahr, 2008, 2010a, 2010b; Lesik, 2007). Bahr (2010a) found that students with different levels and combinations of English and math deficiency who had successfully completed their remedial coursework generally had comparable rates of degree completion and transfer as college-ready students, while controlling for background characteristics. Lesik (2007) found only positive effects at a four-year state university, wherein completion of developmental math increased the likelihood of persistence. Attewell et al. (2006) observed that the successful completion of remedial reading and writing (but not math) increased the likelihood of graduation among community college students. Only null effects were found for successful remediation among four-year college students. Attewell et al. concluded that the mix of mainly null and positive results suggests that "most of the gap in graduation rates has little to do with taking remedial classes in college. Instead, that gap reflects preexisting skill differences carried over from high school" (p. 915).

Differential effects.

In order to explain the presence of mixed results, researchers have sought to determine whether developmental education is differentially effective for some students (e.g., Bahr, 2010a, 2010b; Bettinger & Long, 2009; Boatman & Long, 2010; Scott-Clayton & Rodriguez, 2012). One possible moderator of the effect of remediation is the degree of academic under-preparation. Presumably, remedial education should yield a null or positive effect for students with actual academic deficiencies. But misplacing students with marginal deficits into developmental courses when they could have handled college-level coursework may create a sense of discouragement that adversely affects their persistence (Venezia, Bracco, & Nodine, 2010). Accordingly, negative effects detected in past research might be partly attributed to groups of "developmental" students that mainly contain misplaced students. Recent research provides some support for this hypothesis (Boatman & Long, 2010; Scott-Clayton & Rodriguez, 2012). In their analysis of public four- and two-year institutions in Tennessee, Boatman and Long (2010) observed that the assignment of students with only marginal academic deficits to remedial mathematics or writing yielded negative effects on degree completion. But among students with low levels of academic preparation, remediation was sometimes positively

associated with degree completion. Similarly, Scott-Clayton and Rodriguez (2012) found that assignment to remedial math reduced the likelihood of passing a college-level math course among community college students with a low or medium risk of drop out but not among those with a high risk of drop out.

Conclusion

In conclusion, while developmental education must be continuously improved, this review fails to support the notion that developmental education has been categorically ineffective. A positive effect on student persistence has been detected when examining the successful completion of remedial education (Attewell, 2006) and remedial assignment among students with truly low levels of academic preparation (Boatman & Long, 2010). The traditional approach has been particularly ineffective for students with only marginal skill deficits who were likely misplaced into remedial coursework (Boatman & Long, 2010; Scott-Clayton & Rodriguez, 2012). Null effects are quite pervasive in effectiveness studies, which suggest that developmental education does not hinder student persistence on average. Additional research is needed to understand the relationship between remedial education and academic achievement as well as the conditions under which the traditional approach can be effective or improved.

Policy Implications

- Less than 40% of high school graduates are college-ready, and nearly half of all students take at least one remedial course at a postsecondary institution. Moreover, the disparities in remedial enrollment by ethnicity and income mirror the achievement gaps observed in the PK-12 sector. This suggests that the problem of high enrollment in remedial education during college must be partly addressed in the PK-12 sector. Two promising interventions for promoting PK-16 alignment are dual enrollment and early skills assessment (Rutschow & Schneier, 2011).
- Estimates of success rates in remedial education greatly depend upon how students are categorized. Student cohorts should be defined by referral and enrollment status, course subject, severity of skill deficit, and academic intentions. Cohorts should be tracked over time to account for differences in remedial course sequences and student circumstances.

- Indicators of student success should be consistent with the objectives of remedial education and institutional mission. Remedial coursework is frequently intended to enable students to complete college-level coursework, which would suggest measures of academic achievement and pass rates in college gateway courses. Further, colleges generally hold the aim of facilitating progress towards a credential for all students, and thus measures of student persistence, transfer, and degree completion should be used to track longer-term success rates.[13]
- Simple comparisons of remedial and "college-ready" student outcomes will typically fail to demonstrate whether developmental education is effective. Evaluations of student outcomes should account for differences in academic preparation and intentions, the accuracy of student placement, variation in program quality, and utilization of support services, among other factors.
- The review of effectiveness research suggests that the completion of remedial education on average does not hinder and may improve student persistence. However, students capable of college-level work who are misplaced into remedial education appear to be most at risk of departure. This underscores the importance of establishing appropriate program requirements and ensuring that student placement processes are accurate.

[13] Significant numbers of students will transfer to other colleges after failing to make adequate academic progress. Should those students be counted as "successful" at their original college? One way of overcoming that challenge is to consider transfers as successful only when students have met a certain academic standard at their original institution, such as a GPA of 2.0.

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