

# **An NCPR Working Paper**

## **Building Foundations for Student Readiness**

### **A Review of Rigorous Research and Promising Trends in Developmental Education**

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## **Abstract**

One of the greatest challenges that community colleges face in their efforts to increase graduation rates is improving the success of students in their developmental, or remedial, education programs. This literature review seeks to examine research on developmental education strategies and reforms and identify the most promising approaches for improving developmental education students' success. The key focus is on investigating those strategies with rigorous evidence showing improvements in students' achievement and suggesting areas for future innovations in developmental education practice and research. This analysis focuses on four different types of interventions for improving students' progress through remedial education and into college-level courses, including (1) strategies that help students avoid developmental education and move directly in college-level work; (2) interventions that accelerate students' progress through developmental education; (3) contextualized instructional models that connect students with workforce training and college-level courses; and (4) supplemental supports aimed at improving students' success.

The findings from this study suggest that while research on best practices in developmental education abounds, little rigorous research exists that documents the effects of these reforms on students' achievement. The most promising strategies for moving students more quickly through remedial courses and into college-level work tend to be those that: (1) help students build their skills before entering college; (2) integrate students' into college-level courses; and/or (3) provide clear opportunities for the development of occupational and workforce skills. Exploration of more radical approaches to transforming developmental education is also recommended. Finally, suggestions for tackling the institutional challenges to implementing developmental education reforms, such placement tests, adjunct faculty, and professional development, are also provided.



# Contents

<b>Abstract</b>	iii
<b>Acknowledgments</b>	vii
<b>1. Introduction</b>	1
Previous Research on Best Practices in Developmental Education	2
Rigorous Research in Developmental Education: The Next Step	9
Methods	10
Identification of Promising Models	11
<b>2. Interventions for Avoiding Developmental Education</b>	13
Models for Avoiding Developmental Education	14
Dual Enrollment Programs	14
Early Placement Assessment Programs	17
Summer Bridge Programs	19
Summary	20
<b>3. Accelerating Students' Progress through Developmental Education</b>	23
Models for Accelerating Students' Progress through Developmental Education	24
Fast-Track Courses	24
Modularized Courses	26
Mainstreaming into College-Level Courses	28
Summary	30
<b>4. Contextualized Instruction</b>	32
Models for Contextualized Learning with Developmental Education Students	33
Contextualized Learning in Vocational Programs	33
Learning Communities	35
Summary	38
<b>5. Supplemental Supports to Advance Students' Achievement</b>	40
Models for Supplemental Supports with Developmental Education Students	40
Tutoring and Supplemental Instruction	41
Advising	44
Student Success Courses	46
Summary	47
<b>6. Conclusion</b>	50
Improving the Quality of Evidence	52
Promising Strategies for Improving Developmental Students' Success	53
Additional Considerations for Future Research and Practice	59
Conclusion	64
<b>Appendix: List of Journals Reviewed (Keyword Search)</b>	65
<b>References</b>	66



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# 1. Introduction

In recent years, community colleges have become a centerpiece of America's efforts to improve the quality of its workforce and maintain its competitiveness in the global market. Enrolling over one-third of all post-secondary education students, community colleges play a critical role in helping educate the U.S. populace, often serving as the gateway for traditionally disadvantaged students to enter college.<sup>1</sup> However, community colleges have often struggled to graduate their students, with only one in ten community college students earning a degree within three years of first enrolling.<sup>2</sup> Faced with this dilemma, the federal and state governments, along with major national foundations such as the Bill and Melinda Gates Foundation and Lumina Foundation for Education, have begun to invest millions of dollars into improving community colleges' success rates. Along with these monies, these stakeholders have also called for a dramatic increase in community college graduation rates, with most seeking to double the number of graduates in the next 10-15 years.<sup>3</sup>

One of the greatest challenges that community colleges face in their efforts to increase graduation rates is improving the success of students in their developmental, or remedial, education programs.<sup>4</sup> Recent research has revealed that over half of community college students are academically underprepared for college-level work and need to enroll in at least one developmental-level reading, writing, or math course upon entering college; however, very few of these students end up completing their developmental education sequence, let alone graduating from college with a diploma or certificate.<sup>5</sup> In fact, longitudinal studies have shown that the success rates of students with remedial needs have dropped over the past few decades, with fewer students earning a post-secondary degree regardless of the depth or subject of their remedial need.<sup>6</sup>

Some of these challenges may be due to the fact that little rigorous research exists documenting effective practices for improving developmental education students' success. The field is slowly moving towards higher standards of evidence, however. While research

<sup>1</sup> Provasnik and Planty (2008).

<sup>2</sup> Goldrick-Rab, Harris, Mazzeo, and Kienzl (2009).

<sup>3</sup> Bill and Melinda Gates Foundation (2009); Lumina Foundation for Education (2009); Office of the Press Secretary (2009).

<sup>4</sup> Developmental, remedial, and basic skills are all terms commonly used to describe students who enter college with lower-level skills. These terms will be used interchangeably to discuss developmental education students and practices throughout this report.

<sup>5</sup> Adelman (2004); Attewell, Lavin, Domina, and Levey (2006); Jenkins, Jaggars, and Roksa (2009); Kolajo (2004).

<sup>6</sup> Adelman (2004).

on developmental education practices have abounded since the 1970s, few of these studies have provided hard evidence of how particular program components or interventions may have increased students' achievement, particularly in comparison to a similar group of students who did not receive such treatment.<sup>7</sup> However, though the research base on developmental education practice is still thin, recent studies, based in more rigorous scientific methods, have noted some promising changes in students' achievement. Simultaneously, a number of institutions and agencies have begun developing more radical approaches in an attempt to escalate developmental education students' achievement beyond its past limits.

This literature review seeks to examine the body of available research on developmental education strategies, in an effort to identify the most promising approaches for revising the structure and curriculum of developmental education, as well as suggest areas for future growth in developmental education research and practice. The key focus will be on investigating those strategies that have rigorous evidence documenting improvements in students' achievement, though the analysis will also touch upon earlier studies documenting best practices in developmental education. The key research questions this report seeks to answer are:

- Based on rigorous research, which practices show the greatest promise for increasing developmental education students' success?
- What are the more recent practices that show promise for increasing students' success in and progress through developmental education?
- Which of these practices should be highlighted for further study?

## **Previous Research on Best Practices in Developmental Education**

Research into developmental education programs and practices is not a new field of study. Indeed, research articles have been discussing colleges' efforts to remediate students since the mid-19<sup>th</sup> century. However, as higher education enrollments increased in the latter half of the 20<sup>th</sup> century and numerous colleges implemented open admissions programs, further focus has been placed on supporting those students who enter college with basic skills needs.<sup>8</sup> Starting in the 1970s, national organizations were formed to promote the

<sup>7</sup> Boylan (1980); Boylan, Bliss, and Bonham (1997); Morante (1987); Roueche and Baker (1987); Roueche and Snow (1977); Boylan (1985); Maxwell (1985).

<sup>8</sup> See Roueche and Roueche (1993), p. 41 – 48, for a discussion of the history of developmental education.

discussion of remedial education, many of which have published research on promising practices in the field.<sup>9</sup>

Since this time, a wealth of studies have focused on identifying “best practices” for improving the instruction, support, and programming offered to developmental education students.<sup>10</sup> In the past fifteen years, a number of literature reviews and synthesis studies have been developed, which utilize this research to develop overarching recommendations for the management, placement, and instructional practices in developmental education programs.<sup>11</sup> As can be seen in Table 1.1, many of these studies utilize surveys or case studies at “exemplary” institutions to analyze what program components were associated with increased student achievement. Often, these exemplary institutions were selected based on their receipt of community college or developmental education awards or researchers own identification of strong programs. Many of these studies also reviewed previous research on developmental education practices, often citing similar studies as evidence for their recommendations. As is common with synthesis reviews, most of these studies did not cite specific information on student outcomes, instead relying upon the effects noted in previous research to support their recommendations.

Perhaps unsurprisingly, given the overlap in their research base, many of the synthesis studies of the last 15 years have presented relatively uniform recommendations for developmental education programs and practices (see Table 1.2). For instance, nearly all of the reviews agree that mandatory assessment and placement of students into developmental education programs helps improve students’ success. Additionally, many also note the important role that particular program components, such as intensive advising or pedagogy supporting active learning, can play in improving students’ achievement. Many also suggest specific management practices, such as creating centralized developmental education departments and conducting ongoing evaluations of programming and policies.

While a useful foundation for improving colleges’ practices, much of this research in developmental education suffers from several limitations. First, a large proportion of these studies are based upon descriptive statistics or correlation analyses, which document whether a specific program practice was correlated with higher student outcomes (see Table 1.3). Although such studies can suggest how particular services may be related to students’

<sup>9</sup> Boylan (1985, 2002); Boylan, Bliss, and Bonham (1997); McCabe (2000); McCabe and Day (1998); Roueche and Roueche (1993, 1999); Starks (1994).

<sup>10</sup> Boylan, Bliss, and Bonham (1997); Boylan and Saxon (1999); Maxwell (1985); McCabe (2000); Morante (1987); Roueche and Baker (1987); Roueche and Roueche (1993, 1999); Roueche and Snow (1977); Cross (1976); Casazza and Silverman (1996).

<sup>11</sup> Boylan (2002); Boylan, Bliss, and Bonham (1997); Center for Student Success (July 2007); McCabe and Day (1998); Roueche and Roueche (1993); Sperling (2009); Schwartz and Jenkins (2007).

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Table 1.1

Summary of Major Research Works

Research study	Type of report	Approach/method used	Select citations used for developing best practices	Effects on student outcomes cited?
Roueche and Roueche (1993)	Survey-based case study and literature review	Survey of directors of 12 award-winning programs for at-risk students; literature review and theory on best serving at-risk students in community colleges (not necessarily students in need of developmental education)	Cross (1976); Roueche and Snow (1977); Kulik, Kulik and Schwalb (1983); Roueche, Baker and Roueche (1984); Astin (1985); Pascarella and Terenzini (1991)	Some
Boylan, Bliss, and Bonham (1997)	Survey and transcript analysis	Successful program components identified based on literature review; survey and transcript data collected from 160 randomly selected colleges to measure the extent to which they implemented these components; "causal-comparative" statistical tests done to see if a relationship between program components and student outcomes	Roueche and Baker (1987); Roueche and Snow (1977); Boylan, Bonham, Claxton and Bliss (1992; 1994); Kulik, Kulik and Schwalb (1983); Morante (1987); Casazza and Silverman (1996); Maxwell (1985)	Some
McCabe and Day (1998)	Case study	Had Boylan identify 10 colleges with exemplary developmental education programs; looked at program components in place at these colleges and shared student outcomes, with no effort at correlation	Cross (1976); Boylan (1985); Roueche and Roueche (1993); Boylan, Bliss, and Bonham (1994); Starks (1994); Casazza and Silverman (1996)	No
Boylan (2002)	Survey, case study, and literature review	Surveyed 36 colleges with reputations for strong developmental education programs; based on surveys and student outcome data, chose 5 highly effective programs and conducted follow-up interviews; used findings to guide best practices literature review	CQIN/APQC (2000); McCabe and Day (1998); Boylan and Saxon (1998); Boylan, Bonham, and Bliss (1997); Roueche and Roueche (1993, 1999); Roueche and Baker (1987); Grubb (1999); additional practice-specific research	No
Center for Student Success (2007)	Literature review	Reviewed literature related to basic skills and developmental education (250 articles from past 30 years)	Boylan (2002); McCabe and Day (1998); Perin (2005); Roueche and Roueche (1999); McCabe (2000); Boylan and Saxon (2002); Boylan, Bliss, and Bonham (1997); additional practice-specific research	Some
Sperling (2007)	Survey, interviews and literature review	Surveyed Massachusetts community college administrators; interviewed administrators, faculty chairs and program coordinators; compared practices with literature review of research-based best practices and policies	Center for Student Success (2007); Schwartz and Jenkins (2007); Boylan (2002); Brock et al. (2007); Bailey and Alfonso (2005); additional practice-specific research	No
Schwartz and Jenkins (2007)	Literature review	Summary of key findings from literature on effective practice; clearly identifies that most of these analyses are not rigorous studies	Boylan (2002); Center for Student Success (2007); Sperling (2006); Bailey and Alfonso (2005); Goldrick-Rab (2007); Roueche and Roueche (1999)	No

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Table 1.2

A Synthesis of Best Practices Recommendations Noted to Increase Students' Success

	Roueche and Roueche (1993)	Boylan, Bonham and Bliss (1997)	McCabe and Day (1998)	Boylan (2002)	Schwartz and Jenkins (2007)	Center for Student Success (2007)	Sperling (2009)
<u>Management and Administration</u>							
College makes a stated commitment to developmental education	X		X	X	X	X	X
Mission statement for developmental education	X		X	X	X	X	
Developmental education should be centralized into one department or highly coordinated	X	X	X	X		X	X
Policies should require enrollment in and completion of developmental education early in college career					X	X	
Developmental education required before enrollment college-level courses	X					X	
Collaboration between support services staff and faculty/academics				X		X	X
Ongoing evaluations conducted of programs and policies; programs and policies revised as needed	X	X	X	X	X	X	X
<u>Assessment and placement</u>							
Provide preparation or orientation to placement tests				X	X		X
Mandatory assessment upon entry into college	X	X	X	X		X	
Mandatory placement into developmental education	X	X	X	X			
Colleges should manage faculty and/or students' expectations				X	X	X	X
<u>Faculty</u>							
Sufficient proportion of courses are taught by full-time faculty				X		X	X
Enthusiastic and knowledgeable faculty hired	X			X	X	X	
Adjunct faculty are integrated within the college community and dev ed practice				X	X		X


Table 1.2 (continued)

	Roueche and Roueche (1993)	Boylan, Bonham and Bliss (1997)	McCabe and Day (1998)	Boylan (2002) What Works	Schwartz and Jenkins (2007)	Center for Student Success (2007)- CA Basic Skills Initiative	Sperling (2009)--MA Community College Dev Ed Audit
<u>Faculty (continued)</u>							
Collaboration among faculty	X			X	X	X	X
Professional development provided to faculty	X			X	X	X	X
Orientation should be provided for new dev ed faculty				X		X	X
<u>Pedagogy/Curriculum for Instruction</u>							
Curriculum and teaching tailored for adult learning					X		
Active learning strategies employed, including collaborative learning	X			X	X		
Peer review/coaching				X	X		X
Problem-based learning				X	X	X	X
Contextualized/real-world instruction	X				X	X	X
Culturally responsive teaching				X	X	X	
Higher order/critical thinking skills				X	X	X	X
Self-directed learning/self-monitoring/teaching study skills	X			X	X	X	X
Learning communities				X	X	X	X
Computer-assisted teaching	X		X	X	X		X
Alignment between and among dev ed and college level courses	X			X	X	X	X
Use Mastery Learning	X			X	X	X	
Employ varied instructional methods to accommodate diverse learning styles	X		X	X		X	
<u>Student services</u>							
Comprehensive support services offered which are tailored to students' needs and generally linked to dev ed program			X	X	X	X	X
Attention is paid to the social, emotional, and cognitive development of the student (holistic approach)			X	X	X	X	
Proactive and frequent counseling/advising provided		X	X	X	X	X	X
Tutoring or external labs provided for extra support		X	X	X			
Training provided to tutors		X	X	X			

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Table 1.3

Standards of Evidence: How This Paper Classifies Available Quantitative Research on Developmental Education

	Types of evaluation	Means of establishing a comparison	Background characteristics of comparison group are:	Strengths of research design	Limitations of research design	With strong research design:
<i>Rigorous Research</i>						
Experimental research	Randomized control trials	Sample randomly assigned to either a program group that receives the program, or a control group that does not participate in the program	Equivalent to program participants as a result of random assignment, including unobservable characteristics such as motivation	Equivalent program and control groups; controls for background characteristics	Difficult to generalize to other groups and settings	
Quasi-experimental research	Regression discontinuity analyses	Group just above strictly defined cut-off (i.e. score on assessment test) compared to group just below cut-off	Extremely similar as a result of selection method	Relatively similar program and control groups	Does not control for certain background characteristics, such as motivation	
	Statistically equated control evaluations	Program group compared to students with similar characteristics (i.e. level of developmental need)	Controlled for with statistical procedures such as multivariate regression	Some differences in program and control groups equalized through statistical measures	Does not control for certain background characteristics such as motivation	
<i>Promising Trends</i>						
Descriptive statistics	Time-series analyses	Outcomes for program group compared to statistically predicted outcomes for same group without the program	n/a	Background characteristics equivalent	Comparison outcomes predicted, not actual; require large sample for validity	
	Matched control studies	Program group compared to students with similar characteristics (i.e. level of developmental need)	Observably similar but no controls for variation	Simple comparison group	Does not control for background characteristics	
	Before-and-after studies	Outcomes (i.e. score on assessment test) before and after the program measured for same group of students	n/a	Shows growth over course of time	No comparison group to analyze relative effectiveness of program	

SOURCES: Rossi and Freeman, 1993; Levin and Calcagno, 2008.

achievement, they do not provide definitive proof that such relationships exist. Indeed, the relationships identified may well be due to other factors in a students' experience which have not been unearthed, thus creating a misleading representation of the effects on student outcomes. This is particularly true when a number of different services are being analyzed together within one institution, as is often the case in case study or survey research, making it difficult to disentangle which practice, if any, may be responsible for improved student achievement. As such, studies that utilize correlational analysis should be approached with caution as they rarely provide a clear understanding of how particular program services may affect students' achievement.

Additionally, while some of these studies attempt to monitor the outcomes of students who received an intervention, the descriptive statistics employed generally provide a before- and after-comparison of outcomes among the same group of students or provide only simple comparisons among students who did or did not receive a program (see Table 1.3). Before-and-after studies can be useful for monitoring the trends in students' achievement while matched control and time-series analyses can provide some sense of how a program may have influenced students' achievement. However, these simple comparisons do not account for other pre-existing characteristics that may affect students' achievement nor measure how differences in the characteristics of the program and comparison groups might influence their outcomes. As such, they only provide a rough estimate of the trends in student achievement rather than definitive proof of a strategy's success.

Furthermore, few of these studies provide specificity about the content of particular program components, the quality of its implementation, or the quantity that is needed to see improvements in students' success. For instance, a number of studies recommend instituting mandatory assessment and placement into developmental education upon students' entry into college. However, they do not specify the type of assessment that should be used, how students should be divided across different developmental education levels, or at what point these students should be considered college-ready. Generalizations such as these are evident in much of the research on developmental education practices, making it difficult to ascertain how different permutations of particular practices may affect students' achievement or progress into credit-bearing courses.

Finally, much of the research on best practices in developmental education tends to provide a tacit acceptance of developmental education students' current performance and the practices that are generating their disheartening outcomes. For instance, many of the exemplary colleges profiled in earlier literature reviews did not report an overall profile of their students' achievement. However, when reported, many schools had dissimilar student achievement levels, with large proportions of developmental education students still



struggling to make it through their programs.<sup>12</sup> Such challenges reveal that even institutions that had implemented a number of researchers' recommended practices still had difficulty helping their students move into college-level courses and graduate. These challenges become even more apparent when looking at developmental education students' performance at a national scale, as multiple studies have noted that few students complete their developmental education sequence, move on to credit-bearing courses, or graduate with a degree or certificate.<sup>13</sup> Such findings reveal that more radical changes may be needed to improve developmental education students' outcomes, with a much deeper focus on documenting the changes in their achievement over time.

## **Rigorous Research in Developmental Education: The Next Step**

In the past decade, new research has begun to take a more rigorous approach to analyzing developmental education programs and practices.<sup>14</sup> Several key changes define these studies, as opposed to the descriptive statistics and correlational research of the past. First and foremost, these studies employ more rigorous methods of analysis that attempt to account for differences in baseline student characteristics and minimize spurious correlations between potentially unrelated variables (see Table 1.3). These studies also attempt to directly measure the effect of particular programs, services, or developmental education programs as a whole on students' achievement, and clarify what factors, if any, may be associated with increases in students' achievement.

Additionally, students' progress tends to be measured around particular benchmarks, such as student assessment scores, progress through specific levels of developmental education, course pass rates, persistence, and/or graduation rates. Often these studies employ longitudinal designs whereby student outcomes can be tracked over a number of semesters or years, allowing changes in student outcomes to be measured more definitively. Finally, this research tends to pay close attention to program scale, either by analyzing students' achievement with large state or national databases or tracking the effects of large-scale programs that enroll many students. Such attention to larger populations of students allows findings to be more readily generalized to whole populations of developmental education students.

<sup>12</sup> Roueche and Roueche (1993); McCabe and Day (1998); Boylan (2002).

<sup>13</sup> Adelman (2004); Attewell, Lavin, Domina, and Levey (2006); Bailey (2009); Jenkins, Jaggars, and Roksa (2009); Kolajo (2004).

<sup>14</sup> Adelman (2004); Attewell, Lavin, Domina, and Levey (2006); Jenkins, Jaggars, and Roksa (2009) Bahr (2010); Bailey (2009); Bailey and Alfonso (2005); Calcagno and Long (2008); Goldrick-Rab (2007); Bettinger and Long (2009); Grubb (2001); Karp et al. (2008); Levin and Calcagno (2008); Martorell and McFarlin (2007); Scrivener et al. (2008); Scrivener, Sommo, and Collado (2009); Scrivener and Weiss (2009); Visher, Butcher, and Cerna (2010).

Beyond the increasing reliability of their results, these studies provide a number of benefits for analyzing developmental education programs and their students' achievement. First, they help provide a clearer picture of the overarching challenges in developmental education, as they are able to document the trends in student achievement at a larger scale. Additionally, many measure students' achievement by recording students' performance at baseline, thereby creating a more accurate basis for assessing students' progress or lack thereof. Finally, the analyses of particular program interventions often identify key program characteristics that are associated with changes in students' outcomes, allowing for a more concrete understanding of how differences in program components or implementation may affect students' achievement.

In order to provide a clearer picture of the link between programs and student outcomes, this review will focus primarily on these more rigorous analyses of developmental education programming and policies. Additionally, given the challenges in developmental education students' achievement, this review will also seek to document practices that focus on improving students' progress through developmental education and into credit-bearing courses. In cases where the research on these programs is limited, the key theoretical tenets of these programs and descriptive findings will be discussed, with an eye towards how to future research may explore these trends more rigorously and develop more conclusive findings.

## Methods

In order to access articles on developmental education programming and policies, an in-depth computerized search of the literature was conducted using the Educational Resources Information Center (ERIC) database. Additionally, numerous higher education and general education journals were analyzed for specific articles related to developmental education (see Appendix A). Key words used in the search included *developmental education*, *remedial education*, *basic skills*, and *community college*. In addition, several journals related to research in community colleges and developmental education were hand-searched, including the *Community College Journal of Research and Practice*, *Journal of Developmental Education*, and *Research in Developmental Education*. Finally, a thorough search was conducted of the websites and publications of organizations dedicated to research on community colleges and developmental education, including organizations such as the *Community College Research Center*, the *National Association for Developmental Education*, and *MDRC*.

The type of research conducted was noted for each of the studies reviewed, which were divided among six different categories. These included: (1) experimental or random assignment research; (2) quasi-experimental research; (3) descriptive statistics; (4)

practitioner or qualitative research; (5) theory; and (6) literature review. As shown in Table 1.3, studies were considered rigorous if they employed an experimental or quasi-experimental design, both of which utilize methods to control for differences in students' background characteristics. Random assignment methodology is the most rigorous of these methods as it uses a lottery system to assign study participants to either a treatment group that receives an intervention or a control group that does not. Because assignment to these groups is random, differences in students' motivation and background characteristics are minimized, thus allowing for a truer measure of a program's effects. While quasi-experimental research uses statistical controls for observable characteristics, such as educational background, these studies are unable to control for certain types of characteristics, such as students' motivation or self-selection into a program.

Given the limited availability of rigorous research in developmental education, studies noting promising trends in students' achievement were also tracked, particularly for more recent, innovative designs that have not yet been rigorously evaluated. Studies documenting promising trends in student achievement often provided quantitative analyses of student outcomes for particular interventions or programs, sometimes with reference to a comparison group that did not receive the intervention. However, these studies generally lacked a more rigorous design, either because the comparison groups were convenience samples which did not necessarily provide the best reference point for changes in students' outcomes or because they did not attempt to control for differences in students' achievement or characteristics. Many of the qualitative and practitioner-led studies fell into this category of studies.

General statistics describing the current or past state of developmental education were also noted, as well as theoretical work on promising practices or strategies in developmental education. The statistical studies were used to denote larger trends in developmental education or to describe the characteristics of particular student populations, such as the number of developmental students in community colleges. The theoretical studies, published by both researchers and practitioners, were reviewed in order to better understand the theoretical foundations of a particular practice and its intended outcomes.

## **Identification of Promising Models**

Once selected, the studies were divided by the type of intervention discussed and categorized into four broad areas of research. These include:

1. *Interventions aimed at helping students avoid developmental education*

These strategies are designed to pre-identify academically underprepared students before they enter college and provide extra instructional supports to

get them “up to speed” in order to bypass developmental education coursework. Common interventions include early assessment programs or summer bridge programs for recent high school graduates. (See Chapter 2)

2. *Interventions designed to accelerate students’ progress through developmental education*

These programs focus on compressing developmental education courses into shorter sequences in an effort to help students move into college- or professional-technical courses as quickly as possible. Key acceleration strategies include the modularization of traditional developmental education courses or “fast track” courses that provide instruction in compressed time periods. (See Chapter 3)

3. *Programs that provided contextualized learning opportunities*

These models seek provide a richer context for student learning by integrating a basic skills curriculum with vocational or college-content coursework. Typical models include integrated basic skills training in technical or professional programs or learning communities models that link developmental education courses with other college-level courses and seek to enhance students’ social integration at the college. (See Chapter 4)

4. *Programs and services to further support developmental learners’ educational advancement.* Programs designed to enhance the supports for developmental-level learners include interventions such as tutoring, advising, and student success courses. These strategies tend to focus on enhancing a college’s support resources, or increasing students’ usage of existing resources, in an effort to help students overcome a multitude of barriers that may limit their academic progress. (See Chapter 5)

Each of these models reflects a different entry point for improving students’ progress through developmental education, into credit-bearing courses, and ultimately graduating with a degree or certificate. These interventions and the research evidence supporting their success will be discussed in further detail in the following chapters. A final chapter will provide a synthesis of these models and suggestions for further research.

## 2. Interventions for Avoiding Developmental Education

The goal of developmental education is simple: prepare students to engage in college-level work, so they can earn a credential in their field of choice and leave school qualified for a greater range of jobs and salaries. With this goal in mind, two- and four-year institutions have established a system for preparing academically underprepared students for college-level work by devising a sequence of semester-long courses aimed at improving their skills. Generally focused on improving students' reading, writing, and math abilities, most community colleges offer sequences of two to four levels of preparatory work in each of these subject areas. Students are placed into these classes based on their scores on a common placement test, which is designed to assess whether they have the skills to enter directly into college-level courses.<sup>15</sup> Students must work upwards from the level to which they are assigned, towards entry into college-level, credit-bearing courses. Additionally, they may be barred from college-level courses in their field of interest until their developmental prerequisites are completed.

While providing a noble opportunity for further preparation, the lengthy sequence of developmental education courses offered at most community colleges has also been criticized for creating an often-insurmountable barrier to students' progress through college. Recent large-scale studies have shown that a majority of students never enroll in or complete the recommended sequence of developmental education courses to which they are referred.<sup>16</sup> This is particularly true for students with multiple developmental needs, as numerous studies have revealed that the number of developmental courses that a student places into is negatively associated with their likelihood of completion.<sup>17</sup> Finally, while some studies have revealed positive outcomes for students who successfully complete their developmental education sequence,<sup>18</sup> a string of recent studies have shown just the opposite: that students who completed developmental education had little effect on their subsequent academic performance<sup>19</sup>

Given these challenges, a number of colleges have begun to focus on helping students better prepare for college-level work before they enter postsecondary education. Usually in collaboration with local high school districts, colleges have sought to identify

<sup>15</sup> Common placement tests include the ACCUPLACER (developed by the College Board) and COMPASS (developed by ACT, Inc.) However, each college (or district) chooses which test(s) to accept and where to set the cut-off score for college-level coursework.

<sup>16</sup> Bailey (2009); Jenkins, Jaggars, and Roksa (2009).

<sup>17</sup> Attewell, Lavin, Domina, and Levey (2006); Bailey (2009); Jenkins, Jaggars, and Roksa (2009); Kolajo (2004).

<sup>18</sup> Crews and Aragon (2007); Lesik (2006); Martorell and McFarlin (2007).

<sup>19</sup> Attewell, Lavin, Domina, and Levey (2006); Bahr (2010); Bettinger and Long (2009)

students who are academically underprepared for college work and provide them with extra instruction or supports to avoid placement into developmental education courses. The key goal for these programs is to improve students' skills before they enter college, thereby allowing them to bypass developmental education and enroll directly in college-level, credit bearing courses. These programs may be provided by the high school itself and take place while students are still enrolled in their junior or senior year of school. Other programs are offered by colleges and provide students with the opportunity to build their skills during the semester or summer before their entry into college. Often, high schools and colleges offer several of these types of programs, thereby providing a number of entry points for additional preparation.

## **Models for Avoiding Developmental Education**

A number of common strategies exist for helping students avoid developmental education. *Dual enrollment* programs, which allow high school students take college courses while still enrolled in high school, are a relatively well-established strategy across U.S. community colleges and have recently been expanded beyond their traditional focus on high-achieving students to those who have more basic skills needs. Another intervention focused on secondary institutions provides *early assessments* to high school enrollees. In these programs, high school students take the local college placement exam during their junior or senior year, and those deemed underprepared for college-level work are encouraged to follow a course of instruction to improve their college readiness before graduating from high school. Colleges have also developed similar types of early assessment programs for recent high school graduates, which are then used to recommend entering students to *summer bridge programs*. Summer bridge programs provide the final opportunity for entering students who have tested into developmental education courses to learn or re-learn essential knowledge just before their college coursework begins. More information about each of these interventions and their related research is provided below.

## **Dual Enrollment Programs**

As noted above, dual enrollment programs allow students to enroll in college courses and earn college credits while they are still enrolled in high school. Similar to Advanced Placement and International Baccalaureate programs, dual enrollment programs exist in most states and school districts across the country, though the policies around minimum academic requirements, tuition, and course options vary greatly.<sup>20</sup> National data shows that nearly half of all U.S. high schools have students taking courses for college

<sup>20</sup> Bailey, Hughes, and Karp (2003).

credit within a dual enrollment program, and that about five percent of high school students take advantage of these programs.<sup>21</sup>

While dual enrollment has long been a popular option for high-achieving students, these programs have only recently begun to target more academically needy students. Although still limited,<sup>22</sup> several models have been developed which create more structured opportunities for at-risk students to attempt courses, at no cost, which require the academic rigor and thinking expected in college-level courses.<sup>23</sup> These programs include both high school and college-level courses, with a specific focus on college preparatory coursework for students who are academically underprepared in a particular subject. In addition, these programs aim to familiarize students with the college environment and, by doing so, make pursuit of a postsecondary degree into an imaginable prospect rather than an unthinkable goal.<sup>24</sup>

Two large-scale interventions, College Now and the Middle/Early College High School movement, provide good examples of well-established dual enrollment programs aimed at academically disadvantaged students. College Now programs are offered at a number of institutions through the country in a wide variety of formats. Generally, College Now courses are offered at the college campus, taught by traditional college faculty, or at the high school, with instruction delivered by specially trained high school faculty. Students often take a placement test or other standardized exam to become eligible for the program, with those scoring below a minimum threshold eligible to take developmental-level education courses while still in high school.<sup>25</sup> College Now thus also serves the important purpose of informing students about their readiness for college classes, while giving them an opportunity to improve their skills before enrolling in college.

The Middle/Early College High School movement is an all-encompassing version of dual enrollment. These programs integrate high school enrollment with the first two years of college, such that students have the opportunity to accumulate credit towards an Associate's degree, along with earning their high school degree. Originally, these schools were designated as Middle College High Schools and located on college campuses. However, with a recent investment from the Bill and Melinda Gates Foundation, these

<sup>21</sup> Kleiner and Lewis (2005).

<sup>22</sup> In the 2002-2003, there were 110 institutions offering dual enrollment programs specifically targeting at-risk students; these programs served about 6,400 students. (Kleiner and Lewis (2005))

<sup>23</sup> American Institutes for Research and SRI International (2007); Jobs for the Future (2009); Karp et al. (2008).

<sup>24</sup> American Institutes for Research and SRI International (2007); Kleiman (2001). See also the websites for College Now in New York (<http://collegenow.cuny.edu>), and the Early College High School Initiative ([www.earlycolleges.org](http://www.earlycolleges.org)).

<sup>25</sup> Kleiman (2001).

institutions have been revamped as stand-alone small high schools, now termed Early College High Schools.<sup>26</sup> As with College Now programs, students can take a mix of high school and college-level courses, based on their level of preparation and interest.<sup>27</sup> Upon graduation, these students can potentially earn both a high school diploma and an Associate's degree.

### **Research Evidence Supporting Dual Enrollment Programs**

Research on dual enrollment programs for academically needy students is relatively limited, and is primarily based on research on College Now programs at colleges in the City University of New York (CUNY) system and a developing national study of Early College High Schools.<sup>28</sup> Additionally, most of the available studies tend to focus on the implementation of these interventions or undertake statistical analyses that do not employ rigorous methods, making it difficult to ascertain their true effects on student achievement. While some utilize comparison groups, these are often simple comparisons that do not take into account factors such as pre-existing differences in students' achievement levels.

Evidence about College Now's effectiveness is promising but partial, and none of the available studies specifically examine outcomes for academically underprepared students (see Table 2.1). However, early data showed that the college GPAs of College Now students were comparable to those of a national sample of freshmen.<sup>29</sup> More recently, simple comparison studies of CUNY's College Now program found that College Now had small but statistically significant benefits for students who matriculated at a CUNY college, compared to a group of CUNY freshmen who did not enroll in College Now. Both studies found that College Now students earned more credits and were more likely to persist than students in the comparison group; one study also found a decrease in the likelihood of remediation, and the other found that among students who were pursuing bachelor's degrees, College Now students also had slightly higher GPAs.<sup>30</sup> A similarly non-rigorous large-scale analysis of several College Now programs at vocational high schools and several CUNY campuses focused found that College Now students were more likely to pursue bachelor's degrees, to earn higher first-semester GPAs, and to earn more college credits after seven semesters of postsecondary enrollment.<sup>31</sup>

<sup>26</sup> Golann and Hughes (2008).

<sup>27</sup> Kim and Barnett (2008).

<sup>28</sup> Michalowski (2007); American Institutes for Research and SRI International (2007); Karp et al. (2008).

<sup>29</sup> Greenberg (1988).

<sup>30</sup> Michalowski (2007); Kleiman (2001).

<sup>31</sup> Karp et al. (2008). Like the previously cited studies, this study employed some controls for background characteristics but did not use a quasi-experimental design; therefore, they are categorized as promising trends



Evidence on Middle/Early College High Schools is also limited and non-rigorous, though more rigorous analyses may be available in the future a result of the American Institute for Research (AIR) and SRI's evaluation of Gates Early College High Schools.<sup>32</sup> Early trend data on Middle College High Schools revealed less positive results for academically disadvantaged students, as these students tended to receive worse grades in college than a national sample of freshmen.<sup>33</sup> However, more recent non-rigorous studies have shown more positive results, with Early College High School students successfully making progress on their postsecondary education goals, earning an average of 27 college credits by the end of high school, and passing ninety-percent of their college courses after matriculation.<sup>34</sup> National analyses have further confirmed these positive trends, with 75 percent of 2007 Early College High School graduates earning some college credit and 10 percent on top of those earning enough credits for an Associate's degree. Additionally, over sixty-five percent were accepted to four-year colleges.<sup>35</sup> However, as noted earlier, these findings should be approached with caution as they do not account for pre-existing differences in students' characteristics and academic achievement.

## **Early Placement Assessment Programs**

One way to ensure that high school students are college ready is to test their skills with the same assessment instruments that are used when they enroll in college. In this way, students who are academically underprepared for college courses can be identified early and given extra time or tools to strengthen their skills before they arrive at college. As noted previously, early assessment programs are generally developed collaboratively by colleges and high school districts. While a relatively new intervention, two promising, large-scale examples can be seen in the state of California's Early Assessment Program and in El Paso Community College's College Readiness Initiative in El Paso, Texas.

California's Early Assessment Program (EAP) is designed to inform high school juniors, along with their educators and family members, whether the California State University (CSU) system would consider them academically prepared to take college-level courses in English and math. Designed jointly by CSU and the state's Department of Education, the EAP adds optional questions to a mandatory statewide test for 11<sup>th</sup> graders to assess students' college readiness and provides them with concrete steps to follow if they are deemed academically underprepared. While students who score above a certain

<sup>32</sup> Much of this work to date has been about the implementation of the programs and students' experience in the programs. For example, see American Institutes for Research and SRI International (2007) and other reports in this series.

<sup>33</sup> Greenberg (1988).

<sup>34</sup> Kim and Barnett (2008).

<sup>35</sup> Jobs for the Future (2009).

threshold on these questions are exempted from the CSU placement exam and remedial coursework, students who score below the threshold can follow several pathways during their senior year to improve their skills, with the goal of being ready for college-level work when they matriculate at a CSU campus. These pathways include taking additional math, reading, or writing courses during their senior year or enrolling in an online math learning program designed by CSU. Ideally, these options will allow students to make an informed decision about enrolling in college and make it possible for them to potentially avoid taking developmental education courses.<sup>36</sup>

A similar program on a smaller scale has been developed at El Paso Community College (EPCC). EPCC has implemented an early assessment program, termed the College Readiness Initiative, in partnership with the University of Texas at El Paso (UTEP) and their local K-12 school districts. The college readiness initiative is predicated on a common concern about the validity of assessment tests: namely, the belief that some students do poorly on assessment tests when they enroll in college simply because they are unprepared to take the test, not because they are unprepared for college-level coursework itself. To address this, EPCC and UTEP worked with local high schools to develop a protocol for graduating seniors to prepare for this exam. The protocol encourages students to (1) complete a joint application to EPCC and UTEP; (2) attend an orientation about EPCC's placement test (ACCUPLACER), which includes an introduction to the high-stakes nature of the test and review materials for the exam; (3) take the placement exam; and (4) meet with a counselor at the high school to review test scores and make decisions about the best way to move forward, given their level of academic preparation. Students qualifying for developmental courses can complete a refresher course in the subject(s) of their weakness or enroll in a five-week summer bridge course with intensive coursework in reading, writing, and math. These students can then retake the ACCUPLACER for a final placement score, with the hope that they will assess into college-level courses or a more advanced developmental education course.<sup>37</sup>

### **Research Evidence Supporting Early Placement Assessment Programs**

Both California's Early Assessment Program and El Paso's College Readiness Initiative have seen positive improvements in students' achievement, with a more rigorous analysis of California's EAP program demonstrating key reductions in the number of students placed into developmental education (see Table 2.1). In a quasi-experimental analysis of the placement patterns at CSU's Sacramento State, students who participated in

<sup>36</sup> Howell, Kurlaender, and Grodsky (2010 (forthcoming)).

<sup>37</sup> Kerrigan and Slater (2010).

EAP were less likely to need developmental English (6.2 percentage point reduction) and math (4.3 percentage point reduction) when compared with similar students who did not participate in EAP.<sup>38</sup> While unable to control for students' motivation levels, this study did account for a number of other factors including students' characteristics and high school differences.

El Paso Community College undertook a less rigorous, internal evaluation of their College Readiness Initiative, which show promising trends in students' placement into developmental education. Over the course of three years, their findings revealed an increase in the number of students placing into college-level courses (2-percentage point increase) and their highest level of developmental education (13-percentage point increase). These increases were paired with a 6- to 9-percentage point reduction in students' placement into their two lowest developmental course levels. While these trends cannot be causally linked to El Paso's program, they demonstrate that this type of program may be a promising method for reducing developmental education course placement.<sup>39</sup>

## **Summer Bridge Programs**

Summer bridge programs can provide a last-minute opportunity for students qualifying for developmental education courses to further develop their skills before entry into college. These programs have been popular for a number of years at four-year institutions and have recently become more widely implemented at community colleges.<sup>40</sup> While not providing the residential component often associated with four-year college's programs, community college summer bridge programs also seek to foster a quick boost in students' skills in relatively short timeframe.

Though they can take many forms, summer bridge programs generally require students to attend on-campus classes for several weeks during the summer before the fall semester begins. Courses take place during a compressed time period, usually three to five weeks, for students who have taken college placement exams and tested into developmental education. Courses may focus on only one academic subject at a time or touch upon all developmental course areas and may range from a quick review of course concepts to more formal classes. Some summer bridge programs also incorporate a college-skills seminar that seeks to introduce students to college life and responsibilities. The goals of these programs vary from efforts to improve students' placement test scores to helping students complete one or more developmental courses before entry into college. Often summer bridge

<sup>38</sup> Howell, Kurlaender, and Grodsky (2010 (forthcoming)).

<sup>39</sup> Kerrigan and Slater (2010).

<sup>40</sup> Ackermann (1990); Fitts (1989); Garcia (1991); Miller (1990); Santa Rita and Bacote (1996); Barnett (2009).

programs are offered free-of-charge to students as a quick, low-cost way to improve their academic skills.<sup>41</sup>

### **Research Evidence Supporting Summer Bridge Programs**

Only non-rigorous research is currently available on summer bridge programs, and the current research is sparse, showing mixed results on students' achievement (see Table 2.1). While summer programs at four-year institutions have shown some promising results,<sup>42</sup> research in community colleges has been more limited and tended to focus the implementation of these programs rather than rigorous analyses of student outcomes. Older, simple comparison studies of summer bridge programs in New York and New Jersey showed mixed results, with one study revealing higher levels of persistence and subsequent course pass rates while another found little change in students' skill levels or GPA.<sup>43</sup> More recently, internal analyses of student trends from several colleges conducting summer bridge programs in Texas have demonstrated promise, with descriptive statistics showing promising improvements in students' study skills and college readiness in math and reading.<sup>44</sup>

Building on these positive trends, a more rigorous analysis of summer bridge programs at eight Texas colleges is currently being conducted by the National Center for Postsecondary Research (NCPR). The evaluation utilizes a random assignment design to compare the effects of four- to six-week summer bridge programs on students' college enrollment, need for developmental education, GPAs, persistence, and credit accumulation. This research will help provide more definitive evidence with which to evaluate the effects of these programs on students' ability to avoid developmental education.

### **Summary**

As can be seen above, very limited evidence is available supporting recent efforts to improve students' chances of avoiding remediation and placing directly into college-level, credit-bearing courses. Rigorous evidence is currently limited to an evaluation of California's efforts to provide early assessment to high school students, which has shown positive results in decreasing the number of students placing into developmental education. While many studies have found promising trends related to dual enrollment and summer bridge programs, additional research is clearly needed to confirm what effect these

<sup>41</sup> Barnett (2009).

<sup>42</sup> Garcia (1991); Santa Rita and Bacote (1996).

<sup>43</sup> Fitts (1989); Santa Rita and Bacote (1996).

<sup>44</sup> Texas Higher Education Coordinating Board (2009); Zuniga (2008).

programs have on reducing community college students' need for remediation. Given the promising trends noted with dual enrollment programs and early placement testing, these strategies appear to be the most promising for more rigorous analysis. Key to this research will be a clear demarcation of students' differing levels of need and documentation of how programs with differing structures and intensity affect students' placement into developmental and college-level courses. As the number of academically underprepared students leaving high school continues to rise, such studies will provide critical information about how to better prepare students for full entry into college-level courses and programs.

Building Foundations for Student Readiness

Table 2.1

Summary of Research on Avoidance Programs

Programs	Dual enrollment		Early assessment		Summer bridge programs
	Middle College/Early College High School	College Now	California EAP	El Paso Readiness Initiative	
<b>Rigorous studies</b>					
Findings			<u>Positive outcomes:</u> Students less likely to need math or English remediation		
Studies			<i>Howell, Kurlaender and Grodsky (2010)</i>		
<b>Promising trends</b>					
Findings	<u>Mixed outcomes:</u> Substantial progress towards AA in high school; high pass rates in college courses; in one study, lower grades in college level courses	<u>Positive college outcomes:</u> More likely to persist; earn more credits; GPAs comparable or higher		<u>Positive outcomes:</u> Increase in students placing into college-level courses and highest level of dev ed; reduction in placement into two lowest levels of dev ed	<u>Mixed outcomes:</u> Higher levels of persistence and course pass rates; various studies find no changes in skill levels <u>or</u> improvement in college readiness
Studies	<i>Greenberg, (1988); Kim and Barnett (2008); Jobs for the Future (2009)</i>	<i>Greenberg, (1988); Karp, et al. (2008); Michalowski (2007)</i>		<i>Kerrigan and Slater (2010)</i>	<i>Garcia (1991); Santa Rita and Bacote (1996); Fitts (1989); Texas Higher Education Coordinating Board; Zuniga (2008)</i>

### **3. Accelerating Students' Progress through Developmental Education**

One of the key criticisms of developmental education is the lengthy amount of time that many students spend in these courses before reaching college-level work. As noted in Chapter 2, most community colleges provide multiple levels for each developmental education subject and require students to successfully complete each level before progressing to the next. Given that virtually all of these courses are taught as semester-long classes, students who place at the lowest levels in a particular subject take multiple semesters, even years, to complete the course sequence in math, reading, or writing, in order to enroll in college-level courses. To make matters worse, most students do not receive standard college credits for the developmental education courses they take nor are these courses transferable to four-year institutions. However, students are required to pay for these courses, often using significant chunks of their limited financial aid packages to subsidize their costs.

Recent research has pointed out the difficulties that can be engendered by this long course sequence. For instance, in an analysis of data from Achieving the Dream, a large national initiative now encompassing over 10 percent of community colleges in the nation, less than 30% of students who place into the lowest levels of developmental math and reading ever complete their developmental education coursework.<sup>45</sup> Often, these students fail to enroll in the first developmental education course to which they were referred or do not re-enroll in the next highest level after successfully completing their first recommended course. Additionally, fewer than 10 percent of students who are recommended to the lowest level of developmental math successfully complete a college-level math course, while fewer than 30 percent recommended to the highest level completed these courses.<sup>46</sup> Such findings reveal the enormous hurdles facing students placing into developmental education courses, particularly those with multiple remedial needs.

As a result, greater attention has been placed recently on helping students progress more quickly through the lengthy developmental education sequence. Most frequently, such programs have focused on modifying the timing of these courses, with an effort to condense the amount of time needed to successfully complete a particular developmental education level. These re-framed courses are generally designed to serve students with variable levels of need, creating alternative options for the pace of instruction depending on students' skill levels in a particular area. For instance, some colleges offer compressed courses in which students may brush up on their skills, in preparation for direct entry into a college-level

<sup>45</sup> Bailey (2009).

<sup>46</sup> Bailey (2009).

course. Other courses offer self-paced instruction, which allows students to self-determine the amount of time spent on particular tasks or skills. In considering what option to recommend, colleges often refer to students' placement test scores, with higher scoring students placed into faster-paced review courses while lower scoring students are referred to slower-paced instructional models.

## **Models for Accelerating Students' Progress through Developmental Education**

Several models currently exist for accelerating students' progress through developmental education. With a focus on providing instruction in a shorter time frame, some colleges have developed "fast track" developmental education courses, which compress the curriculum into several weeks or half-semester, allowing students to pass through multiple levels in a single semester. Alternately, other models focus on offering self-paced instruction through modularized courses. This approach creates multiple mini-courses, which focus on particular skill sets rather than offering the whole curriculum in one continuous course. This option allows students to strengthen particular weaknesses they may have in a subject area while bypassing instruction in their areas of strength. A third model relies on the assumption that students deemed developmental-level are capable of the work in college-level courses, with extra assistance or a different curricular approach. This approach therefore "mainstreams" students directly into college-level courses, which are then supplemented with additional supports such tutoring or additional courses for students with greater academic needs. A deeper discussion of each of these models and their accompanying research evidence is provided below.

### **Fast-Track Courses**

As noted above, fast-track courses are classes that are offered in a compressed time frame, usually in a several week format during the summer or in half a semester during the regular school year. Generally, two levels of a particular developmental education subject are offered together and run back-to-back within the same semester, allowing students to complete both courses within one semester. For example, at Mountain Empire Community College in Big Stone Gap, Virginia, "Fast Track" math provides two developmental math course levels as half-semester courses designed to articulate with each other, with a focus on review and fast-paced instruction. These courses therefore allow students to come two developmental course levels in one semester.<sup>47</sup> Similarly, at University of Maryland College Park (UMCP), students take an accelerated version of the developmental course in

<sup>47</sup> Zachry (2008).



the first five weeks of the semester and then re-take the placement exam. Those whose scores have increased to college-level spend the remainder of the semester in a compressed, intensive version of the college-level course.<sup>48</sup>

These courses are often designed for more prepared developmental education students, with many schools implementing an initial screening process to ensure that this criterion is met. For instance, both Mountain Empire Community College and UMCP screen students based on their assessment scores and allow only those students testing close to the next developmental or college-level course to enroll in a fast track course. While most colleges restrict entry to these accelerated courses, such practices are not always a requirement. For instance, Community College of Denver's FastStart program mandates that students meet with a counselor to ensure that they understand the course structure and speed, but the college does not have a placement score requirement for entry into these courses.<sup>49</sup>

In addition to compressed instruction, fast track courses may also modify the traditional requirements or pedagogy in the course to better suit the needs of its revised structure. For instance, these courses may mandate attendance at every class or depend on students' self-instruction in order to cover all the course concepts. Additionally, fast track courses often utilize computer-aided instruction to facilitate self-paced learning among their students. For example, Community College of Denver's FastStart program utilizes computer tutorials in instruction, allowing faculty to individually monitor students' mastery of particular subjects.<sup>50</sup>

### **Research Evidence Supporting Fast-Track Courses**

Like most developmental education interventions, little rigorous research exists documenting the success of fast-track courses. The most promising evidence comes from a rigorous analysis of fast-track courses at two Ivy Tech Community College campuses in Evansville and Fort Wayne, Indiana. Using rigorous statistical methods, internal evaluators found positive increases in students' course pass rates and fewer withdrawals in their accelerated courses when compared to courses offered in the traditional semester-long format.<sup>51</sup>

Similarly promising results were found in less rigorous analyses of other programs described above. In internal evaluations employing simple comparisons between program

<sup>48</sup> Adams (2003).

<sup>49</sup> Bragg and Barnett (2009).

<sup>50</sup> Epper and Baker (2009).

<sup>51</sup> Brown and Ternes (2009), as cited in Edgecombe (2010).

and non-program students, Mountain Empire Community College found that Fast-Track math students passed the math course and persisted at higher rates.<sup>52</sup> Similarly, UMCP exploratory evaluations found that students in the accelerated math classes had comparable success rates in the college-level class, and passed out of developmental requirements more quickly than had students taking the traditional-length math class.<sup>53</sup> Likewise, in two non-rigorous evaluations of Community College of Denver's FastStart math program, students were more likely to pass their developmental education math classes, gain more developmental education credits, pass their college-level math courses, and stay enrolled in the college than students taking the semester-long courses.<sup>54</sup> While the evaluation of FastStart utilized a comparison group, it did not use more rigorous statistical methods to control for pre-existing differences among the two groups of students, thereby limiting the reliability of this evidence. Building on these promising results, the Community College Research Center (CCRC) will be conducting a quasi-experimental analysis of this program's success as part of their efforts to test a number of promising interventions in developmental education.

## Modularized Courses

Another approach to accelerating students' progress through developmental education courses is to divide a traditional semester-long course into discrete learning units, or modules, that are designed to improve a particular competency or skill. This approach has become increasingly popular in the last decade, particularly in restructuring developmental math courses; a number of colleges participating in high profile developmental education reform movements, such as Achieving the Dream's Developmental Education Initiative, the Ford Foundation's Bridges to Opportunity Project, and the Charles Stewart Mott Foundation's Breaking Through Initiative, have focused on ways to increase students' progress through these courses.<sup>55</sup> While modularized courses can be implemented a number of different ways, they generally allow students to prove mastery of particular skills by taking a series of short, focused assessments. After they demonstrate competency, students can move on to more advanced modules.

While some modularized courses are instructor-led, others implement a self-paced format, allowing students to complete particular segments of courses at their own pace.

<sup>52</sup> Zachry (2008)

<sup>53</sup> Adams (2003).

<sup>54</sup> Brancard, Baker, and Jensen (2006); Bragg (2009).

<sup>55</sup> Epper and Baker (2009). Additionally, see the websites of these foundations for a list of project participants and their developmental education strategies: Developmental Education Initiative (<http://www.deionline.org/>); Bridges to Opportunity Project (<http://www.communitycollegecentral.org/>); and Breaking Through Initiative (<http://www.breakingthroughcc.org/>).

Computer-aided instruction is frequently used to aid this self-paced format. Tutorial software packages, such as MyMathLab, Plato, ALEKS, and Math Zone, are often used to supplement in-class instruction or as the primary vehicle for teaching students new skills. These packages begin by identifying students' skills deficits and then allow them to work independently on building these skills through increasingly challenging content, built around frequent assessments of students' developing abilities.<sup>56</sup>

Math My Way at Foothill Community College in Los Altos Hills, CA and the SMART math program at Jackson State Community College in Tennessee provide two useful examples of modularized math courses. In both of these programs, the traditional math curriculum has been broken down into a series of modules, with frequent assessments by which students demonstrate their mastery of key concepts. Math My Way employs intense, in-person instruction for two hours a day, five days a week, which is supplemented by tutorials using the ALEKS mathematics software package.<sup>57</sup> Jackson State's SMART program, on the other hand, is delivered through a twelve online instructional modules, with supplemental assistance provided by instructors in a math lab center. Students can pass quickly through modules by demonstrating their competency in an online pre-test; if their skills fall below an 80 percent mastery level, then they are required to complete a series of lessons and homework assignments, and then pass a proctored post-test. Students can complete the modules at their own pace, meaning that it is possible to complete all three levels of the college's developmental math sequence in a single semester.<sup>58</sup>

### **Research Evidence Supporting Modularized Courses**

A number of evaluations of modularized courses reveal promising trends in students' achievement, though the available evidence is limited to simple comparisons between program and non-program students and therefore lacks the rigor needed to make causal inferences about these programs' effectiveness. These evaluations show some promising gains in students' pass rates of both developmental and college-level courses, as well as students' GPAs and persistence into subsequent semesters.<sup>59</sup> For instance, internal evaluations of Foothill's Math My Way Program showed that students who participated in the program had a 20 percent higher pass rate in college level math, while Jackson State noted a 20 percentage point increase in students' progress through the college's

<sup>56</sup> Epper and Baker (2009).

<sup>57</sup> Epper and Baker (2009).

<sup>58</sup> Bassett (2009).

<sup>59</sup> Bassett (2009); Bragg and Barnett (2009); Epper and Baker (2009).

developmental sequence, which they attributed to implementation of their new modularized course format.<sup>60</sup>

## **Mainstreaming into College-Level Courses**

Mainstreaming developmental education students into college-level courses is another practice being explored by a number of community colleges as of late. While different versions of mainstreaming exist, the most common practice is offering a college-level course with a modified curriculum over a lengthier period of time (usually two semesters), or including additional supports, such as tutoring or additional class periods, for developmental students placed into a traditional college-level class. Both approaches rely on the assumption that students with remedial needs are, with extra assistance, capable of successfully mastering college-level work.

Year-long, college-level courses for developmental students have been more popular in four-year colleges, driven by a political interest in minimizing remedial courses at these institutions. These courses provide the opportunity to earn college credit immediately and contextualize skill acquisition with the applications these competencies have in a college-level course. Additionally, because these courses offer the standard college-level curricula, they align with other college-level courses, effectively bridging the gap that can sometimes occur between the competencies taught in developmental-level courses and those expected in college-level courses.<sup>61</sup> Many of these courses also emphasize student-centered instructional strategies and rely on a wide range of assessment practices, such as portfolio-based grades. For example, the yearlong Integrated Reading and Writing course at San Francisco State – which replaces semester-long courses in developmental reading, developmental writing, and college composition – reflects a holistic approach to reading and writing, incorporating self-reflective writing and activities to support metacognitive development.<sup>62</sup> Programs at Arizona State University and at the City University of New York (CUNY) use similar activities to support active learning and analytic thinking.<sup>63</sup>

At the community college level, mainstreaming has tended to focus on integrating developmental education students into a traditional semester-length, college-level course with additional supports to enhance these students' success. For example, in the Community

<sup>60</sup> Epper and Baker (2009); Bassett (2009).

<sup>61</sup> Grubb and Cox (2005).

<sup>62</sup> Goan-Salter (2008).

<sup>63</sup> Glau (2007); Gleason (2000). Note that the CUNY program is no longer in existence as a result of the institutional decision to relegate all developmental-level students to the system's community colleges, rather than providing remediation at the four-year colleges as well.

College of Baltimore County's (CCBC) Accelerated Learning Project (ALP), a limited number of developmental-level students are placed into a college-level English composition course along with students who tested directly into the college-level course. While the college-level course follows the standard curriculum, the developmental-level students enroll in an additional hour-long companion section, in which the same instructor provides extra assistance and guidance.<sup>64</sup> A similar type of immersion program is being run in Aptos, California through Cabrillo College's Digital Bridge Academy (now known as the Academy for College Excellence), whereby developmental English students receive a two-week basic skills foundations course followed by enrollment in six integrated courses, including the college-level English course. The program also features supplemental student supports such as study groups, counseling, and other services.<sup>65</sup>

### **Research Evidence Supporting Mainstreaming into College-Level Courses**

The most promising evidence for mainstreaming comes from the Community College Research Center's quasi-experimental evaluations of CCBC's Accelerated Learning Program. When comparing students with similar skill levels and controlling for pre-existing student characteristics, students who participated in CCBC's Accelerated Learning Program were found to complete introductory college-level courses, enroll and complete additional college English requirements, and attempt college courses at a higher rate than non-ALP students.<sup>66</sup>

Less rigorous studies have also shown promising trends. The year-long college-level courses offered to remedial students at four-year colleges have shown promising increases in students' persistence and course pass rates as well as improved comprehension skills. For instance, an internal evaluation of San Francisco State's Integrated Reading and Writing program revealed increases in retention rates, English course pass rates, and the levels of reading comprehension and critical skills thinking for those who participated in the program. Additionally, students were found to have similar achievement levels in other college-level courses as students who had no remedial needs.<sup>67</sup> Similarly, non-rigorous, internal evaluation's of CCBC's Accelerated Learning Program found that students' participating in the program passed college-level English course at nearly 1.5 times the rate of students with similar academic needs who took the college's traditional developmental education sequence.<sup>68</sup> Finally, an evaluation of the Digital Bridge Academy demonstrated

<sup>64</sup> Adams, Miller, and Roberts (2009).

<sup>65</sup> Jenkins (2009).

<sup>66</sup> Edgecombe and Jenkins (2010).

<sup>67</sup> Goan-Salter (2008).

<sup>68</sup> Adams, Miller, and Roberts (2009).

that participating students passed college-level English and persisted at higher rates than a comparison group.<sup>69</sup> While these trends cannot be used to establish a causal link between these programs and students' improved achievement, they do reveal that such mainstreaming programs may have an important influence on students' outcomes and should be more rigorously tested to provide further evidence of their effectiveness.

## Summary

As described above, several models currently exist for accelerating students' progress through developmental education, many of which show promising trends towards improving students' course pass rates and advancement into college-level work. Practices with the most rigorous evidence include mainstreaming students directly into college-level classes and the fast track, compressed course model implemented at Ivy Tech Community College. However, several other non-rigorous evaluations have also shown promising improvements in students' completion of developmental education, persistence in college, and success in subsequent college-level courses.

While this compendium of studies together provides positive support for these strategies, further research is needed to establish a causal link between these programs and increased student outcomes. Evaluations of each of these efforts have shown relatively strong increases in students' achievement, revealing that mainstreamed, modularized, and fast-track courses are ripe for more rigorous evaluation. Efforts to replicate these practices and implement more rigorous evaluations will need to tackle the political issues inherent in some of these strategies, as some community college practitioners have resisted modifying developmental courses into more accelerated or mainstreamed formats, even when such courses were mandated by higher-level administrators or college trustees.<sup>70</sup> Additionally, researchers and practitioners should attend to the motivational and academic differences in students who voluntarily enroll in accelerated or mainstreamed course formats, as these factors complicate an understanding of these programs true effects for the larger developmental education population. Future research should attempt to control for these challenges and provide even stronger evidence for promoting these practices.

<sup>69</sup> Jenkins (2009).

<sup>70</sup> Moltz (2010).

Building Foundations for Student Readiness

Table 3.1

Summary of Research on Acceleration Strategies

	Fast track courses	Modularized courses	"Mainstreaming" into college-level courses
<b>Rigorous research</b>			
Findings			<u>Positive outcomes:</u> Increased progress through developmental education; higher levels of persistence; higher pass rates in college-level course
Studies			<i>Jenkins, Zeidenberg, Wachen and Hayward (2009)</i>
<b>Promising trends</b>			
Findings	<u>Positive outcomes:</u> Increased progress through developmental education, course pass rates, grades.	<u>Positive outcomes:</u> Higher pass rate in college-level courses; faster progress through developmental course sequence	<u>Positive outcomes:</u> Increased progress through developmental education; higher levels of persistence; comparable or higher pass rates in college-level course
Studies	<i>Browne and Ternes (2009); Brancard and Jensen (2006); Zachry (2008); W. Adams (2010)</i>	<i>Bassett (2009); Bragg and Barnett (2009); Epper and Baker (2009).</i>	<i>Edgecombe and Jenkins (2010); Goan-Salter (2008); Gleason (2000); Adams, Miller, and Roberts (2009)</i>

## 4. Contextualized Instruction

Throughout the best practices literature, there is a strong conviction that developmental-level skills and knowledge are best learned when applied to content that will be relevant to students outside of their developmental course curriculum.<sup>71</sup> In many ways, this is a common-sense recommendation, designed to head off the classic question — “Why do I have to learn this?” — which can be applied equally to lessons on arithmetic, grammar, or basic essay structures. More importantly, it is grounded in educational psychology and theories of learning. Research on knowledge transfer has shown that students are better able to apply skills to new situations when they understand the underlying principles and procedures in addition to the facts.<sup>72</sup> Additionally, active learning theory suggests that learning is deepest when students personally engage with and interpret material, generating meaning based on their own experiences and previous knowledge.<sup>73</sup>

Building on these theories, some practitioners have focused on developing instructional models that provide more contextualized learning experiences for students. Generally, contextualized instructional models focus on teaching basic skills in reading, writing and math in conjunction with other course content, with special attention to students’ own personal experiences or learning goals.<sup>74</sup> Contextualized instruction for remedial students may be offered in two different formats. First, basic skills instruction may use a particular course subject, such as nursing or computer technology, to ground students’ development of reading, writing, or math skills. In these cases, improvement of students’ basic skills, rather than knowledge of content from the field, remains the primary objective. Alternately, contextualized instruction may focus more concretely on developing students’ knowledge of an academic discipline or vocational field, with instruction in basic skills as a secondary objective towards better understanding this course content.<sup>75</sup>

Contextualized instructional models are thought to be a particularly promising model for helping academically underprepared students engage more quickly with their academic or vocational field of interest.<sup>76</sup> Unlike traditional developmental reading, writing, and math courses, which are offered as individualized courses disconnected from

<sup>71</sup> Center for Student Success (July 2007); Grubb and Associates (1999); McCabe and Day (1998); American Mathematical Association of Two-Year Colleges (AMATYC) (2006); Simpson, Stahl, and Francis (2004).

<sup>72</sup> Gillespie (2002); Berns and Erickson (2001).

<sup>73</sup> Center for Student Success (July 2007); Grubb and Associates (1999); De Corte (2007); Dirx and Prenger (1997).

<sup>74</sup> Baker, Hope, and Karandjeff (2009).

<sup>75</sup> Perin (2010 (in progress)).

<sup>76</sup> Grubb and Kraskouskas (1992); Berns and Erickson (2001); Perin (2001); Badway and Grubb (1997).



other course subjects, contextualized approaches offer more integrated learning environments for developing students' basic skills. By connecting with students' professional interests and providing real-world contexts for the application of these skills, contextualized learning programs are expected to help students advance more quickly in their skill attainment.<sup>77</sup>

## **Models for Contextualized Learning with Developmental Education Students**

While contextualized learning has been used in a number of disciplines to promote more authentic learning experiences, contextualized approaches with developmental education students have tended to focus on enhancing students' basic skills within the context of particular academic or vocational disciplines. Within vocational programs, contextualized learning affords students the opportunity to gain professional or technical skills while still enrolled in their pre-collegiate programs. Contextualized learning may also be used in particular academic subjects to promote students' integration of course concepts with reading, writing, or math skills. Finally, learning communities, in which developmental courses are linked with other college-level courses, can provide integrated environments for students to engage with both academic course content and basic skills learning.

## **Contextualized Learning in Vocational Programs**

A practice gaining much attention in the community college world is contextualized learning opportunities for basic skills students interested in vocational or technical fields, such as allied health or early childhood education.<sup>78</sup> These programs may be geared towards adult basic education students who have yet to earn a high school credential or developmental education students entering community college. In both cases, students have not yet developed the reading, writing or math skills needed to earn their credential of interest and need additional preparation in these areas to master the course content. Therefore, occupational programs in these colleges have looked to develop integrated vocational and professional training along with substantial basic skills preparation. Many also provide opportunities for direct enrollment in degree or certificate programs, thus accelerating students' completion of these credentials.<sup>79</sup>

<sup>77</sup> Jobs for the Future (2010).

<sup>78</sup> Washington State Board for Community and Technical Colleges (2005).

<sup>79</sup> Bragg and Barnett (2009); Washington State Board for Community and Technical Colleges (2005).

One of the most promising contextualized learning models to date is Washington State's Integrated Basic Education and Skills Training (I-BEST) program, in which English as a Second Language and adult basic education instructors work together with career-technical faculty to jointly design and teach occupational courses. In this program, basic English instruction is tailored to the language and communication skills needed for students' chosen occupation and are taught in the context of students' workforce training classes. Comprehensive supports, such as tutoring, advising, and mentoring, are also key program components for assisting students. The primary goal of I-BEST is to ensure that students receive at least one year of college training that culminates in the award of a certificate or degree.<sup>80</sup>

Another promising program that emphasizes contextualized learning models is the Charles Stewart Mott Foundation's Breaking Through initiative. Breaking Through pilots are being tested in a number of community colleges throughout the country, with many focusing on contextualized learning as a key gateway to college success. For instance, Central New Mexico Community College has implemented a Construction Apprenticeship program, which offers for-credit, contextualized courses in math and reading while integrating these skills in other college-level courses such as carpentry. Similarly, Cuyahoga Community College has created a pre-State Tested Nursing Assistant program that allows individuals with pre-8<sup>th</sup> grade skills to improve their academic abilities while learning about core concepts in healthcare and nursing.<sup>81</sup> While many of these programs focused on students in adult basic education programs, several also targeted developmental education students who had already received a high school credential and were seeking entry into community colleges.

### **Research Evidence Supporting Contextualized Learning**

The most promising evidence supporting contextualized learning for students with remedial needs comes from the Community College Research Center's recent evaluation of Washington's I-BEST program. Build on encouraging results from the state's descriptive analysis, CCRC's evaluation used statewide data to compare I-BEST students with other similarly skilled adult basic education students. Using a multivariate logistic regression analysis and controlling for background characteristics such as socio-economic status and previous schooling, the analysis found positive effects across the board for students in the I-BEST program. These students were significantly more likely to advance into credit-bearing courses, persist in college, earn credits that counted towards a credential, earn occupational certificates, and make learning gains on basic skills tests than students not

<sup>80</sup> Washington State Board for Community and Technical Colleges (2005).

<sup>81</sup> Bragg and Barnett (2009).

participating in the program, with I-BEST students often showing large gains across many of these measures.<sup>82</sup>

Promising evidence also exists documenting the success of several Breaking Through programs, although the studies did not employ rigorous statistical methods and thus the findings from this research should be approached with caution. Internal evaluations at several of the participating colleges have shown positive college outcomes overall for students in the programs, such as increased progress through developmental education and higher pass rates in both developmental- and college-level courses.<sup>83</sup> However, the statistical analyses employed in this research either do not use a comparison group or fail to control for factors such as earlier differences in achievement levels between students who are in the program and those who are not.

## **Learning Communities**

Learning communities are another popular strategy employed by many community colleges to provide contextualized learning experiences for students. While variations of learning communities are wide-ranging, the general principle behind these programs is that students enroll in two or more classes together as a cohort. In the more developed versions of these programs, instructors of these courses collaborate with one another to create an integrated curriculum to support the development of multiple aspects of students' learning. As such, these linked courses generally employ overlapping curricula, with joint assignments and projects across the courses. Additionally, because students proceed through these classes with the same cohort of classmates, learning communities are expected to promote the social cohesion and the integration of students within the college campus.<sup>84</sup>

While learning communities are used with a number of different programs and courses at community colleges, those that involve developmental education learners often link a developmental education course with a for-credit, college-level course. For example, at Queensborough Community College in Queens, New York, developmental math is linked with a variety of college-level courses, such as College English, Sociology, and Business.<sup>85</sup> Another popular strategy is to include a college skills or college success course with these classes in order to provide additional advising and supports to students who are adapting to college life. Learning communities at Kingsborough Community College in Brooklyn are an example of this program model, which links a developmental English course, a content area college-level course, and a one-credit college success course. The

<sup>82</sup> Jenkins, Zeidenberg, and Kienzl (2009).

<sup>83</sup> Bragg and Barnett (2009).

<sup>84</sup> Tinto (1975, 1987); Visher, Schneider, Wathington, and Collado (2010).

<sup>85</sup> Weissman, et al. (forthcoming).

college also includes additional supports with their program, including enhanced counseling and a voucher to purchase textbooks.

Although most learning communities do not engender the type of workforce or experiential skills addressed in other contextualized learning settings, the deliberate links made between developmental and college-level courses can give students the opportunity to practice skills they are learning in their developmental courses in college-level content classes. For instance, linking a developmental reading course with an introductory psychology course allows students the opportunity to use the psychology text as a resource for their reading development. Similarly, linking developmental math with an entry-level biology course allows students to apply their developing math knowledge to science problems. Additionally, learning communities that include college-level courses afford developmental students the opportunity to gain credits towards credentials, while still working to improve their basic skills. Finally, learning communities' general promotion of active learning and student engagement is expected to enhance knowledge acquisition and encourage greater levels of commitment to the institution.<sup>86</sup>

### **Research Evidence Supporting Learning Communities for Developmental Education Students**

Learning communities are one of the few strategies for which more rigorous evidence is available. In general, the findings related to learning communities have been positive, though modest, with some studies showing more mixed results. Quasi-experimental studies on the effects of learning communities for both college-level and developmental students at over a dozen institutions have found a significant relationship between students' participation in a learning community and their level of engagement with their classes, fellow students, and faculty. Additionally, students participating in the programs were found to persist to the following year at significantly higher rates than a comparison group who did not take learning communities, even when controlling for differences in background characteristics among students.<sup>87</sup>

More recent experimental studies, which test learning communities specifically for developmental-level students, reinforce many of these promising findings, though their findings tend to be more modest. For instance, qualitative studies of learning communities at six different colleges throughout the country have shown that these programs clearly influence students affectively, leading to high levels of engagement and a strong sense of belonging among students. Some positive impacts on academic achievement have also been

<sup>86</sup> Tinto (1997); Visher, Schneider, Wathington, and Collado (2010).

<sup>87</sup> Engstrom and Tinto (2008); Tinto (1997); Zhao and Kuh (2004).

found, though these effects seem to depend upon the level of the program's maturity, as well as faculty's training and use of recommended practices.<sup>88</sup>

These experimental studies also found positive impacts on students' achievement and persistence in school although, as with the qualitative findings, these effects seem to depend on the strength and maturity of colleges' programs. For instance, as noted above, Kingsborough developed a relatively comprehensive learning communities model for developmental-level English students. This program resulted in some improvements in students' educational outcomes, including the number of credits earned during the semester that students were enrolled in learning communities and students' progression through developmental education.<sup>89</sup> However, the size of these effects tended to be small, with program students' achievement increasing only one or two percent points over the control group. Additionally, these effects diminished after the program ended, thereby resulted in no long term gains in students' academic achievement.

Currently, the National Center for Postsecondary research is building on this work to conduct experimental evaluations of six different models of learning communities, five of which are geared toward developmental students. Emerging results about student academic outcomes are mixed. At Hillsborough Community College in Tampa Bay, Florida, learning communities linked a developmental reading course with a student success course, but did not integrate course curricula or offer comprehensive supports at the level achieved by Kingsborough's program. The program did not have a meaningful impact on students' academic success, but evidence suggests that it had some positive impacts on students' educational outcomes in subsequent semesters as faculty collaboration and curricular integration increased.<sup>90</sup> In learning communities for developmental math students at Queensborough Community College (Queens, NY) and Houston Community College (Houston, Texas), students attempted and passed the math course in the learning communities at significantly higher rates than students in comparison groups. After the program, learning communities students at Houston also progressed along the developmental course sequence more rapidly.<sup>91</sup>

Taken together, these findings suggest that more mature versions of learning communities, which integrate training for faculty, institutional supports, and strong leadership over time, may have a greater effect on students' achievement. However, the effects of these programs have been relatively modest, suggesting that learning

<sup>88</sup> Scrivener et al. (2008); Weiss, Visher, and Wathington (2010)

<sup>89</sup> Scrivener et al. (2008).

<sup>90</sup> Visher, Schneider, Wathington, and Collado (2010); Weiss, Visher, and Wathington (2010).

<sup>91</sup> Weissman, et al. (forthcoming).

communities will not dramatically increase students' success in and progress through developmental education.

## **Summary**

Based on the evidence currently available, models offering contextualized learning opportunities for developmental education students seem to hold the most promise for helping students build their basic skills and advance into college-level courses and beyond. Vocational and occupational contextualized learning, at least as implemented in Washington state's I-BEST program, appears to offer the most encouraging results, as these programs appear to quickly move basic skills students into college-level courses and help them graduate in a compressed amount of time with a certificate or degree. It should be noted that many of the vocational contextualized learning programs worked with adult basic education and ESL students rather than those entering into college and placing into developmental education programs. However, given the promising findings from these programs, developmental education programs may want to consider how links with more occupationally focused courses might further improve their students' outcomes. Similarly, more rigorous research should be conducted to validate the promising results of these programs.

Learning communities also provide some heartening news about the potential of contextualized learning for improving student outcomes although these effects of these programs on long-term student outcomes are much more limited. While strong learning communities models show some positive effects for student outcomes during their participation in the program, less well developed programs showed fewer effects. Additionally, most academic improvement tended to dissipate over time, after the learning communities program ended. This evidence, taken together with the strong research models used to document these effects, reveal that learning communities may be a less effective method for dramatically changing developmental education students overall success. Given this, researchers, policymakers, and practitioners should look towards other methods which may hold more promise for improving these students' achievement.

## Building Foundations for Student Readiness

### Table 4.1

#### Summary of Research on Contextualized Programs

Programs	I-BEST	Breaking Through	Learning communities
<b>Rigorous studies</b>			
Findings	<u>Positive outcomes:</u> Increased progress into credit-bearing courses, persistence in college, credits that counted towards a credential, occupational certificates, and learning gains on basic skills tests		<u>Mixed outcomes:</u> more comprehensive program leads to impact on student engagement, credits earned, and developmental course sequence completion; less comprehensive program for English students has no substantive effects, for math students there is an increase in pass rates and progression in the developmental course sequence
Studies	<i>Jenkins, Zeidenberg, and Kienzl (2009)</i>		<i>Scrivener et al. (2008); Weiss, Visher and Wathington (2010); Weissman, et al. (2010)</i>
<b>Promising trends</b>			
Findings		<u>Positive outcomes:</u> Increased progress through developmental education, higher pass rates in developmental and college-level courses	<u>Positive outcomes:</u> Increased student engagement and persistence.
Studies	<i>Washington State Board of Community and Technical Colleges (2005)</i>	<i>Bragg and Barnett (2009)</i>	<i>Engstrom and Tinto (1998); Tinto, Goodsell-Love and Russo (1994)</i>

## **5. Supplemental Supports to Advance Students' Achievement**

Most community colleges offer a wide array of services for their students in order to further support their persistence and advancement in college. These services range from providing academic counseling to students upon their entry into college to specialized programs for students with particular interests or backgrounds. Most colleges also offer academic supports, such as individualized tutoring, support labs for math or English, and computer tutorials, which are aimed to supplement the instruction students receive in class. As such, student support services seek to facilitate students' academic achievement and remove the barriers that students may experience when transitioning to postsecondary education.

While many developmental education students may take advantage of these offerings, questions have been raised about whether these more general supports meet the challenges that are faced by academically underprepared students. Numerous studies have noted that students who place into developmental education arrive at school with more handicaps than the general population of students and are more likely to come from disadvantaged backgrounds with little exposure to college expectations.<sup>92</sup> As such, a number of colleges have looked to developing more extensive support services for students with remedial needs in an effort to better support their progress in college.

### **Models for Supplemental Supports with Developmental Education Students**

As noted in Chapter 1, many of the field's best practice studies encouraged integrating a multiple student supports into a comprehensive model to foster developmental students' academic achievement.<sup>93</sup> These services primarily include advising (both academic and career-focused) and academic assistance, such as tutoring or the creation of learning centers, but can also include workshops or courses designed to teach study strategies and opportunities for students to access learning-assistance technology.<sup>94</sup> Generally, recommendations for comprehensive student support services tend to state that the academic instruction and student support service divisions should work together

<sup>92</sup> Adelman (2004); Attewell, Lavin, Domina, and Levey (2006); Hagedorn et al. (1999).

<sup>93</sup> Boylan (2002); McCabe and Day (1998); Center for Student Success (July 2007); Sperling (2009).

<sup>94</sup> American Mathematical Association of Two-Year Colleges (AMATYC) (2006); Boylan (2002).



collaboratively – on both an institutional and individual level – to ensure that students are aware of these services and accessing those that are most appropriate for their needs.<sup>95</sup>

Unfortunately, limited evidence is available supporting these recommendations for more comprehensive supports. However, several promising models focused on selected support services have shown some encouraging results. First, a number of colleges have looked to implementing more intensive tutoring services for developmental education students, particularly through Supplemental Instruction programs, which link tutoring directly with a particular course. Additionally, intensive advising models, where students meet regularly with a staff or faculty advisor about their course plans and college experiences, have also proven popular among a number of schools as a way to advance students' achievement. Finally, student success courses, which generally provide students with an introduction to college life and study skills training, are another key intervention colleges are using to improve developmental education students' achievement.

## **Tutoring and Supplemental Instruction**

Tutoring is a popular support that has been implemented by a number of colleges as means to further advance developmental education students' achievement.<sup>96</sup> As with many student support practices, tutoring can take diverse forms. Tutoring can be offered by faculty, staff, or student peers, or through computer-assisted instruction with tutorial software packages. Students may receive individualized assistance or work in small groups with a tutor outside of class. On college campuses, tutors may be housed in a stand-alone center or in learning assistance centers, which provide a number of other supports for students learning.<sup>97</sup> Finally, tutoring can be more generalized, covering a number of academic subjects, or more specialized to a specific course curriculum or content area.

One of the more focused models of tutoring, which has become popular among developmental educators as of late, is supplemental instruction (SI). Unlike more generalized tutoring practices, which are offered independent from students' courses, supplemental instruction is a structured tutoring model that is connected directly with a particular course. Generally, a trained tutor (the "SI leader"), or the instructor, conducts an additional course section, which provides structured assistance to students on the course material or assignments. If lead by someone other than the instructor, the supplemental instruction leader generally attends the core curriculum class so that they are familiar with the course material and the instructors' presentation. SI leaders may be peer tutors who

<sup>95</sup> Center for Student Success (July 2007); Weissman et al. (2009).

<sup>96</sup> Brock et al. (2007).

<sup>97</sup> American Mathematical Association of Two-Year Colleges (AMATYC) (2006); Perin (2004); Maxwell (1991).

have already achieved success in the course, or be faculty or staff members who are well versed in the course content. Sessions are often led using active or collaborative learning techniques, which encourage students to more fully interact with the course material. The SI leaders work closely with the faculty member leading the course and often receive guidance on the content of their sessions.<sup>98</sup>

Supplemental instruction is used widely across the country in a variety of developmental-level and entry-level courses, all of which have historically high failure rates at the institution. One example of this type of structured supplemental instruction program is being offered by Mountain Empire Community College in Big Stone Gap, Virginia. Termed Peer-Led Team Learning, this program provides an extra section of the colleges' developmental algebra courses and meets during an open block each week just before students' class. The supplemental instruction section is led by a peer tutor, who successfully completed the course in an earlier semester and received training to lead the supplemental section. The peer tutor is also required to regularly attend the developmental algebra course and work closely with the instructor, including having her lessons reviewed and modified. As with many supplemental instruction programs, Mountain Empire's Peer-Led Team Learning program also emphasizes active learning, with most lessons providing engaging exercises for students to interact with the course content.<sup>99</sup>

### **Research Evidence Supporting Tutoring and Supplemental Instruction for Developmental Education Students**

Little rigorous evidence exists documenting the success of either generalized tutoring or supplemental instruction programs for developmental education students. Several challenges also limit the reliability of research demonstrating promising trends. First, student self-selection bias is particularly apparent with tutoring programs, as most studies to date have not accounted for the motivation of students who seek out tutoring services, which may be correlated with other characteristics that help these students succeed.<sup>100</sup> Additionally, some research has indicated that students who utilize tutoring and learning assistance centers tend to be older and have attended college for a longer period of time, making it difficult to generalize conclusions to a larger student population.<sup>101</sup> It can also be challenging to isolate the effect of tutoring from other forms of academic assistance, such as advising or revised pedagogical strategies, as many developmental education students often receive multiple services when attending college.<sup>102</sup> Finally, few studies

<sup>98</sup> Arendale (1997).

<sup>99</sup> Zachry (2008).

<sup>100</sup> Xu, Hartman, Uribe, and Mencke (2001).

<sup>101</sup> Bannier (2007).

<sup>102</sup> Xu, Hartman, Uribe, and Mencke (2001).

focus specifically on developmental education populations, making it difficult to disentangle the effects for these students from that of the general student population.

Overall, the available data on a variety of tutoring programs has shown mixed results. Some promising trends have been noted for students who utilize learning assistance centers.<sup>103</sup> For instance, one experimental study of a program in which students were required to go to a learning assistance center showed some positive effects on academic outcomes such as credits earned, course pass rates, and GPAs. However, these mandatory visits were offered in conjunction with a student success course, making it difficult to disentangle which service had the greatest effect on students' achievement.<sup>104</sup> Other non-rigorous, studies have found little evidence of improved achievement from tutoring except when certain types of tutoring were implemented.<sup>105</sup> Those programs with the most promising evidence include small-group tutoring led by a peer, programs designed to help students with specific assignments, and more personalized systems of instruction, where students go through pre-programmed learning material with a tutor available for assistance.<sup>106</sup>

While supplemental instruction is popular within developmental education, little research is available documenting the results of these programs in community college settings. Non-rigorous, internal evaluations of Mountain Empire's Peer-Led Team Learning program revealed promising increases in students' course pass rates, persistence, and GPAs; however, the evaluation had relatively few students and only employed simple comparisons with those not enrolled in the program, thereby limiting any causal statements about the program's effects.<sup>107</sup> Other non-rigorous studies conducted in four-year universities have shown positive effects for students who received supplemental instruction in historically difficult entry-level courses.<sup>108</sup> For instance, when using large datasets to compare students who received and did not receive supplemental instruction, those receiving this intervention were found to have higher grades, lower course withdrawal rates, higher GPAs, and higher rates of persistence and graduation.<sup>109</sup> Others have noted positive effects of supplemental instruction with at-risk students when compared with more traditional students.<sup>110</sup> However, it is important to note that these studies did not effectively control for differences in

<sup>103</sup> Perin (2004); Roueche, Ely, and Roueche (2001).

<sup>104</sup> Scrivener, Sommo, and Collado (2009).

<sup>105</sup> Maxwell (1991); Topping (1996); Hock, Deshler, and Schumaker (1999).

<sup>106</sup> Maxwell (1991); Topping (1996); Hock, Deshler, and Schumaker (1999).

<sup>107</sup> Zachry (2008)

<sup>108</sup> Maxwell (1991); Hock, Deshler, and Schumaker (1999).

<sup>109</sup> Arendale (1997); Bowles, McCoy, and Bates (2008); Hodges and White (2001); Ogden, Thompson, Russell, and Simons (2003); Ramirez (1997).

<sup>110</sup> Ogden, Thompson, Russell, and Simons (2003); Ramirez (1997).

students' motivation and were, at times, limited by the types of comparisons made between the two groups.

## Advising

Developmental educators have also looked towards more intensive advising models as means to improve remedial students' success. At a minimum, advising in community colleges entails a staff or faculty member helping students navigate their choice of classes or majors although advisors in some schools also offer assistance in helping students access campus services or develop career goals or plans. Advising in community college settings tends to be more limited, as advisors often have large caseloads of students, sometimes in excess of 1,000 students a semester, making it difficult for them to give these students more personalized attention.<sup>111</sup> This high caseload, combined with the fact that at-risk students are far less likely to be proactive and seek out advising opportunities, means that developmental-level students tend to receive quite limited advising.<sup>112</sup>

In order to reverse this trend, some schools have looked to create more intensive advising experiences for students with remedial needs. One of the most commonly recommended approaches is the reduction of advisors' caseload, allowing them to meet more frequently with students and provide more personal attention, which can be coupled with mandatory advising for students.<sup>113</sup> A more intensive version of this model is to have advisors serve as mentors to students, regularly meeting with them to monitor their progress and inform them of college services that may assist them with their challenges. Other strategies have focused on implementing early alert systems, in which faculty and student services staff collaborate to communicate with students who are at risk of failure. These systems may also include meetings with an advisor to establish a corrective plan of action.<sup>114</sup>

Lorain County Community College and Owens Community College's enhanced advising program and South Texas College's Beacon Mentoring program provide two examples of alternate advising models. Students in Lorain County and Owen's enhanced advising program – who were not all developmental-level – were assigned to a team of counselors, with whom they were expected to meet at least two times per semester for two semesters to discuss academic progress and resolve any issues that might affect their schooling. The caseloads of these counselors were reduced in order to facilitate more

<sup>111</sup> Boylan, Bliss, and Bonham (1997); Weissman et al. (2009).

<sup>112</sup> Grubb (2001).

<sup>113</sup> Sperling (2009).

<sup>114</sup> Pflieger (2002).

frequent, personalized contacts with students.<sup>115</sup> South Texas took a different approach to advising, choosing to assign faculty or staff mentors to advise students in developmental and introductory math courses. Termed the “Beacon Mentoring” program, these college employees made several short presentations within students’ math classes about available resources on campus and worked with faculty to identify struggling students and offer them help early on. Some mentors also had more regular contact with their students through personalized meetings or emails.<sup>116</sup>

### **Research Evidence Supporting Enhanced Advising**

A number of rigorous and non-rigorous studies of a variety of advising approaches have been conducted, which tend to show mixed results on developmental education students’ achievement. Less rigorous, large-scale studies have noted some positive trends from specialized advising services for developmental education students.<sup>117</sup> Similarly, non-rigorous studies of advising models for minority developmental education students were found to positively influence students’ progression through developmental coursework, grades, and rates of college-level course completion.<sup>118</sup> Furthermore, some trends research on early alert models of advising has revealed positive trends in students’ persistence.<sup>119</sup> However, the findings related to early alert programs appear to be dependent upon whether students followed advisors’ recommendations for corrective actions, such as attending tutoring. Additionally, most early alert programs did not show meaningful improvements in students’ academic achievement.<sup>120</sup>

Rigorous research on intensive advising models has shown more mixed results. Experimental study results from Lorain County and Owen’s enhanced advised models paired with tutoring revealed some positive outcomes, as students who received more personalized attention from their advisors accessed advising services more often and had higher retention rates for the first two semesters following the program. However, the program did not have a positive impact on other academic outcomes, such as course pass rates, credit accumulation, or GPAs.<sup>121</sup> Alternately, a random assignment study of South Texas’ Beacon Mentoring program provided more encouraging evidence about an advising service with relatively low intensity. While the program did not make a significant

<sup>115</sup> Scrivener and Weiss (2009).

<sup>116</sup> Visher, Butcher, and Cerna (2010)

<sup>117</sup> Bahr (2008); Boylan, Bliss, and Bonham (1997); Light (2001).

<sup>118</sup> Taylor (1996); the program (Puente, in California) also has a coursework component where students take English courses especially designed for Latino students.

<sup>119</sup> Lewallen (1993); Pflieger (2002); Cartnal and Hagen (1999).

<sup>120</sup> Lewallen (1993); Pflieger (2002); Cartnal and Hagen (1999).

<sup>121</sup> Scrivener and Weiss (2009).

difference in the academic outcomes of the overall sample, students in developmental math classes who were visited by a Beacon withdrew from the course at lower rates and earned more credits at the end of the semester. However, the effects of the program were relatively modest and did not affect other academic outcomes such as students' course pass rates, GPAs, or post-program persistence.<sup>122</sup>

## **Student Success Courses**

Student success courses have become one of the most popular support interventions among community colleges seeking to improve developmental-level students' achievement. Sometimes referred to as study skills, student development, or new student orientation courses, these classes are generally offered as stand-alone, credit-bearing courses for developmental education students or newly entering students at the college. Generally held as semester-long classes, student success courses are often used as a way to introduce new students to college life, help them learn about the college's services, and orient them to the types of decisions and responsibilities they will have as college students. In a number of recent studies, these courses have been associated with promising increases in students' academic achievement and persistence in college, leading a number of states and schools to mandate them for newly entering students.<sup>123</sup>

Examples of student success courses abound in community college literature. For instance, these courses were linked to developmental courses in Hillsborough Community College and Kingsborough Community College's learning communities' models, providing extra support to students' academic and social integration into college life.<sup>124</sup> Additionally, student success courses may be targeted specifically to at-risk or developmental students, as was the case with Chaffey College's student success for students on probation and Guilford Technical Community College's success course for students needing one or more developmental education classes.<sup>125</sup> These courses may be offered as less-intensive, one-credit classes (as was the case with Kingsborough) or more structured, three-credit classes that provide more opportunities for student interaction (as in Guilford's model). However, regardless of the intensity of these programs, each of these models shared a key focus on developing students' study skills and knowledge of college life and expectations.

<sup>122</sup> Visher, Butcher, and Cerna (2010).

<sup>123</sup> Scrivener, Sommo, and Collado (2009); Zeidenberg, Jenkins, and Calcagno (2007); Derby and Smith (2004).

<sup>124</sup> Visher, Schneider, Wathington, and Collado (2010); Weiss, Visher, and Wathington (2010); Scrivener et al. (2008).

<sup>125</sup> Scrivener, Sommo, and Collado (2009); Zachry and Orr (2009).

## Research Evidence Supporting Student Success Courses

Student success courses have long been promoted in the best practices research as an important way to help developmental education students develop better learning strategies, and some practitioner research has shown positive trends in student outcomes.<sup>126</sup> Recently, more rigorous research has confirmed these promising trends. For instance, the Community College Research Center's quasi-experimental analysis of students who enrolled in a student success course revealed positive effects on students' persistence, degree earning, and transfers, particularly for developmental-level students.<sup>127</sup>

Experimental studies utilizing random assignment methodology have also shown promising effects. For instance, the experimental results of Kingsborough's learning communities model, which incorporated a one-credit student success course, found positive impacts on the number of credits students' earned and their progression through developmental education.<sup>128</sup> Similarly, an analysis of Chaffey College's success course for probationary students found that students enrolled in the success course earned more credits, passed more classes, and had higher GPAs than those who did not receive the course.<sup>129</sup> However, because the success course at both of these schools were linked with other services, these results should still be approached with caution, as it is difficult to know whether these findings were related to the success course or other programs offered.

## Summary

Student success courses, intensive advising, and supplemental instruction have each shown some promising effects for increasing students' achievement though their effects appear to be limited. For instance, rigorous research on intensive advising and student success courses has documented some positive increases in the number of credits developmental education students earned and, in some cases, their progression through developmental education. Additionally, there is some suggestive evidence revealing that certain types of tutoring programs and supplemental instruction may produce positive gains in students' success in their courses and persistence in college.

While these findings are promising, none of the student supports services described in this chapter have had dramatic effects on helping developmental education students advance more quickly to and through college-level courses. For example, none of the

<sup>126</sup> Boylan (2002); Weinstein et al. (1997).

<sup>127</sup> Zeidenberg, Jenkins, and Calcagno (2007)

<sup>128</sup> Scrivener et al. (2008).

<sup>129</sup> Scrivener, Sommo, and Collado (2009). MDRC is conducting an additional random assignment study on a student success course designed for developmental education students; results are due out in 2011.

supplemental supports studied here provided striking changes in students' course pass rates, GPAs, or credits earned. Additionally, several of the positive findings noted during the time when these services were offered dissipated after the program was over. These findings suggest that while supplemental support services may produce modest gains in students' achievement, they are unlikely to have more dramatic effects on students' progress into college-level work and receipt of a credential. While follow up studies on Chaffey's student success course and Kingsborough's learning communities may provide more heartening information, the current evidence implies that reforming student support strategies may be a step in the right direction, but are not sufficient in isolation to see remarkable gains in developmental education students' achievement.



Building Foundations for Student Readiness

Table 5.1

Summary of Research on Student Support Services

	Student success courses	Advising	Tutoring	Supplemental instruction
Examples	Orientation courses; study skills courses; curricula such as <i>On Course</i>	Mentoring programs; early alert; mandatory advising	Peer tutoring; tutoring with trained staff person; tutoring labs	Course-based small-group tutoring with trained tutor
Rigorous Research				
Findings	<u>Positive outcomes:</u> Increased credits earned, course pass rates, GPAs, receipt of credentials, and transfer to four-year colleges	<u>Positive outcomes:</u> More intensive advising, paired with tutoring, had positive effects on students accessing support services on campus and persistence; "light-touch" mentoring program had positive effects on student outcome	<u>Positive outcomes:</u> Visits to learning assistance center, paired with intensive advising, had positive effects on students accessing support services on campus and persistence	
Studies	<i>Zeidenberg, Jenkins and Calcagno (2007); Scrivener, Sommo and Collado (2009)</i>	<i>Scrivener and Weiss (2009); Visher, Butcher, and Cerna (2010)</i>	<i>Scrivener and Weiss (2009)</i>	
Promising trends				
Findings	<u>Positive outcomes:</u> Associated with increased academic outcomes	<u>Mixed outcomes:</u> Early alert systems mixed (dependent on students use of follow up services); Advising has been positively associated with passing classes and receiving a higher GPA.	<u>Mixed outcomes:</u> Learning center usage positively associated with student achievement; ntrained tutors show no changes in student outcomes; trained tutors more positive effects; small-group peer tutoring and tutoring related to specific assignments more helpful than other kinds of tutoring	<u>Positive outcomes:</u> Associated with higher grades and lower withdrawal rates; higher graduation rates; some studies find more promise for at-risk students
Studies	<i>Weinstein et al. (1998)</i>	<i>Taylor (1996); Rudmann (1992); Bahr (2008)</i>	<i>Boylan, Bliss and White (1997); Maxwell (1990); Xu, Uribe and Mencke (2001); Topping (1996); Hock, Deshler and Schumaker (1999)</i>	<i>Arendale (1996); Ramirez (1997); Ogden, Thompson, Russell and Simons (2003); Zachry (2008); Hodges and White (2001); Bowles, McCoy and Bates (2008)</i>

## 6. Conclusion

The charge of developmental education is clear: to build up the skills of academically underprepared students so that they may be successful in college-level work and progress quickly to a credential that will advance their position in the marketplace. Unfortunately, as the system currently stands, this goal is rarely met. While over 60 of community college students begin their college career in developmental courses, less than 30 percent of these students will ever make it through these courses successfully.<sup>130</sup> Even more disturbing, approximately 60 to 70 percent of those students who took a remedial course never earn a postsecondary degree or credential.<sup>131</sup>

Given these troubling achievement levels, many educators, policymakers, and foundations are reconsidering the most effective strategies for supporting developmental-level students. As noted in this report, a number of these strategies have exhibited promising trends in increasing the number of students who are ready for college-level work, with some even improving students' receipt of credentials. Generally, the strategies that hold the most promise focus on improving students' skills with a compressed time frame and on linking remediation to relevant college-level work: programs that offer contextualized remedial education within occupational and vocational programs, programs that mainstream developmental students into college-level courses with additional supports, and programs that provide accelerated courses to allow remedial students to more quickly complete their developmental work. These strategies tend to modify pedagogical approaches to fit within the programs' non-traditional structures, and provide clear opportunities for students to remain on track in their work towards their college goals rather than become mired in multiple semesters or years of remedial work.

While these encouraging findings are a welcome relief for those hoping to advance remedial students' success in college, their relatively modest effects also need to be taken in context of the larger challenges facing developmental education students. Most of the promising programs cited in this report were conservative efforts to tweak the existing curriculum and improved students' academic achievement by only a few percentage points, a small change relative to the large numbers of students failing their developmental education courses. Additionally, virtually all of these programs discussed in this report are still in the pilot stages, touching relatively few students, which makes it difficult to ascertain how they might affect the achievement of larger groups of students. Finally, and most importantly, rigorous research demonstrating a clear causal link between these programs

<sup>130</sup> Adelman (2004); Attewell, Lavin, Domina, and Levey (2006); Bailey (2009).

<sup>131</sup> Attewell, Lavin, Domina, and Levey (2006).

and improved student achievement is limited, making it challenging to say with certainty how well these strategies have actually increased students' success.

Given these issues, a number of researchers and policymakers have begun to suggest that developmental education in its current form is broken, and have called for a more radical re-envisioning of these programs. Noting that more conventional efforts to improve students' achievement have produced only modest results, these individuals have sought to restructure the core curricula of developmental education programs and offer more innovative ways to help students build their skills. While still new and untested, these ideas offer a fresh perspective for advancing academically underprepared students' success, which may hold promise for more radical improvements in these students' achievement.

Finally, while new reform efforts are creating increasingly more novel ways to improve developmental education students' success, a number of institutional and organizational structures supporting developmental education also present clear challenges for any reform effort. For instance, most developmental education programs are structured around entrance exams, which assess students' skills upon entering college and are used to place students into the appropriate developmental education or college-level courses. Given that these tests are part of the admissions process at most community colleges, even the most innovative of reforms must consider whether and how they will be utilized to assess students' abilities. Similarly, most community colleges rely heavily on adjunct, or part-time faculty to teach developmental courses, meaning that large proportions of students are taught by instructors who are less connected to the campus community. Any reform effort that seeks to reach large groups of developmental education students must therefore find ways to integrate these faculty into their efforts, a goal which has proved difficult for many community colleges in the past.

Given these challenges, this concluding chapter will outline several promising paradigms for improving developmental education students' success while also detailing several key considerations for developmental education reform efforts. First, this chapter will delineate a plan for increasing the availability of reliable evidence about the successes of innovative programs for developmental education students' successes. It will then develop an agenda for future innovation in developmental education, focusing both on the reform efforts for which reliable evidence exists as well as new, more radical approaches to changing developmental education curricula. Finally, this chapter will discuss several mediating factors that affect the delivery of developmental education, and thus have the potential to create improvements within both traditional and innovative practices.

## **Improving the Quality of Evidence**

Currently, there is a dearth of reliable evidence for many of the acceleration, avoidance, contextualization, and support strategies discussed in this paper. Only a few experimental and quasi-experimental studies exist which attempt to control for factors such as pre-existing differences among students or students' motivation levels. While a number of descriptive and correlational analyses exist, these studies rarely provide clear definitions of a program's implementation or characteristics, which limits the conclusions that can be drawn from their results and can also create challenges for replicating the program at other institutions.

Researchers and policymakers should prioritize expanding the field's knowledge about the causal link between these new programs and students' achievement. Such investigations might begin with quasi-experimental analyses, using clearly identified student-level data, which investigate the associations between a new program intervention and students achievement. Whenever possible, these analyses should seek to control for characteristics such as pre-existing differences in students' achievement levels and differing policies across institutions or states that might affect how students are placed or advanced through developmental education. Similarly, when available, these analyses should provide concrete information about programs' implementation and components to allow for a better understanding of how program structure might be related to students' success.

While quasi-experimental research provides a useful first step into these investigations, more rigorous experimental analyses should also be pursued when feasible. Experimental analyses, utilizing random assignment methodology, would allow for a causal link to be established between these new interventions and any resulting changes in students' achievement. Such experiments would also control for issues such as students' motivation levels, a challenge that cannot be easily overcome with quasi-experimental research. Again, careful attention should be paid within this research to the structure, programming, and implementation of these new strategies in order to facilitate an understanding of what specific programmatic components may be linked with any improvements in students' achievement.

In considering a research agenda, researchers and policymakers should look to analyze those programs which appear to hold the most promise for rapidly increasing students' progress through developmental education, success in credit-bearing courses, and ultimate completion of a degree. This agenda should remain paramount in considering what strategies to evaluate, with researchers actively pursuing more radical programmatic strategies for accomplishing these goals. While tweaks to current developmental education practices may produce some modest results, the available research clearly demonstrates that such small changes are unlikely to produce dramatic improvements in students'

achievement. Given that current programs succeed in promoting fewer than 30 percent of their students into college-level courses, more drastic changes are undoubtedly needed.

## **Promising Strategies for Improving Developmental Students' Success**

### **Interventions with Reliable Evidence**

As noted above, few developmental education reform efforts have been evaluated rigorously, thereby limiting the number of programs that can be causally linked with improved student achievement. Moreover, virtually all of the programs that have been experimentally evaluated using random assignment methodology have shown either no increases in academic success or only modest increases in student persistence or credits earned rather than long term effects on students' overall achievement.<sup>132</sup> For instance, the most promising of these studies, a random assignment evaluation of Chaffey College's student success course linked with tutoring, minimally increased students' credit earning (by 3 credits) and GPAs (7 percent more program students earned a GPA of 2.0 or higher), with much of the differences in students' credit earning due to their enrollment in the success course itself.<sup>133</sup> Similarly, an evaluation of Kingsborough's learning communities found that the program drove minor increases in developmental credits earned (by almost 1 credit) and the proportion of students who attempted and passed skills tests that would allow them to move on to college-level English (a 5 percentage point increase), but that the program had few long-term effects.<sup>134</sup> Finally, evaluations of advising and mentoring programs at South Texas College, Lorain County Community College, and Owens Community College revealed no sustained increases in the achievement of the overall population of students and only a 0.2 increase in the number of developmental credits earned (in South Texas College's mentoring program).<sup>135</sup>

Interestingly, earlier quasi-experimental research on some of these programs, including learning communities and student success courses, showed more promising results.<sup>136</sup> The differing findings further underscore the need for more rigorous analyses of developmental education reforms, as they suggest that other characteristics, such as

<sup>132</sup> While programs at these colleges targeted both developmental and college-level students, developmental education students' made up a substantial proportion of the sample population in each of these studies.

<sup>133</sup> Scrivener, Sommo, and Collado (2009)

<sup>134</sup> Scrivener et al. (2008).

<sup>135</sup> Scrivener and Weiss (2009); Visher, Butcher, and Cerna (2010).

<sup>136</sup> Engstrom and Tinto (2008); Tinto (1997); Zhao and Kuh (2004); Zeidenberg, Jenkins, and Calcagno (2007).

students' motivation and self-selection into these programs, may have accounted for the more positive results seen in the quasi-experimental studies,. More importantly, however, experimental research on learning communities and student support reforms suggest that these relatively conservative reforms have a fairly limited effect on students' overall achievement and progress through developmental education. These findings imply that more radical revisions developmental education curricula and practice may be needed to see more demonstrable changes in these students' success.

Though more rigorous, experimental analysis is needed, quasi-experimental research on several acceleration and avoidance strategies and contextualized instructional models have shown more hope for increasing developmental education students' overall achievement, including their progress through developmental education and success in credit-bearing courses. The most promising of these models have focused on integrating developmental education students more quickly into mainstream college programs and providing clear opportunities for them to link their skill development with their field of interest. In particular, quasi-experimental research on Washington State's I-BEST program, which integrates basic skills instruction with vocational and professional training, has revealed substantial improvements in students' progress into credit-bearing courses, credits earned, and attainment of certificates. When controlling for differences in students' background characteristics, students in the I-BEST programs earned an average of 44 more college credits, or nearly a full academic year, than non-I-BEST students and had a 17 and 40 percentage point higher probability of persisting into the second year and earning an occupational certificate, respectively.<sup>137</sup> Furthermore, the short tracking period of this study (two years) reveals that substantial improvements in basic skills students' achievement may be possible within a relatively short period of time.

While the correlation between participation in I-BEST and better educational outcomes is striking, it is important to note that further research is needed to determine whether a causal link exists between this program and students' increased achievement. I-BEST students' improved success may have resulted from factors unrelated to this program, such as the way students were selected into the program or their relatively higher motivation levels when compared with students not participating in the program. However, these findings do represent one of the most notable improvements in student achievement of the interventions analyzed in this report, demonstrating this program's potential for further replication and study.

Models that help students avoid developmental education before entering college as well as strategies to mainstream students into college-level courses have also demonstrated

<sup>137</sup> Jenkins, Zeidenberg, and Kienzl (2009).

promise for improving students' achievement. As noted in Chapters 2 and 3, two quasi-experimental studies of avoidance and mainstreaming revealed modest improvements in developmental education students' success when controlling for pre-existing differences between participating and non-participating students. First, a study of California's Early Assessment Program, which gave college placement exams to 11<sup>th</sup> graders and allowed students with lower level skills build on their abilities while still in high school, was associated with 4- and 6-percentage point reductions in the number of students needing developmental English and math, respectively.<sup>138</sup> Second, Community College of Baltimore County's Accelerated Learning Program (ALP), which mainstreamed developmental English students into college-level English classes, was correlated with substantial improvements in students' college-level English pass rates, with nearly a 30 percentage point difference in ALP and non-ALP students' pass rates in one year. The program was also associated with modest improvements in the number of college-level courses ALP students' attempted (approximately one more course) and the number of credits ALP students earned (approximately a 3-credit difference).<sup>139</sup>

As with evaluations of Washington's I-BEST program, these results should be approached with caution as their improved results cannot be causally linked to these programs, and other non-intervention related issues, such as student motivation, may explain some of the positive results noted in these reports. However, the fact that participation in these programs was associated with substantial increases in students' progress into credit-bearing courses, even when controlling for a number of student characteristics, suggests that these programs have important potential for helping decrease the lengthy amount of time that students spend in developmental courses.

When looking to expand or replicate these program models, practitioners and policymakers should pay careful attention to how students with lower-level skills or multiple developmental needs can be better assisted, as these students are the ones most at risk of failure. Washington State's I-BEST model, which worked with students who had skills below the 8<sup>th</sup> grade level, provides a useful example of how students with low skill level may be able to more quickly achieve credentials and degrees that will advance their status in the marketplace. Similarly, California's EAP program provides increased opportunities for students to advance their basic skills, which may be particularly beneficial to students with multiple needs. Developmental education programs should take such findings to heart and consider how variations of such programs might improve their own struggling students' opportunities.

<sup>138</sup> Howell, Kurlaender, and Grodsky (2010 (forthcoming)).

<sup>139</sup> Edgcombe and Jenkins (2010).

## **Untested Innovations in Developmental Education Practice**

While most developmental education reforms have focused on modest tweaks to programs' curricula and practices, a few recent innovations have focused on changing the foundations of these programs in an effort to more quickly advance students into credit-bearing courses and the attainment of post-secondary credentials. For instance, some reformers have sought out technological approaches to instruction as a way to provide more individualized instruction to students. Additionally, policymakers and national leaders have recently made efforts to better align secondary and post-secondary curricula and mandate further preparation in high school in order to increase students' success in college. Finally, other programs have sought to redefine the curricula and practices in both developmental and college-level courses to focus on the key skills students will need in their careers and more quickly advance them through introductory college-level courses. While relatively untested, these recent innovations hold clear promise for advancing developmental education students' success and should be a critical part of the research agenda moving forward.

## **Technology-Aided Approaches to Instruction**

Computer-aided instruction poses a number of new avenues for developmental education instruction. To date, many colleges have integrated technology into developmental courses with traditional content and curriculum. Many institutions use computer programs, such as MyMathLab, Plato, ALEKS, and Math Zone, to supplement classroom instruction through learning assistance centers or individualized tutoring sessions.<sup>140</sup> Similarly, some colleges have explored using this technology to provide online courses, where all learning takes place remotely via the software's interface.<sup>141</sup> However, more recently, practitioners have used technology as a means for structuring accelerated or modularized courses, which aim to help students progress more quickly through developmental education. With these reforms, computer tutorial packages are used to help students focus on particular areas of weakness while allowing them to advance more quickly through other areas of strength. These technological packages have an additional advantage as they generally can be pre-set to create an individualized program of instruction for each student.<sup>142</sup>

While some efforts have been made to evaluate the use of technology in the classroom, little rigorous research exists documenting the effectiveness of these practices in

<sup>140</sup> Parsad, Lewis, and Greene (2003).

<sup>141</sup> Carpenter, Brown, and Hickman (2004); Zavarella and Ignash (2009); Creery (2001); Lancaster (2001); McClenden and McArdle (2002); Weems (2002); Blackner (2000).

<sup>142</sup> Epper and Baker (2009).



improving developmental education students' outcomes. Given the utility that technology holds for creating more individualized methods of instruction, researchers, policymakers, and practitioners should seek to better understand how such systems may be used to help students more quickly build their skills. These individuals should be aware, however, that less rigorous studies have suggested that technology-aided instruction may have its drawbacks, as several analyses have revealed that instruction provided wholly through computers may result in greater course withdrawal and failure rates.<sup>143</sup> However, students who remain in the courses often perform at similar or higher levels than students who take traditional courses, implying that appropriate assessment and advising might be a step toward ensuring that students who will benefit from these courses are the ones who actually take them. Moreover, exploratory research into the use of technology in accelerated and modularized courses suggests that these instruments may be best used to support innovative course structures, in which they seem to hold more promise for improving students' mastery of course content, course completion, and progress into college-level courses.<sup>144</sup>

### **Improving the Alignment Between K-12 and Postsecondary Education**

As suggested by several of the programmatic interventions discussed in this report, critical challenges remain with aligning the standards and curricula from K-12 to postsecondary education. While studies have noted that taking a college preparatory curriculum through the final years of high school may reduce the chances of students needing remediation, others have noted that a substantial proportion of these students still place into developmental coursework when entering college.<sup>145</sup> Similarly, other research has noted a divide between the skills taught in developmental education courses and those required in college-level courses in the same subject.<sup>146</sup>

Given these challenges, a number of states and organizations have begun to focus on eliminating the gap between high school, developmental, and college-level courses. For instance, organizations such as Achieve, Incorporated and the American Youth Policy Forum have driven a push for states to require a college- and career-ready curriculum in high schools; these organizations are also working actively to disseminate best practices in states across the country.<sup>147</sup> Building on these efforts, the National Governors' Association and the Council of Chief State School Officers recently announced the Common Core State Standards Initiative, which sets out "clear and consistent goals for learning that will prepare

<sup>143</sup> Boylan (2002); Jaggars and Bailey (2010); Zavarella and Ignash (2009).

<sup>144</sup> Epper and Baker (2009).

<sup>145</sup> Fine, Duggan, and Braddy (2009); Hoyt and Sorenson (2001).

<sup>146</sup> Boylan (2002); Grubb and Cox (2005); Roueche and Roueche (1993).

<sup>147</sup> Achieve (2010); American Youth Policy Forum (AYPF) (2009).

America's children for success in college and work."<sup>148</sup> Such efforts have the potential to take developmental education avoidance strategies, such as early placement testing and preparation, to a national scale by integrating college expectations and standards into the secondary school curricula. Similarly, they could help reduce the number of students placing into developmental education as students are better able to develop the skills needed for college-level work while still in high school.

Better alignment of K-12, developmental, and college-level curricula is perhaps one of the most important frontiers for improving students' avoidance of developmental education and progress through college. As several developmental education avoidance strategies have shown, helping high school students develop a clear perspective on how their skills and abilities match with college expectations and allowing such students additional preparation time before entering college has real promise for helping students reach college-level coursework quickly. Given the important influence such alignment practices can have on developmental education students' success, researchers and policymakers should prioritize research in this area and seek to better understand how these policy efforts are making changes to students' educational experiences and achievement.

### **Transforming Developmental and College-Level Curricula and Practice**

While a number of efforts are being made to better align K-12 and college curricula, even more radical efforts are taking place within colleges in an attempt to better align developmental and college-level practices and advance remedial students progress to college-level work. One of the most transformative of these movements is the Statistics Pathway (also known as Statway), a collaborative project being launched by the Carnegie Foundation for the Advancement of Teaching and the Charles A. Dana Center at the University of Texas at Austin. This new initiative is aimed at transforming the math curricula offered to entering college students in non-technical fields and seeks to advance students with basic skills needs through an introductory college-level math curricula in one year. Arguing that statistical reasoning and data analysis are key requirements for many of today's growing occupations, Statway seeks to realign colleges' math curricula to focus on statistics rather than the algebra and calculus content currently required.<sup>149</sup> Thus, the initiative seeks to better prepare students for the needs of the workforce while also helping basic skills students move more quickly through their math courses, a critical consideration given that developmental math tends to be the biggest hurdle to developmental education students' success.<sup>150</sup>

<sup>148</sup> National Governors Association (2010).

<sup>149</sup> Bryk and Treisman (2010).

<sup>150</sup> Bailey, Jeong, and Cho (2010).

Such efforts to dramatically transform both developmental and college-level math curricula and move students more quickly through their basic skills work represents a distinct departure from past developmental education reforms, which have focused primarily on tweaking particular aspects of instruction and less on changes to actual curricula. Programs such as Statway provide a unique answer to researchers' recent calls for more radical intervention into developmental education and provide a promising venue for exploring how more dramatic reforms may affect students' outcomes. Given the limited impact that previous reforms have had on students' achievement, researchers and policymakers should prioritize investigations into these more innovative designs and pay close attention to how these efforts affect students' progress through developmental education and into college-level courses.

## **Additional Considerations for Future Research and Practice**

While a number of promising innovations in developmental education are under development, most of these reforms will also need to consider how to tackle several institutional issues at the core of developmental education programming and practice. For instance, most developmental education programs rely on entrance exams or placement tests to funnel students into the appropriate course levels. These tests thus play a large role in determining the length of students' tenure in developmental education, an issue which most practitioners will need to face when developing new reforms. Similar types of issues arise when considering which faculty members will be implementing new classroom innovations and how these individuals will be trained in newly developed methodologies. The following section will seek to outline some of the challenges that these issues pose for developmental education reform and provide recommendations for how practitioners, researchers, and policymakers might approach these difficulties.

### **Placement Assessments**

Upon entering community college, most students are required to take an entrance exam, which assesses their current math, reading, and writing skills, and is used to place them into the appropriate developmental- or college-level courses. While designed to aid colleges' placement practices and encouraged within earlier developmental education research, much debate exists as to the validity of these assessments and their benefits for students. First, colleges across the country have established different cutoff scores for placement into developmental education, creating questions about how well these tests demarcate a true deficit in students' skills.<sup>151</sup> Additionally, recent research reports,

<sup>151</sup> Safran and Visher (2010).

employing sophisticated statistical methods, have shown that students with skill levels denoted by some colleges as developmental performed successfully in college-level courses.<sup>152</sup> Finally, these assessments are not diagnostic and provide little information about how instruction could better improve students' skills, making their validity for classroom assignment questionable.<sup>153</sup>

Given the important role that assessment and placement plays in defining students' college careers, researchers and policymakers should place a high priority on developing more nuanced placement methods and understanding how they affect students' progress through college. Much as four-year colleges use a compendium of resources to assess students' skills, community colleges should seek to diversify their methods. In particular, more diagnostic assessments, which delineate particular skill weaknesses and strengths, would help practitioners better understand the level of students' deficiencies (or lack thereof) while also providing clearer guides for classroom practice and instruction. Such tests would be particularly useful for certain classroom reforms, such as fast-track or modularized courses, as they would help to place students into the appropriate class format.

While some of the current placement test developers have begun to develop more diagnostic tools to accompany their tests,<sup>154</sup> other, more comprehensive assessments should be identified and researched in order to see if more valid measures can be used for placing students into different levels of developmental education. Effective measures used in K-12 schools for diagnosing reading, writing, and math deficiencies would be one place to begin, as these assessments have already been validated for classroom use. Other assessments, such as those designed to measure students' affective characteristics, could also be an option, as these tests might be useful in considering other supports that might help improve students' success, such as more intensive advising or mentoring.<sup>155</sup>

### **Adjunct Faculty**

Studies have clearly demonstrated that a large majority of developmental education classes are taught by adjunct, or part-time, faculty. While consistent estimates are difficult to find, national surveys have found that up to three-quarters of developmental courses in community colleges are taught by adjuncts.<sup>156</sup> While adjunct faculty make invaluable contributions to the nation's higher education system, they can also suffer several major

<sup>152</sup> Bettinger and Long (2009); Attewell, Lavin, Domina, and Levey (2006)

<sup>153</sup> Safran and Visher (2010).

<sup>154</sup> For instance, the College Board has developed a diagnostic tool for the ACCUPLACER test, an assessment used in many community colleges throughout the country (Hughes and Scott-Clayton (2010)).

<sup>155</sup> Hughes and Scott-Clayton (2010); Boylan (2009).

<sup>156</sup> Boylan, Bonham, Jackson, and Saxon (1994); Gerstein (2009); Shults (2000)

disadvantages as a result of their employment status. For instance, adjunct faculty are generally only paid for their time teaching in the classroom, which can limit their involvement in other activities at the college, such as departmental decision-making and piloting new programmatic strategies. Additionally, adjuncts tend to work multiple jobs, which usually makes them less accessible to students or other faculty. Finally, adjunct faculty are rarely paid for professional development, thus restricting their chances of being trained to fully implement programs seeking to transform developmental education practice.<sup>157</sup>

Given that adjunct faculty have the greatest access to developmental education students, educators and policymakers need to pay close attention to their integration into new interventions, particularly when considering how to scale these strategies to reach larger populations of students. While a number of community college initiatives and developmental educators recommend such integration, few structures currently exist in the community college environment to make such practices a reality, resulting in very few adjuncts becoming deeply involved in colleges' work.<sup>158</sup> Indeed, numerous colleges have cited limited budgets as the key reason why adjunct faculty are employed at such high numbers, thus revealing the substantial challenges colleges face in providing additional support to these faculty.<sup>159</sup>

These issues suggest that more fundamental changes in community college programming and practices may be needed to bring larger proportions of adjunct faculty into colleges' implementation of new reforms. For instance, higher-level policies, allowing for additional resources to be funneled to adjunct faculty preparation, might help colleges overcome some of the limitations they face in readying these personnel to lead new instructional interventions. Similarly, finding ways to standardize practices across full-time and adjunct faculty will require deeper investment in a college's ongoing professional development activities (which is itself an important field for future research, as discussed below).

### **Classroom Instructional Practice**

Several studies have demonstrated that the quality and effectiveness of instruction is one of the most important factors influencing developmental-level students' academic performance, and that classroom experiences are a major predictor of commitment to the institution for students at all levels.<sup>160</sup> Researchers, however, have given only cursory

<sup>157</sup> Gerstein (2009); Schuetz (2002).

<sup>158</sup> Zachry (2008); Zachry et al. (forthcoming); Center for Student Success (July 2007).

<sup>159</sup> Zachry et al. (forthcoming)

<sup>160</sup> Boylan (2002); Strauss and Volkwein (2004); Tinto (1975).

treatment to instructors' pedagogy and practice within the classroom, and currently no rigorous studies have attempted to document how different instructional practices affect student outcomes.<sup>161</sup> Theoretical and best practices research have hypothesized that certain pedagogical techniques, such as active or "constructivist" learning, in which students play a critical role in facilitating and evaluating their own learning, provide a promising methods for classroom instruction.<sup>162</sup> However, while some researchers have attempted to document the variation in developmental education instruction and have found correlational evidence that active learning is beneficial to developmental-level students, currently no standardized measures exist for assessing the effectiveness of various pedagogical practices.<sup>163</sup>

Given the important role that pedagogy and instruction plays in student learning, practitioners, policymakers, and researchers should pay close attention to the variation in instruction and develop more standardized measures for assessing the effectiveness of different practices. In order to undertake this work, these individuals might identify particular instructors with high levels of success and determine what practices make their instruction effective. Similarly, researchers might look to develop a standardized classroom observation instrument, which would allow for a more consistent method for assessing instruction across different classes and schools. Finally, more intensive observations of actual classroom instruction should accompany rigorous evaluations of new reforms and innovations, so that researchers can evaluate the continuity of implementation across classrooms and policymakers and practitioners can better understand what practices and pedagogies facilitate student achievement.

### **Professional Development**

Professional development is also a critical consideration in developmental education practice and reform. As might be expected, classroom instructors and other support staff play a key role in implementing new reforms to improve students' success and, as such, may require substantial training to learn the methodology behind such practices. Professional development is particularly important for developmental education instructors as these individuals tend to have limited previous training for teaching basic skills students.<sup>164</sup> Unfortunately, studies have found that most community colleges provide only

<sup>161</sup> Grubb and Associates (1999).

<sup>162</sup> Boylan (2002); Grubb and Associates (1999); Simpson, Stahl, and Francis (2004); Center for Student Success (July 2007). These recommendations do not entirely discount lectures but suggest that students are more likely to succeed if they are exposed to a variety of pedagogical techniques that encourage active rather than passive learning.

<sup>163</sup> Grubb and Associates (1999); Schwartz and Jenkins (2007); Braxton, Milem, and Sullivan (2000); Weinstein et al. (1997); Kuh, Pace, and Vesper (1997); DePree (1998); Chaffee (1992).

<sup>164</sup> Shults (2000).

episodic staff development activities, which tend to take the form of one-day workshops or seminars led by outside experts, or else informal and isolated conversations among colleagues, or departmental meetings focused on logistics or content knowledge rather than pedagogy.<sup>165</sup> Sadly, studies have revealed that such isolated professional development does little to change individuals' everyday practice as they become subsumed in their normal routines with little support for integrating their new learning into their practice.<sup>166</sup> Moreover, little research has been done within community colleges to determine if and how a particular professional development activity may have influenced faculty practice or student outcomes.<sup>167</sup>

Intensive professional development activities will be vital in colleges' efforts to implement large-scale reforms aimed at increasing developmental education students' success. As such, policymakers and reformers should place a high priority on developing more integrated approaches to professional development, which provide ongoing support to faculty and staff implementing new reforms and assist them with bringing this new learning into their actual classroom practice. Promising methods have been developed at a few colleges to date, including the efforts of several California community colleges to create Faculty Inquiry Groups, which provide opportunities for regular collaboration and reflection around specific student success goals.<sup>168</sup> Similarly, Patrick Henry Community College in Martinsville, Virginia has developed a college-wide training center, the Southern Center on Active Learning Excellence, to support the institutionalization of pedagogical practices that support active and collaborative learning. This center provides a number of ongoing faculty training opportunities, including free courses for faculty and staff to learn different pedagogical approaches, coaching and mentoring in implementing these practices, examples of classroom lessons, surveys for students, and training institutes for other colleges to learn about collaborative learning.<sup>169</sup> Innovations such as these represent promising steps towards a more integrated approach for faculty and staff training that have the potential to create a more systematic approach to implementation while also supporting the wide-scale adoption of new reforms.

Similarly, given the dearth of rigorous research on the effects of professional development in community colleges, researchers should seek to develop new inquiries into this field. One useful approach would be to create a more holistic research process for observing program implementation, which provides more on-the-ground time to assess instructors' training and the consistency with which they implement new methodologies

<sup>165</sup> Grubb and Associates (1999); Murray (2002)

<sup>166</sup> Troen and Boles (2003).

<sup>167</sup> Chism and Szabo (1997)

<sup>168</sup> Carnegie Foundation for the Advancement of Teaching (2008)

<sup>169</sup> Zachry et al. (forthcoming).

within their actual practice. As with research into instructional practices, developing more standardized techniques for evaluating the effectiveness of colleges' training practices would allow for more concrete comparisons across different institutions. Such instruments might seek to document factors such as the depth and intensity of colleges' training programs, their institution of research-based principles and practices, the ongoing supports provided for classroom implementation, and the actual integration of the new knowledge and methods into classroom instruction.

## **Conclusion**

Developmental education remains an area ripe for further research and intervention. With multiple studies revealing alarmingly low success rates for developmental students, these programs can no longer afford to focus on the status quo, making minimal changes to the educational programs and policies that fail to help thousands of students succeed each year. Research available to date, however, clearly demonstrates that minor modifications to developmental education programs are insufficient for producing dramatic improvements in student achievement. Given this, educators, policymakers, and researchers should continue to question the traditional developmental course sequence and turn to more radical efforts aimed at transforming the educational experience of academically underprepared students. Creating ever more novel ways to improve students' achievement and providing concrete evidence for the successes of these new innovations are two actionable steps that educators, policymakers, and researchers can each take to allow academically disadvantaged students the opportunity to achieve the college and career dreams that they are so avidly pursuing.



## **Appendix: List of Journals Reviewed (Keyword Search)**

American Educational Research Journal  
Community College Journal of Research and Practice  
Education and Information Technologies  
Education Technology Research and Development  
Educational Assessment, Evaluation and Accountability  
Educational Evaluation and Policy Analysis  
Educational Research for Policy and Practice  
Educational Studies in Mathematics  
Higher Education: The International Journal of Higher Education and Educational Planning  
Industry and Higher Education  
Innovative Education  
Journal of College Student Development  
Journal of Developmental Education  
Journal of Higher Education  
New Directions for Community Colleges  
New Directions for Higher Education  
New Directions for Teaching and Learning New Directions in Adult and Continuing  
Education  
New England Journal of Higher Education  
Opportunity Matters  
Research in Higher Education  
Review of Research in Education  
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