Developmental Education: New Approaches for the 21st Century

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Peter Conforti

Jonell Sanchez

Katie Larsen McClarty

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Abstract

In the past decade, developmental education has come under increased examination by stakeholders. Founded as an avenue for learners with academic deficits to meet educational goals, developmental education has helped many students. However, many more learners fail to succeed due to institutionalized difficulties, chief of which is a no-credit return on a highly intensive temporal and economic commitment. Supporters believe developmental education to be a critical time of learning for its participants while critics argue the process begins with inaccurate use and interpretation of placement tests (Bailey, Jaggers, & Scott-Clayton, 2013) followed by long, mandatory sequences of non-credit bearing courses. Additionally, these detractors cite that less than half of all students referred to developmental education complete their recommended curriculum sequence before beginning a degree program (Charles A. Dana Center et al., 2012). This paper summarizes the literature, providing a brief history of developmental education before evaluating these contemporary issues and problems. Key features of innovative programs are then evaluated, along with real-life examples of these features in practice. The paper concludes with recommendations for continued improvements in developmental education in order to ensure the opportunities of higher education remain open to as many students as possible.

Keywords: developmental education, developmental education redesign, higher education, college readiness, accelerated instruction, co-requisite models, contextualized instruction, supplemental advising and counseling, technology-supported learning systems

Developmental Education: New Approaches for the 21st Century

Introduction and Purpose

The American educational system, an engine that has fueled the nation's economic growth, democratic stability, and social cohesion for hundreds of years, is experiencing unprecedented re-evaluation and change. The field of developmental education is especially affected by this re-examination which, in the past few years, has intensified—especially at the community college level. Originally created as a way for struggling learners to overcome academic difficulties, especially in reading, writing, and/or mathematics (Bibb, 1998), in some cases developmental education has evolved into an area seemingly wrought with unmet expectations and aspirations for many students and educators.

The nation is becoming more cognizant of the challenges of increasing access to students who are not prepared. In fact, of all students who go to college, approximately 40 percent are referred to developmental education. This percentage substantially increases to 60 percent when examining enrollment numbers of students at community colleges (Bailey & Cho, 2010). Research shows that most of these students fail to graduate; only 28 percent of two-year college students who took at least one developmental education course earned a degree or certificate within 8 ½ years, compared to 43 percent of non-remedial students (Attewell et al., 2006; Lu, 2013). Many reasons can account for this lack of success: misaligned K-12 and college curriculum coupled with unclear expectations, test-based placement policies with differing cut scores, and high financial and temporal costs. Additionally, Complete College America (2011) noted in their publication *Time Is The Enemy*, that more students than in the past must work to support themselves and their families, leaving only part-time options available for higher education. Furthermore, these students report being overwhelmed by too many choices in post-

secondary education with little structure for guidance. As a result, they spend numerous semesters and years trying to complete a certificate or degree. Combined, all these issues negatively affect the students who most need a supportive educational environment.

In the past decade, the U.S. Department of Labor estimates that 80 percent of the fastest-growing jobs in the American economy require some post-secondary education (Alliance for Excellent Education, 2006), whether it be a certificate, vocational license, or baccalaureate degree. Between 1973 and 2008, this requirement became especially apparent. Jobs requiring post-secondary education increased from 28 percent to 59 percent, and an analysis by the Georgetown Center on Education and the Workforce predicts this percentage will increase over the next decade to 63 percent (Carnevale, Smith, & Strohl, 2010). The United States has also fallen behind European and Asian countries in global competitiveness due, in part, to students saddled with excessive debt and deficient skills (Schwab & Sala-i-Martin, 2013). This lack of preparation provided in post-secondary education has far-reaching implications for the economic and commercial well-being of the United States.

This paper provides a summary of the literature on current reform efforts in developmental education. We begin with the history and purpose of developmental education before discussing advantages and criticisms of its current structure in the United States. Key features of some policy initiatives and reform movements currently underway are discussed. The paper finally concludes with recommendations for developmental education improvement.

History and Purpose of Developmental Education

Beginning in the mid-nineteenth century, many universities in the United States established "preparatory departments" to help prepare students for university-level coursework. Because the curriculum of many institutions at this time required knowledge of Latin, Greek,

mathematics, philosophy, and literature, many incoming freshman did not possess sufficient knowledge to be successful upon matriculation. Beginning in the early 20th century, some of these preparatory departments evolved into junior colleges to prepare men for four-year degree-granting institutions. By 1940, however, these junior colleges were considered opportunities only for "lesser" students, while traditional four-year universities were seen to be more for the "educational elite" (National Center for Developmental Education, 2013).

After the end of World War II in 1945, a dramatic shift in the student demographics across the United States emerged which had a significant impact on developmental education. First, men returning from the various theaters of war found themselves able to take advantage of post-secondary educational endeavors through opportunities provided by the G.I. Bill. Whereas men returning from war historically had gone back to their previous livelihoods, these soldiers found opportunities to socioeconomically advance by obtaining a college education. Furthermore, for the first time in American history, women emerged from the household (due to the substantial support they provided towards the American war effort through manufacturing) and pursued post-secondary opportunities as well. The Civil Rights movement of the 1960s also created avenues for racial and ethnic minorities to obtain a college education under anti-segregationist policies.

To accommodate the influx of diverse students, universities began implementing open-enrollment policies at the junior college and university levels, giving all students opportunities to pursue higher education. However, this also placed a greater demand on educational services because many of the students did not receive either adequate academic preparation or even a formal education before enrollment.

Therefore, in the 1960s, universities established remedial and compensatory education services and collectively called them "developmental education" (Dotzler, 2003). As Boylan (1995), a prominent educator, researcher, and supporter of developmental education states, "It [Developmental education] is a far more sophisticated concept involving a combination of theoretical approaches drawn from cognitive and developmental psychology" (p. 2). By synthesizing interventions and pedagogical approaches from multiple fields, developmental education seeks not only to "fill gaps" in student learning, but to also give students the skills necessary to succeed in more advanced topics.

Support for Developmental Education

Developmental education advocates believe that students must master basic, prerequisite skills before advancing to more in-depth or complex topics. Because some students may have neither mastered skills in previous coursework nor received any instruction in a particular topic, additional time for learning the appropriate curriculum is necessary for success in subsequent credit-bearing courses. This period could be considered a type of "academic incubation" where, just as in nature, the student is kept in a supportive environment until they are ready to emerge.

Additionally, developmental education programs are not only intended for mastery, but they are also believed to preserve the integrity and rigor of credit-bearing courses because students enter the credit-bearing classes with a basic level of preparation. Boylan (1995) writes, "Administrators also realize that the integrity of their institution is diminished if sophomore literature classes have to teach students how to write complete sentences [or] physics classes have to teach basic algebra…" (p. 2).

Although advocates may acknowledge that not all developmental education programs are equitable in quality or standard, they see them as necessary pathways to afford educational

opportunity and intellectual capital to all students, not just those who have always excelled in the classroom (Boylan, 1999). In fact, about 60 percent of community college students and 20 percent of freshmen at four-year universities enroll in at least one developmental education course (Bailey & Cho, 2010; Complete College America, 2011; Lu, 2013). This large percentage demonstrates that many students have not mastered pre-requisite skills to be successful in the post-secondary classroom upon arrival to college.

Even though students may not be earning credit towards degrees or certificates while enrolled in developmental education courses, supporters trust the time and energy dedicated to learning prerequisite skills will only serve to positively affect the student's future. For example, Bettinger and Long (2008) found that both remediation in mathematics and English had positive overall impacts on student performance, and Calcagno and Long (2008) found that remediation helped students earn more college credits and promoted more academic persistence earlier in college work.

Impetuses for Change

Although there are several supporters of developmental education's philosophy and goals, there are not many vocal defenders of its existing structure. Most, if not all, educators in the field have put forth suggestions on how to improve its framework, content, and delivery. The criticisms of the current system are numerous and traditional models are under intense scrutiny. The body of research, thought, and state policy initiatives, combined, also echo this call for improvement. It is important to understand the etiology of these criticisms, though, before effective corrective measures can be advanced and implemented.

The large number of students enrolling in developmental education courses in higher education implies that students do not graduate high school "college ready." One source of this

lack of readiness may be a lack of alignment between K-12 education and higher education

(Kirst & Venezia, 2002). For example, Conforti (2013) examined each state's requirements for

high school graduation as well as the requirements for entry into each state's flagship (or central)

university. The research showed that less than 20% of states had high school graduation

requirements aligned with their respective flagship university's entrance qualifications. As a

result, a number of students graduating from high school may not be eligible to enroll in these

universities. For those who can enroll, there may be further stipulations to complete

developmental education sequences and, even after completion, they may still find themselves

ill-prepared for the rigor and workload of standard college work. In fact, this year alone, ACT

(2013) reported only 26% of high school graduates taking the ACT met their College Readiness

Benchmarks[1] in English, mathematics, reading, and science. The College Board (2013), which

develops the SAT, noted only 43% of its test takers met College and Career Readiness

Benchmarks[2] in reading, mathematics and writing, a percentage that has not changed since 2009.

     Correspondingly, a large number of high school graduates seeking postsecondary

education may find themselves taking placement exams such as ACCUPLACER or COMPASS

to determine whether they need developmental education services. These exams, which assess

reading, writing, and mathematics, as well as English as a second language (in the COMPASS

exam) and computer skills (in the ACCUPLACER exam) are used by many colleges as a single

indicator to place students into various developmental education programs or standard college

enrollment courses.

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[1] The ACT College Readiness Benchmarks are set such that a student meeting the benchmark has a 50% likelihood of receiving a B or better or a 75% likelihood of receiving a C or better on corresponding entry-level college courses.

[2] The SAT College and Career Readiness Benchmark indicate a student has a 65% likelihood of earning a cumulative freshman GPA of a B- or better.

One of the primary challenges of how these tests are used in practice is the variation in cut score implementation across assessments, states, or universities and colleges. The score needed to enroll in credit-bearing courses may vary across institutions. Indeed, research shows it is difficult to establish a specific cut score to separate students who require developmental education from those who will be successful in standard credit-bearing courses. Bailey et al. (2013) cite regression discontinuity studies (see Dadgar, 2012; Scott-Clayton & Rodriguez, 2012; and Xu, 2013) where students scoring in neighborhoods just below established cut scores and complete developmental education sequences do not do better in subsequent credit-bearing work than their counterparts who scored just above the requisite score. This, they argue, demonstrates the lack of effectiveness in existing developmental education programs. Because students scoring just below the cut score are essentially identical to those scoring above, the theory is that students who complete a developmental education sequence should excel beyond their counterparts who did not. Bailey & Cho (2010) provide further evidence, citing studies in Texas and Florida where students who enrolled in developmental education sequences "…did no better on several outcome measures than students who enrolled directly in college-level courses" (p. 46).

Once in developmental education programs, students must make a large temporal and economic commitment; states, taxpayers, and the economy bear a significant fiscal burden as well. Students may spend up to five semesters in developmental instruction before enrolling in a credit-bearing course (Bailey & Cho, 2010). In addition, these students collectively spend approximately $56.6 million dollars per year (Alliance for Excellent Education, 2006), all without earning a single credit towards a degree or certificate. As a result, many students become discouraged and leave the classroom.

Researchers estimate that developmental education needs throughout a student's time in college cost the nation an estimated $5.6 billion. This figure includes $3.6 billion in direct education costs for students who did not have the skills to initially succeed in post-secondary coursework. It also includes an additional $2 billion in lost lifetime wages (Amos, 2011). State governments and taxpayers also express concern that they are "paying twice" to educate students—once in high school and once again in developmental education programs. As a result, many states legislatures have passed a series of mandates and new directions, including the elimination of state financial aid, overhaul of gateway courses, and eradication of double-funding in student education. For example, Oklahoma, Nevada, Colorado, and South Carolina have banned any funding of developmental education at four-year institutions, Tennessee has moved all developmental education courses to community colleges, and Louisiana requires all students who score below a 19 on the ACT to start in a community college setting and complete developmental education sequences before transferring to a four-year university. Given the increased attention to developmental education and multiple reform efforts, the sections that follow review several key features of alternate approaches.

Methods

In this paper, we focused on several features central to developmental education redesign efforts. Rather than detailing a specific theoretical model or applied program, common elements were combined and examined. These features included accelerated instruction, co-requisite models, contextualized instruction, supplemental advising and counseling, and technology-supported learning systems. For each of these features, we synthesized research to address four specific questions:

1. **What is the purpose of this feature and what problem is it trying to solve?** Many of these features were developed to specifically address one or more of the criticisms of developmental education, so we review why this type of approach was created;

2. **What is the rationale?** This section outlines the reasons why the approach is believed to improve student outcomes;

3. **Where and how has this feature been implemented?** Some elements have been incorporated into specific developmental education redesign programs whereas other elements are still in theoretical or design phases. We discuss one or two program examples that exemplify each feature;

4. **What empirical evidence exists to support the use of this feature?** The final evaluation of these features should be on actual student outcomes. Because many of these approaches are fairly new ideas, much empirical evidence may not exist to evaluate their effectiveness. However, this section reviews existing empirical evidence or case study reports from the implementation of each feature.

To complete this review, libraries, institution websites, electronic databases (such as Sage and ERIC), and the Internet were searched for scholarly reports and articles as well as white papers, position papers, and other policy documents. Some key words included "developmental education programs," "developmental education innovations," "costs of developmental education programs," "developmental education redesign," and "future of developmental education," as well as those pertaining to remedial and compensatory education.

We reviewed articles and selected those that discussed aspects of any feature of interest if they could shed light on our four research questions. The majority of the papers reviewed came from policy or advocacy briefs that described the rationale for the different features and

approaches. Fewer peer-reviewed and empirical studies have been done and were available. In addition, case studies of particular products or programs were included if their design incorporated the key features of interest in this review.

Results

The literature provides many different perspectives for what constitutes a successful developmental education program. Many of these perspectives, though, can be grouped into five strands: accelerated instruction; co-requisite models; contextualized instruction; supplemental advising and counseling; and technology-supported learning systems. Each one is described in the following sections.

Accelerated instruction. Accelerated instruction is defined as challenging instructional activities that are intensely focused on academic material the student has not yet learned (Georgia Department of Education, 2002). It is condensed instruction based on the needs of the student. This approach is designed to mitigate the large amount of time and money students spend taking unnecessary developmental education courses. Because students do not cover material already learned, they save time (and therefore money) by not filling seat hours in a specific course.

The rationale behind accelerated instruction is three-fold. First, clear goals are established in the curriculum, often duplicating what is expected of students enrolled in general education courses. Like their general education peers, students receiving accelerated instruction are expected to achieve the same outcomes. Second, students are continuously met in their Zone of Proximal Development (ZPD) (Vygotsky, 1978) by their instructors. Take, for example, a student proficient in solving unilateral variable linear equations in an algebra course. Because they already know how to solve these types of problems, their ZPD is prepared to learn solving

linear equations with variables on both sides. The instructor can then use instructional time and resources efficiently, augmenting the student's abilities to master this part of the curriculum. Third, the curriculum itself is compacted, only providing the instruction the student needs— every topic on the traditional syllabus may not be addressed because the student already understands particular content material. In total, these three points help instructors to meet the additional developmental needs of each student in the same timeframe as conventional general education courses. The benefit is that the student saves precious time and money while still enjoying the benefits of learning the full curriculum.

Accelerated instruction has been implemented in a variety of developmental education programs, products, and services. The Community College of Denver's (CCD) FastStart program provides an excellent example of accelerated instruction (Bragg, Baker, & Puryear, 2010). Developmental education courses that would normally be offered over two semesters are condensed into one semester terms in order to decrease student attrition and enhance student success. Students also enjoy the individualized instruction from their professors in the classrooms, as well as support by advisors and the de-facto learning communities formed by student cohorts.

Research conducted by Bragg et al. (2010) shows that students in the CCD FastStart mathematics program outperformed general developmental education mathematics students on course progression measures over a 48-month tracking period. They also found that acceleration can enhance student progression, retention, transfer, and graduation through the developmental education curriculum at a rate between 40 to 65 percent.

Co-requisite models. In a co-requisite model, students enroll in a non-credit developmental course at the same time a credit-bearing college-level course is pursued. Many

times, the developmental course component meets before or after the credit-bearing course, and students receive assistance not only from the instructor, but also from other non-developmental education students. These models have been implemented in order to save students time and money by allowing them to directly enroll in credit-bearing courses while providing additional supports to facilitate success in those courses. Co-requisite models also differ from accelerated instruction in that co-requisite models are more institutionalized. Colleges and universities will often revise existing course sequences with co-requisite models embedded, whereas accelerated instruction is provided by the educator in the classroom to be more flexible and responsive in the moment.

The rationale behind co-requisite models is to help students master developmental knowledge and skills while learning the content material from a credit-bearing course. Not only does this save time, but it also helps reinforce the credit-bearing material through the developmental education class. Rather than having a student complete a semester-length course in mathematics, for example, before enrolling in a subsequent algebra course, co-requisite models have the student enroll in both courses at the same time. Both courses are often taught by the same professor. Although students must pay for the co-requisite course and do not receive credit, the time it takes to achieve a certificate or degree is shortened because they are earning credits in their other courses. They also receive twice the amount of instructional time, effort, and resource from professors as opposed to general education students.

One place where the co-requisite model has been implemented is the Accelerated Learning Program (ALP) through the Community College of Baltimore County (Cho, Kopko, Jenkins, & Jaggers, 2012). In this program, students are enrolled in ENGL 052 (a developmental English course), which meets immediately after ENGL 101 (the standard-entry English course).

While in ENGL 101 developmental education students are exposed to all the standard material and objectives required of first-year students as they work alongside students not receiving developmental education services. After the ENGL 101 course, the smaller group of students (usually eight) receiving developmental education services stays and meets with the professor for the non-credit section of ENGL 052. Here, the professor is able to answer questions from the ENGL 101 class, discuss ideas for upcoming essays, and assist with instruction in grammar and mechanics.

When evaluating the ALP program, Cho et al. (2012) found that "…ALP students were significantly more likely to persist to the next year, as well as to attempt and complete more college-level courses and credits than non-ALP students" (p. 23). Controlling for several covariates, students in the ALP program were 28.5% more likely to complete ENGL 101 while taking ENGL 052, and 32.5% more likely to complete the credit-bearing course after one year. ALP students were also 5.5% more likely to continue higher education the year after the program, compared with non-ALP students.

Contextualized instruction. Contextualized instruction is embedding practical and applied instruction within the curriculum framework while making a clear connection between course objectives and instructional strategies for the student. This is often implemented in the classroom with two instructors, with one providing content lessons while the other provides instruction in basic skills. Contextualized instruction is offered in lieu of traditional developmental education because the remedial and compensatory instruction is provided within the context of the credit-bearing general education course. Like co-requisite models, contextualized instruction is meant to save students from spending inordinate amounts of time completing developmental courses prior to enrolling in credit-bearing courses. It also has the

additional benefit of saving the student money because they do not have to enroll in a second, non-credit bearing course.

The rationale for contextualized instruction is that student performance improves through better alignment of the curriculum between the general education and developmental education environment. In a contextualized instruction classroom, students from both developmental education and general education programs receive the same content. However, students lacking in basic skills can receive reinforcement in reading, writing, or mathematics within the course. If a student is unable to access the curriculum because of difficulty with a basic skill, they receive instruction in that skill framed within the general curriculum and are taught in the same general manner as their general education peers.

Washington State's I-BEST program exemplifies contextualized instruction. The program provides two instructors in the classroom, one providing instruction in content while the other provides support in basic skills. If students are unable to understand a concept because they are not familiar with the vocabulary of the topic, for example, the basic skills instructor can provide lessons, techniques, and strategies to help the student master the necessary terminology. The basic skills instructor may extend this instruction with lessons on grammar, enhancing the student's overall command of the English language.

Research by Zeidenberg, Cho, & Jenkins (2010) showed that students who enrolled in I-BEST "…earned substantially more college credits (both total and CTE) than their [non I-BEST] peers, were much more likely to earn an award, and were moderately more likely to achieve a basic skills gain" (p. 28). Although these positive outcomes cannot be directly attributed to contextualized instruction alone, it demonstrates the long-term effects of I-BEST in helping

students complete developmental education sequences and ultimately earn a postsecondary credential.

Supplemental advising and counseling. Supplemental advising and counseling provides guidance for students to help them solve both academic and life problems and to make the best decisions possible given resources at their disposal in their community. For most students in the post-secondary environment, advising often consists of a short appointment with an academic advisor where courses the student wants to take are approved by the advisor. The student then enrolls in these pre-selected courses, sometimes unaware of potential implications for academic progress or later academic opportunities.

For students receiving developmental education services, however, supplemental advising and counseling goes beyond this. Advisors and counselors take more time with each student to understand his or her individual goals, needs, life circumstances, and available resources. Much like a personal trainer, these advisors are present to coach students throughout their academic career, taking into consideration each student's individual needs. Because the advisor becomes familiar with student goals, they can better help students navigate through college toward their desired career. This approach was developed because success in college requires more than content knowledge and skills. Although assessments of reading and mathematics knowledge are typically used to place students in developmental education courses, nonacademic supports are also extremely important for student success (Community College Research Center, 2013).

The rationale behind supplemental advising and counseling is to better meet the fundamental needs of each student, thereby allowing the student to use their time and energy to focus on education. Many times these students are the first in their families to go to college, and

they have deficits not only in their knowledge of reading, writing, or mathematics content but

also in knowing how college works (e.g., applying for financial aid, registering for classes,

taking advantage of office hours). David Conley (2008), a prominent researcher on college

readiness, writes:

> …college knowledge is distributed inequitably in society, and the lack of
>
> it frustrates and discourages many students who are the first in their
>
> families to attend college. They may miss one of the myriad deadlines or
>
> overlook potential financial aid…Many first generation students who do
>
> attend struggle to become successful participants in the campus
>
> community; become alienated, frustrated, and even humiliated during the
>
> first year; and leave college precipitously (p. 4)

Because students needing developmental education may not be familiar with the procedural and

institutional methods of college life, they often do not enroll in appropriate courses, fail to

complete applications for financial aid, or miss other opportunities to facilitate academic success.

Counselors and other support staff are also not limited to directing students to university-

provided resources in areas such as these, but also to resources within the community. Being

knowledgeable about what their specific community has to offer (e.g., daycare for students with

children, affordable housing for students on fixed incomes) helps remove barriers to student

success.

Supplemental advising and counseling has been implemented in two California

community colleges through the Student Support Partnership Integrating Resources and

Education (SSPIRE) program. In SSPIRE, counselors are case managers and given no more than

100-200 students to guide and advise. These counselors provide individualized support to each

student and are familiar with each personal situation. This knowledge allows SSPIRE counselors

to guide their students to resources on campus and in the community.

At these two colleges, the percent of students passing developmental education courses

increased over time. For example, Weissman et al. (2009) found that 88% of students in the

SSPIRE cohort completed at least three-quarters of their required coursework in 2008. This

percentage had increased from 19% in 2004, a time before SSPIRE was implemented.

Furthermore, using the Community College Survey of Student Engagement (CCSSE) and the

Community College Faculty Survey of Student Engagement (CCFSSE), Weissman et al.

gathered qualitative data about the effectiveness of the SSPIRE program. Although they noted

that the effects of the SSPIRE program were largely incremental over three years and the

program itself is continually under transformation and refinement, results suggest it did help

students succeed in postsecondary coursework.

Technology-supported learning systems. Technology is becoming more common in the

classroom through the use of computers, tablets, and the Internet. Some post-secondary

institutions have designed a variety of programs to take advantage of this technology, including

implementing it in developmental education frameworks. Technology-supported learning

systems provide students individualized, customized instruction. Developmental education

courses can incorporate these systems in fixed (mandatory hours set at specific days and times)

or flexible (mandatory hours or lessons to be completed at the student's convenience) formats.

Feedback from lessons and assessments are available immediately. These systems allow the

course instructor to spend time working with students on their individual weaknesses. The

programs can also reinforce lessons the instructor provides so that students are able to master the

developmental education material before moving on to credit-bearing coursework.

The rationale behind technology-supported learning systems is that practical, task-oriented, electronic lessons and feedback enhanced by a live, highly-qualified instructor in the classroom encourage the best learning and progress for students who typically struggle with college-level coursework. The combination of interactive and collaborative instruction and activities, along with continuous assessment and immediate feedback, is thought to better reinforce content. This dual approach (technology and teacher) is cost-effective and allows students to quickly shore up their learning gaps and move toward credit-bearing courses.

Some examples of technology-supported learning systems include Pearson's MyLabs, McGraw-Hill's ALEKS, and Hawkes Learning System. These learning systems can then be incorporated into developmental education courses. One of the first implementations began at Viginia Tech in 1997 with the Emporium Model. The Emporium Model provides students with math instruction through interactive computer software in conjunction with immediate instructor assistance and compulsory student participation (de Vise, 2012). The Emporium Model has, thus far, been exclusive to mathematics instruction, and posits that students "learn math by doing math, not by listening to someone talk about doing math." (National Center for Academic Transformation, 2013, p.1). This active approach to instruction aims to deeply engage the student in mathematical learning in a multi-modal environment as opposed to traditional lecture-based methods.

Not only has Virginia Tech created and implemented the Emporium Model, but several other institutions have redesigned their developmental education programs using it as a blueprint. Schools such as Auburn University, Oklahoma State University, Cleveland State Community College, and the University of Central Florida have all incorporated technology-supported learning systems into their curriculum models. Most course redesigns involved algebra,

trigonometry, calculus, and geometry, courses in which developmental education students typically struggle. Overall, results show that students using the Emporium Model scored nearly 10 percentage points better on final exams than developmental education students not receiving the same instruction, and 15 percent more students completed Emporium Model courses than traditional course designs (National Center for Academic Transformation, 2013).

Table 1 provides a summary of the five features of developmental education reform efforts reviewed in this paper: accelerated instruction; co-requisite models; contextualized instruction; supplemental advising and counseling; and technology-supported learning systems.

Table 1

Summary of Reviewed Developmental Education Reform Features

Feature	Description	Purpose	Example(s)
Accelerated instruction	Challenging instructional activities that are intensely focused on the academic needs of the student covering material that has been presented previously though not yet learned.	Saves students time and money from taking excessive (and possibly unnecessary) coursework; Provide focused instruction to meet the needs of the student in their Zone of Proximal Development (ZPD)	FastStart (Community College of Denver)
Co-requisite models	Students enroll and simultaneously complete a non-credit remedial course with a credit-bearing college-level course. Often in this model, co-requisite courses meet immediately before or after the credit-bearing course.	Like accelerated and individualized instruction, this model saves students longitudinal time (i.e., extra semesters on a degree or program track). Furthermore, it allows reinforcement of material taught in the credit-bearing course.	Accelerated Learning Program (ALP) (Community College of Baltimore County)

Contextualized instruction	Two instructors, one content and one developmental, embed practical and applied instruction within the curriculum so that students make clear connections between course objectives and required material.	Students do not have to enroll in non-credit bearing courses prior to credit-bearing courses to learn pre-requisite material. Rather, all students simultaneously receive instruction in the same content while students needing remediation can receive personalized tutorials from the developmental education instructor.	Integrated Basic Education and Skills Training (I-BEST) (Washington state)
Supplemental advising and counseling	Students receive guidance counseling from experienced professionals to solve both academic and life problems. These professionals are also versed in resources available to the student both in the academic setting and throughout the community.	Since many students in developmental education programs need additional supports to balance academic, work, and life or family demands, supplemental advising and counseling provide a better support system to ensure student success.	Student Support Partnership Integrating Resources and Education (SSPIRE) (California community colleges)
Technology-supported learning systems	Students receive mathematics instruction through interactive computer software in conjunction with immediate instructor assistance. Students are assessed on a continual basis in the computerized environment to ensure academic objectives are met.	In technology-supported learning systems, students "learn by doing."	Emporium Model (Virginia Tech, Auburn University, Oklahoma State University, Cleveland State Community College, University of Central Florida)

Conclusion

Although American society has changed and advanced since its inception, the belief that education is a both a basic right and opportunity to a better future remains constant. While methods in education—especially developmental education—have not advanced as quickly as some may have hoped, the past ten years have seen implementation of new approaches that are now able to be evaluated.

Accelerated instruction, co-requisite models, contextualized instruction, supplemental advising and counseling, and technology-supported learning systems are five examples of developmental education redesign that are showing promise. Although it may take time for additional higher education institutions to implement methods such as these, the threshold to put some of these into practice could be rather small. For example, leaders at colleges and universities could consider marrying existing course requirements and faculty into co-requisite models rather than separate courses. Effectiveness could be augmented by providing accelerated instruction in these classrooms. Furthermore, by combining multiple courses into a single requirement, current instructional staff can work together to provide contextualized instruction to those populations that need it most (e.g., English language learners). Individual courses as well as full academic domains (e.g., mathematics) in developmental education can be redesigned incorporating technology-supported learning systems.

Additional financial and human capital might be needed to augment existing advising and counseling services, which are often already overburdened. However, these costs might be mitigated in a number of ways. First, because regression discontinuity studies suggest that students performing just below current placement exam cut scores are not receiving significant advantages from developmental education, perhaps assessing fewer students or recommending

fewer students for developmental education may free some resources. Additionally, a better

alignment between secondary and post-secondary requirements—both in structure and

implementation—could help reduce the need for counseling services in those areas. Existing

counselors and advisors, then, could have more time to guide students already enrolled in

programs rather than non-tuition, prospective students.

It is important to acknowledge the limitations of this review. The primary limitation is

that many developmental education programs at community colleges and four-year universities

were not reviewed because of either outdated or undocumented descriptive material. The

innovations discussed in this paper were the ones best documented and showing evidence of

promise. However, other programs may be implementing innovative efforts without much self-

promotion or documented evidence yet. Many developmental education programs describe

themselves in short paragraphs on larger university websites and do not provide details about the

specific services they provide. Therefore, only a few specific programs or features were

included.

The ultimate purpose of developmental education is to provide an opportunity to equal

education for all. In many ways, it succeeds today by opening doors and affording opportunities

to diverse students which continues to fulfill the social contract that helps bind us as Americans.

However, with further modifications and inventive methods, higher education may provide

opportunities for even more students who would not otherwise have the ability to successfully

advance themselves through higher education. It is important for practitioners and researchers in

the field to look at these programs not as episodic successes, but as opportunities to understand

the features of developmental education reform that lead to greater student success. To

implement the most effective developmental education programs at scale, we must better

understand the effectiveness of various features, combine the most effective features into new

developmental education programs, and establish efficacy evidence at the program level. By

revising existing developmental education programs and disseminating them to more students,

the United States can improve its global effectiveness worldwide. Other nations may be able to

do this quickly because of more homogenous populations or different sociopolitical structures.

However, the strength in the American education system is—and continues to be—its diversity

and ability to adapt to significant challenges.

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