Campus-Based Practices for Promoting Student Success: Developmental Education

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About this MHEC Research Brief Series

This research brief is drawn from specific topics examined in the forthcoming MHEC report, *Institutional Practices Conducive to Student Success: An Overview of Theory and Research.*

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Developmental Education:
A Review of Research on Programmatic Reforms

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Developmental education, also termed remedial education, refers to curricula intended to improve the academic skills and knowledge of students who are underprepared for undergraduate coursework, particularly in the areas of mathematics, reading, and writing. Many practitioners and researchers agree that developmental education should be improved, as the traditional approach appears to work for some students but not for others (Bailey, Jaggars, & Scott-Clayton, 2013). Colleges have begun to experiment with new approaches to developmental education, and preliminary research is suggestive of some promising directions (Nodine et al., 2013; Rutschow & Schneider, 2011). This brief provides a summary of research on policy and program reforms that may improve developmental education and the outcomes of underprepared students, including establishing appropriate program requirements, refining the student placement process, improving the quality of developmental curricula, and incorporating support services.

Program Requirements

The level and type of remediation prescribed partly depends upon which skills and college-level courses are deemed necessary for the completion of each academic program. Sound reading and writing skills are needed to succeed in most academic disciplines, including mathematics (Adelman, 2004; Bahr, 2007). Consequently, although math is the most common remedial subject, reading skills have been deemed most critical to student success (Adelman, 2004). College English is typically required for any student seeking an associate or baccalaureate degree and for many students seeking a career/technical diploma.[1]

The level of math skill needed to succeed in college-level courses, though, is highly dependent on the subject matter. Math skills required for earning an associate degree can be broadly divided between Liberal Arts programs and Science, Technology, Engineering, and Math (STEM) programs. Students pursuing STEM majors likely will need math skills at the College Algebra level or higher to perform well in their careers. In contrast, a sophisticated grasp of calculus is likely unnecessary for students to succeed in many liberal arts programs (National Center on Education and the Economy,

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[1] Usually the only students exempted from demonstrating college-level English skills are those pursuing career/technical certificates that require only a basic level of reading and writing skills.

2013).[2] Thus, colleges have been advised to offer differentiated math pathways to foster the varying math skills required by academic programs (Fulton et al., 2014).

Examples of math-related alternatives to College Algebra for non-STEM majors include Math for the Liberal Arts, Math Concepts, Introductory Statistics, and Logical Reasoning. Recent research suggests that the adoption of such alternative math requirements may improve college-level course completion rates (Asmussen, 2014; Hern, 2012; Rodriguez, 2014). Rodriguez (2014) provided descriptive statistics indicating that the completion of college-level math courses in the Virginia Community College System increased from 5 percent to 18 percent in the first year of enrollment after adopting a new placement exam and differentiating the requirements for Liberal Arts and STEM majors. Additional research is needed to better understand the impact of adopting differentiated program requirements.

Student Placement

Historically, colleges have used a formulaic approach for placing students into developmental courses based solely on standardized test performance (Bracco et al., 2014). While the use of standardized tests may be an efficient method of student placement, it frequently results in misplacement (Boylan, 2009). Analyses of the validity of the ACCUPLACER and COMPASS placement exams have revealed high rates of "severe misplacement," wherein students assigned to developmental education were predicted to earn a "B" or better in a college-level course, and students assigned to a college-level course were predicted to fail (Belfield & Crosta, 2012; Scott-Clayton, 2012). In a study of a statewide community college system, as many as 33 percent of students were severely misplaced in English, and 28 percent were severely misplaced in math (Scott-Clayton, 2012).

High misplacement rates may be partly due to inadequate test preparation and the assessment of an exceedingly narrow construct of college-readiness. In the former, students may be unaware of the high stakes associated with placement exams and fail to prepare themselves properly (Fay,

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[2] Some career/technical programs do not require students to complete any college-level math courses; the required math skills instead are taught as an integrated and applied component of core courses in the program (e.g., culinary arts, carpentry, auto repair).

Bickerstaff, & Hodara, 2013; Venezia, Bracco, & Nodine, 2010). In the latter, the most commonly used standardized tests arguably fail to capture the complexity inherent in college readiness (Boylan, 2009; Bracco et al., 2014; Conley, 2012; Sedlacek, 2004). A sole focus on academic skills and knowledge neglects the role that high levels of motivation, commitment, and perseverance play in enabling students to succeed, despite weak academic skills (Duckworth et al., 2007). Bracco et al. (2014) thus asserted that colleges should use multiple measures to assess whether students are ready for the challenges of college-level coursework. Conley (2012) argued that college readiness assessments should consider cognitive strategies; content knowledge; learning skills and techniques; and transition knowledge and skills.

Recent research clearly supports the merits of using high school transcripts to improve the accuracy of student placement (Belfield & Crosta, 2012; Boatman, 2014; Bowen, Chingos, & McPherson, 2009; Scott-Clayton, 2012). Scott-Clayton (2012) found that basing student placement on high school transcript data alone yielded the lowest severe misplacement rate. Similarly, Bowen, Chingos, and McPherson (2009) found that high school coursework was the best predictor of success in college coursework, overshadowing the predictive significance of standardized cognitive test scores. In contrast, Belfield and Crosta (2012) observed that severe misplacement was lowest when using the best performance of the placement exam and high school GPA. One reason for these findings is that success in high school coursework encapsulates more than just cognitive skills; it embodies competence in non-cognitive skills, including commitment, motivation, perseverance, and time management. Accordingly, the North Carolina Community College system has moved away from standardized cognitive testing and now exempts recent high school graduates from placement testing when they have high school transcripts that demonstrate college readiness (NCCCS, 2013).

Another area of innovation in student placement is to provide students with some discretion in placement decisions. This change was motivated by the imprecision of existing placement practices and evidence that some students who had skipped developmental courses had similar success rates as students who had tested into college-level courses (Roksa et al., 2009). Florida has gone so far as to prohibit its colleges from making mandatory placements into developmental courses – ultimately, students are provided the option to decide whether to enroll in developmental courses prior to college-level coursework (Fulton et al., 2014). Many researchers, though, have concluded

that student placement should be mandatory for students who lack academic preparation (Rutschow & Schneider, 2011), and thus an evaluation of the placement reform in Florida is needed before diffusion can be recommended.

Curricular Structure and Pedagogy

Even if colleges align their program requirements with essential academic skills and improve their placement practices, some students will still need developmental courses to handle the challenges of college-level coursework. Preliminary research has indicated that several types of curricular interventions may prove effective in enhancing developmental student outcomes: pre-college summer bridge programs, student success courses, acceleration, and contextualized instruction.

Pre-college summer bridge programs.

Summer bridge programs for developmental education students provide opportunities to better prepare for placement exams and allow first-year students to complete developmental courses during the summer preceding fall enrollment (Rutschow & Schneider, 2011). These programs are also frequently designed to increase familiarity with campus resources, elaborate academic and career plans, and cultivate relationships with peers and faculty (Kezar, 2000). Research on summer bridge programs for developmental students has revealed modest positive effects (e.g., Barnett et al., 2012; Garcia, 1991). In one of the few studies using an experimental design, Barnett et al. (2012) found that participation in summer bridge programs primarily at community colleges in Texas increased first college-level course completion rates in math and writing. Completion rates were 5 to 9 percentage points higher among program participants than among non-participants by the end of the second semester. However, these differences were no longer statistically significant by the end of the second year, and no effects were detected for credit accumulation or persistence outcomes. This suggests that participants require additional support services beyond the summer bridge that span the duration of the collegiate experience (Barnett et al., 2012). The potential efficacy of summer bridge programs may also be limited at institutions that enroll a significant number of students during the spring term.

Student success courses.

Student success courses typically provide a semester-long orientation to college life that fosters a range of skills that help students adapt to the academic, emotional, and social demands of college,

such as learning style awareness, interpersonal skills training, academic skills development, study skills, public speaking, and campus resource awareness (Padgett & Keup, 2011; Rutschow, Cullinan, & Welbeck, 2012). Student success courses are frequently open to all students as an elective, though enrollment at some colleges is mandatory. The Virginia Community College System requires all students to complete a Student Development Course, and many community colleges in Florida require a success course for students enrolled in developmental education (Zeidenberg, Jenkins, & Calcagno, 2007). Chaffey College in Los Angeles requires all students on academic probation to enroll in its college success course (Weiss et al., 2011).

Past research has generally indicated that student success courses for developmental students are conducive to short-term persistence (Cho & Karp, 2012; Rutschow, Cullinan, & Welbeck, 2012; Weiss et al., 2011; Zeidenberg, Jenkins, & Calcagno, 2007). Zeidenberg, Jenkins, and Calcagno (2007) examined student success courses at 28 community colleges in Florida and found that developmental students who enrolled in the student success course were 5 percent more likely to complete a credential within 17 academic terms, after controlling for student background characteristics. Weiss et al. (2011) conducted a random assignment evaluation of a student success course for probationary students at Chaffey College. After two semesters, program participants had earned more credits and had a higher GPA than non-participants. But a four-year follow-up evaluation revealed no effect on long-term academic outcomes.

Rutschow, Cullinan, and Welbeck's (2012) random assignment evaluation of a student success course at Guilford Technical Community College revealed gains among program participants in several psychosocial domains, such as perceived self-management skills, interdependence, self-awareness, lifelong learning, emotional intelligence, and positive engagement. Students in one of the three program cohorts – a cohort taught by highly enthusiastic, well-supported instructors – accumulated three more regular credits than did students in the control group after three semesters. No long-term effects were observed in the other two cohorts. The absence of large long-term impacts again suggests that additional support services, such as Early Alert systems, and curricular reforms are needed (Rutschow, Cullinan, & Welbeck, 2012). Karp et al. (2012) argued that the long-term impact of student success courses can be improved by providing more opportunities for students to learn how and when to apply course concepts.

Acceleration models.

The traditional approach to developmental education has been to assign students to a series of developmental courses that must be completed before enrollment in College English or College Algebra. However, many researchers have argued that developmental course sequences require too many semesters to complete (Boatman, 2014; Complete College America, 2012; Hodara & Jaggars, 2014; Wyner, 2014). Few students who are placed three or more levels below college-level will ever complete the college-level course (Bahr, 2007). Some colleges have sought to address this problem by adopting an "accelerated" developmental education model that provides remedial instruction over a shorter period of time, including mainstreaming, course compression, and modularization (Nodine et al., 2013; Rutschow & Schneider, 2011; Venezia & Hughes, 2013).

The objective of mainstreaming is to provide supplemental support services to students with minor developmental needs and place them into the same college-level courses as college-ready students. A prime example of mainstreaming is the Accelerated Learning Program (ALP) at the Community College of Baltimore County, wherein upper-level developmental writing students are mainstreamed into a college-level English course and also enrolled in a three-credit, English 101 support course. In their evaluation of program effectiveness, Cho et al. (2012) found that ALP students were more likely to complete College English and persist to the next year, compared to similar non-ALP students. As a cautionary note, though, they observed that College English completions decreased slightly among students in the ALP classrooms who had placed at the college level, which may reflect a negative peer effect of exposure to lower-skilled students (see Carrell, Fullerton, & West, 2009).

The second form of accelerated developmental education, course compression, typically combines two semesters of developmental coursework into a one-semester course. The FastStart program at the Community College of Denver, for instance, combines two semester-length developmental math courses into one course that meets for five and a half hours per week for one semester (Edgecombe et al., 2013). FastStart also provides faculty development opportunities and various forms of student support, such as career planning, academic advising, and case management. Edgecombe et al. (2013) found that FastStart participants were more likely to pass college-level math than were students who had enrolled in the traditional developmental math

sequence, but no effect was observed for persistence or credit accumulation.

Modularization is a technique that breaks down a course into key components that allow students to spend most of their time studying only the course content needed to address skill deficits. Modularized course content is often delivered via enhanced technology in self-paced programs, particularly in mathematics. Examples of software packages for modularized math courses include ALEKS, Math Zone, MyMathLab, and Plato, which "begin by identifying students' skill deficits and then allow them to work independently in building these skills through increasingly challenging content, built around frequent assessments of students' developing abilities" (Rutschow & Schneider, 2011, p. 29). Modularized math curricula were recently implemented at 32 community colleges in a program coordinated by the National Center for Academic Transformation (Twigg, 2013). Twigg's summary of simple comparisons revealed that 83 percent of the 86 redesigned courses had higher student learning outcomes than did traditional developmental courses, and most colleges reported lower instructional costs. Yet, rigorous research is needed to evaluate the effectiveness of these programs.

Contextualized instruction models.

Reviews of research on student outcomes in higher education have concluded that academic achievement is highly contingent on the type of pedagogy employed (Horn & Kamata, 2014; Pascarella & Terenzini, 2005). A critical element of effective pedagogies is the construction of a meaningful context for learning (e.g., Cordova & Lepper, 1996), such as linking classroom lessons with students' knowledge, interests, goals, avocations, and employment experiences. However, Grubb's (2010) qualitative study of developmental education at 13 community colleges in California revealed that most faculty members employed a decontextualized pedagogy based solely on the drill-and-practice of discrete skills (e.g., converting fractions to decimals). "Very seldom is instruction contextualized, with no references to how basic reading or writing or math might be used in settings outside the classroom, either in subsequent classes or in the world outside schooling… [R]arely are there explanations of why mathematical procedures or mathematical thinking is necessary in occupational or civic settings, or illustrations of how math emerges in daily life" (p. 12). Accordingly, some colleges have developed contextualized instructional models that either integrate basic skills instruction within a particular subject or link a basic skills course with a college-level course (Rutschow & Schneider, 2011).

A prominent example of contextualizing basic skills instruction within a college-level course is the Carnegie Foundation's Statway for non-STEM majors, wherein developmental math is combined with introductory statistics into a one-year course (Carnegie Foundation, 2014; Cullinane & Treisman, 2010). Institutions in eight states currently participate in the Statway program, including California, Connecticut, Florida, Hawaii, Minnesota, New York, Texas, and Washington. Contextualized instruction has also been used in Washington's I-BEST program, which avails career/technical certificate programs to students who need Adult Basic Education (SBCTC, 2014).[3] In the program, a basic skills instructor and a vocational program instructor co-teach an occupational course and support labs provide basic skills instruction in relation to occupational subject matter.

The second common method of contextualizing instruction, frequently termed a learning community, links a developmental education course with a college-level course that enhances the perceived relevance of basic skills instruction. Kingsborough Community College in New York, for example, linked a developmental English course with a college-level course (e.g., psychology). Students also enrolled in a first-year student orientation seminar and had access to student support services, such as advising and tutoring (Sommo et al., 2012; Visher et al., 2008; Visher et al., 2012).

Past research suggests that these types of instructional interventions are effective (Quint et al., 2013; Sommo et al., 2012; Visher et al., 2012; Zeidenberg, Cho, & Jenkins, 2010). A recent evaluation of multiple strategies for improving developmental education at 15 community colleges demonstrated that contextualized instruction and active learning pedagogies were most consistently associated with gains in credits earned, GPA, persistence, and passing the first college-level course (Quint et al., 2013). Zeidenberg, Cho, and Jenkins (2010) found that I-BEST participants were seven percentage points more likely to obtain a certificate within three years than were non-participants. A cost-benefit analysis revealed mixed results among I-BEST programs. Even though the cost of I-BEST was significantly higher than the cost of regular program credits, the additional benefits roughly equaled the additional costs on average (Wachen et al., 2012). Wachen et al. caution, though, that

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[3] Adult Basic Education (ABE) generally refers to programs that provide instruction in basic reading, writing, and arithmetic skills without charge to adult learners. Colleges may refer students who do not meet the minimum academic requirements for developmental courses to ABE courses.

the sustainability of an I-BEST approach depends on the ability of colleges to secure and allocate the resources needed for the program.

Finally, a randomized control study of participation in one-semester learning communities for developmental students at six community colleges demonstrated that participants in the Kingsborough program earned an average of 1.5 credits more in the target subject (e.g., English) than did non-participants, and participants in programs without enhanced student support services earned an average of one-half credits more in the target subject (Visher et al., 2012). But no differences were observed in rates of persistence over the first, second, and third semesters. An analysis of the long-term impact of the Kingsborough program revealed higher graduation rates among participants with severe developmental needs than similar non-participants, 26 percent and 21 percent respectively (Sommo et al., 2012).[4]

Student Support Services

As Bailey (2009) pointed out, developmental education is more than a series of remedial courses; it is a system of curricula and support services designed to improve student success. The necessity of effective student support services for developmental students is frequently evident in past research (e.g., Bahr, 2013; Hodara & Jaggars, 2014; Rodriguez, 2014; Visher et al., 2012). In their analysis of colleges in the City University of New York (CUNY) system, Hodara and Jaggars (2014) found that shorter developmental sequences in writing (without accounting for student supports and pedagogy) reduced pass rates in college-level English by 3 percentage points, even though the expanded enrollment in college-level English ultimately increased degree completion rates by 2 percentage points. If colleges increase the proportion of underprepared students placed directly into college-level courses without adequate student support, they may observe a trade-off between course completion rates and the total number of course completers (Rodriquez, 2014).

Community college students, in particular, may bring a fragile initial commitment to college and lack confidence in their academic skills. To increase their success, students may have to be

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[4] This finding was marginally significant at p=.10.

encouraged to adopt a "growth mindset" about their academic abilities (Dweck, 2006) and be convinced that they belong in college (Tough, 2013). Accordingly, it is essential that colleges link the remedial curriculum with student support services, such as enhanced advising and tutoring (Bahr, 2008; Rutschow & Schneider, 2011). For instance, some colleges have attempted to minimize confusion in the course registration process by providing clear roadmaps to their programs (Jenkins & Cho, 2014). Community colleges in Florida created eight "meta-majors," which are broad categories of academic programs that share a common core of foundational courses (Bradley, 2014).

Another example of student support integration is the Accelerated Study in Associate Programs (ASAP) at community colleges in the CUNY system (Scrivener & Weiss, 2013). ASAP requires full-time enrollment, completion of a first-year student seminar, and enrollment in block-scheduled classes. Notably, participants are provided with academic, career, and financial support, including frequent advising, tutoring, and career counseling as well as a tuition waver to cover the aid-cost gap, a free metro pass, and free textbooks. In a random assignment evaluation of low-income, developmental education students, program participants had higher rates of persistence, credit accumulation, and graduation two years after enrollment, relative to the control group (Scrivener & Weiss, 2013). For example, 15 percent of program participants graduated within two years, compared to 9 percent of control group participants.

Academic advising appears to be crucial not only for students enrolled in remedial coursework, but also for those who fail a course or withdraw altogether. Bahr (2013) found that only 16 percent of students who withdraw from remedial math complete a credential or transfer to a four-year institution, even though over half of such students remain enrolled for three additional semesters. Bahr thus argued that advisors should guide students who withdraw from math remediation to certificate programs.

Conclusion

Evaluations of recent reform efforts suggest that developmental education can be improved by differentiating program requirements, improving the accuracy of the student placement process, reducing program length, increasing the perceived relevance of learning tasks, and providing adequate student support (Rutschow & Schneider, 2011). Prior to initiating institutional reform, colleges are urged to gain an understanding of the baseline effectiveness of their developmental

practices and to conduct a policy audit (Fulton et al., 2014). Successful implementation will likely depend on including faculty members in reform efforts, devoting adequate funding to programs, and considering the interrelationships of developmental policies and practices. Institutional leaders can further reduce the future need for remediation by partnering with state agencies and school districts to enhance PK-16 alignment.[5]

Recommended Practices

- Ensure that program requirements reflect the appropriate levels of English language and math skills that students will need to succeed in academic disciplines, occupational contexts, and civic roles. Mathematics requirements, in particular, should be differentiated between Liberal Arts and STEM majors.

- Use multiple measures to assess the college readiness of new students, such as a combination of standardized test scores and high school GPA. Ensure that students realize the high stakes associated with standardized assessment tests and that they are well-prepared for the exams. Evaluate the potential utility of measuring non-cognitive traits as indicators of college readiness.

- Utilize summer bridge programs to provide students with opportunities to better prepare for placement exams and address any remedial needs prior to fall term enrollment. Consider extending similar opportunities to first-time students who enroll during the spring term.

- Encourage or mandate enrollment in student success courses for students who lack skills needed to adapt to the academic, emotional, and social demands of college.

- Ensure that developmental curricula minimally affect time to degree while adequately preparing students for college-level coursework. Design options include acceleration, course compression, and modularization.

- Utilize instructional models that optimize academic engagement, such as contextualized instruction.

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[4] Two promising interventions for promoting PK-16 alignment are dual enrollment and early skills assessment (Rutschow & Schneier, 2011).

- Establish strong connections between developmental curricula and support services that target students' multiple needs: academic, career, financial, social, and emotional. This may include such services as counseling, tutoring, mentoring, and advising as well as financial aid policies that address the cost-aid gap. Consider providing students with guided pathways that clearly identify the steps towards degree completion.

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