

Building A New “Bridge” to Math
A Study of a Transition Program Serving Students with
Low Math Skills at a Community College

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Overview

Most students in the United States who enter community college with limited basic math skills face substantial challenges in completing their math requirements. Many of those students — who, by and large, must begin their studies with developmental (remedial) courses — drop out before ever becoming qualified to take college-level math courses.

In 2014 the Texas Higher Education Coordinating Board (THECB) implemented major new guidelines in how students who score very low in their course placement exams should be placed and served in community college courses. After adopting a new placement test, the state raised the cut score for requiring students to enroll in developmental education and eliminated the lowest-level developmental math course. Colleges were then permitted to choose among several alternatives for serving the lowest-scoring students, who would otherwise have enrolled in the course that had been eliminated.

MDRC partnered with THECB to examine how colleges implemented the new state guidelines for supporting students scoring below ninth-grade proficiency in math on their course placement exams. This report presents the findings from a study of a four-week “Bridge Math” course at Houston Community College (HCC), which was offered for students who scored between the fourth- and eighth-grade levels of math proficiency. This Bridge Math course was intended to boost their basic skills in math in order to prepare them to tackle courses at the ninth-grade level — the level at which they could eventually enroll in developmental math.

Starting in fall 2015, students who completed the four-week Bridge Math course had the opportunity to immediately enroll in the first course of the developmental math sequence to work toward raising their skills to twelfth-grade proficiency. The data and evidence suggest that although some students who enrolled in the four-week Bridge course gained the math skills to prepare themselves for the developmental-level math sequence, the majority of those students who were referred to the Bridge course did not enroll in it, and most who did enroll did not complete it or move on to a developmental-level course.

Colleges that introduce new programs and courses often require more time than expected to fully implement them. As found in the field research for this study, students, instructors, and advisors were not uniformly aware of the new placement policies and program changes, which contributed to lower-than-expected enrollment rates in the Bridge course and still lower transition rates to the developmental course for those who passed the Bridge course. Clear vertical and lateral communication among the administration, advisors, instructors, and students — as well as through information provided on HCC’s website and social media outlets — is particularly critical when a major change in placement rules such as this one occurs, affecting so many incoming students’ chances at making it to and through developmental math and on to earning their college credential.

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The Authors

Chapter 1

Introduction

A recent study found that one in three Americans between the ages of 16 and 65 lack the skills needed to succeed in middle school math, let alone math at the high school or college level.¹ Encouraged by open admission policies for high school graduates, many of these individuals opt to pursue education at community colleges. But before even enrolling in college, most students are expected to take high-stakes placement tests that measure their math and English skills, such as the ACCUPLACER college placement test. These tests are designed to distinguish between students whose skills are below twelfth-grade proficiency levels in math, reading, or writing, and those who are deemed “college ready” — that is, students with skills at the twelfth-grade level or higher. Nationwide, more than half of community college applicants score below the college-ready level; colleges often require these students to pass a series of developmental or remedial courses before they can take credit-bearing math or English courses.² In some cases, students referred to developmental course sequences may be required to enroll in and pass as many as four 16-week-long developmental courses before becoming eligible for college-level courses. The majority of these students end up dropping out before completing their developmental requirements.

In recent years, states have undertaken a variety of reforms in response to these low rates of success. Some states have simply dropped the requirement for remediation in English or math, allowing students to attempt college-level courses regardless of their skill level upon entry to college. Other states have shortened the developmental course sequence, dropping one or two courses in order to reduce attrition among developmental students. Some states have created differentiated requirements for different majors. For example, students who pursue STEM-related majors (science, technology, engineering, and math) may be required to complete college-level math courses, whereas students pursuing liberal arts majors may only be required to complete eleventh-grade math. In other instances, states or colleges have raised standards for developmental courses and routed students who score below the minimum skill level for developmental classes to lower-level college-transition courses or programs such as adult literacy programs.

One state that pursued the strategy of raising the minimum skill level required for developmental math was Texas. In 2014, the Texas Higher Education Coordinating Board (THECB) implemented major changes in how the lowest-scoring students should be placed and served in community colleges. After adopting a new placement test, the state raised the cut score for placing students in developmental education and eliminated the lowest-level developmental math course. Colleges were then permitted to choose among several options for serving the lowest-scoring students, who would otherwise have enrolled in that course. This study places the Texas policy in the context of other state reform strategies and examines the response of one Texas college: Houston Community College (HCC). In 2015, HCC replaced the lowest level in the sequence of

¹Goodman et al. (2013).

²Attewell, Lavin, Domina, and Levey (2006).

developmental math courses with a new four-week “Bridge” course for students who score between the fourth- and eighth-grade levels. This Bridge course was intended to boost their basic skills in math to prepare them to tackle the ninth-grade level — the level at which they could enroll in developmental math.³

The study was originally intended to be a mixed-methods evaluation, using a regression discontinuity design to assess the effects of being referred to the new four-week Bridge course compared with being referred to the higher-level developmental math course. Ultimately, however, this design proved infeasible as the result of a combination of factors, which are discussed in detail in Chapter 3. Instead, this report focuses on interesting findings describing the implementation of this new policy.

Research Questions

This research study focused on the following questions:

1. *How was the new Bridge course at HCC implemented?* The implementation study, which relies primarily on field data collected through interviews with students, instructors, and administrators, examined factors that may have affected the effectiveness of HCC’s program. These included the extent to which the program components were offered as intended, the contrast in experiences of the Bridge students compared with students who placed into ninth-grade-level math courses, and the attitudes and perceptions of students, instructors, and administrators.
2. *How many students who tested near the ninth-grade proficiency level in math were directed to the new Bridge course as a result of the new policy, and what were their demographic characteristics?* This question aims to clarify the size of the population of “affected” students as well as their basic demographic characteristics, such as gender, race, and English proficiency. The study used student records to address these questions.
3. *To what extent did students scoring near the ninth-grade proficiency level in math enroll in the college and their assigned math course?* Texas administrators and policymakers, as well as administrators in other states implementing similar policies, were concerned that students whose scores were “below the cutoff” for developmental courses (and hence assigned to a “Bridge” course) would feel discouraged or confused once they understood that they would have to enroll in a transition program before being allowed to enroll in the “regular” developmental math course. Student records were used to measure the likelihood of various enrollment behaviors, and whether they differed for students above and below the ninth-grade level.

³This report uses the term “Bridge” for this course, although the college itself refers to the course by its course number, MATH-0106.

4. *How did average academic outcomes among students assigned to the Bridge course compare with those of students who were assigned to the developmental math course?* Were there differences between these two groups in terms of making progress through math remediation, attempting college-level math, and earning credits toward a college credential? This question is descriptively explored in Chapter 3.

Sample and Data

The student sample for the demographics, enrollment, and outcomes analyses includes all students who took the Adult Basic Education math assessment between February 2015 and January 2016, a total of 5,552 students. The sample is divided into two cohorts based on the date that students first took the Texas Success Initiative math assessment exam. The first cohort includes 3,783 students who first took the math assessment and scored below 336 on the exam between February 1, 2015, and August 31, 2015; the second cohort includes 1,769 students who first took the assessment between September 1, 2015, and January 31, 2016. Notably, not all students who took the test subsequently enrolled at HCC. HCC served as a testing center for nearby high schools; consequently, some test-takers may have been high school students who had never intended to enroll at HCC.

Data Sources

Qualitative Data

The research team visited HCC during the fall 2015 and spring 2016 semesters to learn about how the new program was being implemented. During the visits, the team conducted individual interviews with administrators and held focus groups with students, advisers, and instructors. The purpose of collecting qualitative data was to document how changes were perceived by the various stakeholders, whether and how students were directed to their assigned math programs, and how they experienced their classes if they did enroll. Additionally, the research team observed a few Bridge course and developmental math classrooms to try to understand the extent to which the new Bridge course was implemented as intended and how the experiences of students assigned to this transition program and to the developmental math courses differed. The research team also conducted a few post-visit follow-up phone interviews with college administrators to gather additional information or gain further clarity about what was learned during the visits.

Interviews were transcribed and analyzed to identify themes and patterns. Participation in focus groups and interviews was voluntary and largely self-selected; thus, these relatively small groups may not be representative of the opinions and observations of all staff at HCC or of all students who participated in the programs described as part of this research.

Administrative Data

The analyses of demographics, enrollment, and academic outcomes in this report drew upon the following data sources:

- *Student placement test data.* These administrative data were provided by HCC and the College Board (which developed and scores the placement tests) and include information on the assessment results for each student in the sample, including scores and test dates.
- *Student demographic data.* These data were primarily provided by HCC and include information on students' gender, race/ethnicity, and other selected background characteristics. Some demographic data were also provided by the College Board.
- *Student transcript data.* These administrative data were provided by HCC and include information on the courses that students took and the grades that they received each semester.

Overview of the Report

The next chapter places this study in a broader reform context by describing college transition initiatives in other states that are similar to the one implemented at HCC. Although different in structure, format, and content, these initiatives in other states were also designed to serve students who scored below developmental-level math proficiency. Descriptive findings on the HCC program are reported in Chapter 3. Chapter 4 concludes the report with a summary of key findings and policy implications.

Chapter 2

New Approaches to Serving Students with Very Low Math Skills: A National Perspective

Across the country, a number of community colleges, college systems, and states have been experimenting with implementing a skill-level threshold, or “floor,” for entry into developmental education.¹ Traditionally, most colleges admit all eligible students, even if their math scores are at primary school levels. With these new policies, students who score below a certain skill threshold are directed to different programs or services than the typical sequence of developmental education courses intended to prepare students for college-level work. Some individual colleges have implemented these policies on their own, while, in other cases, state or college systems have made recommendations about skill thresholds, leaving individual institutions with discretion over whether and how such a policy is implemented.²

As of late fall 2017, some states had implemented statewide policies to reduce the number of developmental education levels with the expectation that all colleges within the state would comply. In 2017, MDRC released an early report, *Raising the Floor*, that described the programs and services that these states had adopted in an attempt to serve students who tested below the minimum threshold.³ For instance, some state leaders recommended that students be referred to and enrolled in other education and workforce programs, such as federally funded Adult Basic Education (ABE) programs, while others encouraged colleges to provide short-term, non-course-based options, such as online tutorials or multiweek “boot camps,” for building these students’ skills.

While similarities exist in the types of programs that colleges have offered to these low-skilled students, the skill-level thresholds set by states and systems and the funding streams to support services for low-skilled students differ. For instance, based on interviews with program leads in various states, MDRC researchers learned that the skill thresholds set in North Carolina and Virginia allowed students with eighth-grade skill levels to enroll in their developmental math course modules. Students at these skill levels would generally start at the first module and then try to make progress through 8 or 10 modules before being allowed to enroll in college-level classes.

In contrast, Colorado, Connecticut, and Texas (the state where the current study was conducted) have set the threshold at ninth-grade skill levels; thus, any student scoring at a ninth-grade level but below the twelfth-grade level could enroll in developmental math courses, while those with eighth-grade level skills or below were redirected away from developmental courses and into other programs or courses. Given these higher skill-level cutoffs for entrance into developmental courses, it is likely these policies affected far more students in Colorado and Connecticut than

¹Similar policies were also enacted in these states for reading and writing; however, only developmental math policies are discussed in depth here, since that is the focus of this report.

²Kansas and Missouri are two examples; see Developmental Education Working Group (2014) and Missouri Department of Higher Education (2017).

³Visher et al. (2017).

in Virginia and North Carolina. (The policies in Texas are discussed in more detail below.) For instance, in 2008-2009, Colorado estimated that 7,100 of its 24,000 developmental students were testing at the lowest level of developmental math. As such, as much as 33 percent of students entering community colleges in Colorado may be redirected into college-transition programs or courses.

As they revised their developmental education policies and established minimum skill thresholds for entry, Colorado's and Connecticut's college systems (and both states) also changed the number and types of developmental courses that could be offered. In both states, colleges within these systems were limited to a single, one-semester developmental math course.⁴ Students whose test scores placed them above developmental level were to be enrolled in college-level courses. For students with test scores below the developmental level, state leaders recommended that they be offered transition or pre-enrollment services either at the college or at a local Adult Basic Education (ABE) or community program.

Regardless of their location, these transition services were not considered college classes in Colorado and Connecticut, were not part of the statewide college course catalogue, and did not offer college credit that could count toward a credential or toward eligibility for federal financial aid.⁵ Also, funding for these programs and services had to rely on sources other than or in addition to funding streams from the college — for example, workforce development or adult education.

Leaders in Colorado and Connecticut noted that the key rationale for these changes was the very low completion rates of students in the lowest-level developmental education courses. As one leader in Colorado stated, students in the lowest-level developmental math class “had less than a 5 percent chance of enrolling in and passing a college-level math course.”⁶ Leaders in both states also noted that many of these low-scoring students were using up their financial aid in courses where they were unlikely to be successful (that is, developmental math course sequences) and wanted to limit this practice. In other words, the assumption was that since students with such low skills were unlikely to pass developmental courses, the cost was greater than the potential benefit of allowing these students to enroll.

In contrast, Virginia and North Carolina divided their traditional developmental math courses into modules, with students being placed into various modules based on their scores on a state-based diagnostic exam. In North Carolina, students took a diagnostic assessment for all six of the developmental modules and received a score between 0 and 7 for each module. Any student who failed module one and tested below a 7 on every other module was recommended to take remedial courses. State leaders recommended that students take the Test of Adult Basic Education (TABE) or the Comprehensive Adult Student Assessment System (CASAS) test — both tests used for placement in the nation's federally funded adult education programs — to determine

⁴Visher et al. (2017); Michael and McKay (2015).

⁵These services or programs did not offer developmental credits, which were generally nontransferable credits that did not count toward a two-year or four-year degree, nor college-level credit courses, which generally are transferable and count toward a degree.

⁶Personal interview, November 2017.

their skill levels. After taking a basic skills support course, students would retake the TABE or CASAS and had to demonstrate an increase in one grade level of skills to enroll in the developmental math modules. North Carolina students could also retake the developmental education diagnostic exam to try to place out of additional developmental course modules.

In Virginia, students take the Virginia Placement Test to determine which of nine different modules they should be placed in. If students test below module 1, they are referred to a remedial course, which teaches math with whole numbers, or about a third-grade skill level. One to two Basic Skills courses were generally offered at larger community colleges across the state; however, smaller campuses generally did not have enough students to support a full course and thus would create different support options for these students.

Tracking Low-Scoring Students' Progress in College-Transition Services

It is difficult to document the numbers of incoming students who are affected by the policy and program changes described above, although a study of several dozen community colleges in five states sheds some light on the question. This study tracked first-time, credential-seeking students who enrolled in college from fall 2003 to fall 2004 using a database of 57 colleges in nine states.⁷ This analysis revealed that approximately 33 percent of entering students tested into a developmental math class that was three or more levels below college-ready,⁸ and another 18 percent tested two levels below.⁹ As such, colleges and states that set a ninth-grade skill threshold for entry into developmental math may be affecting as much as one-third of their incoming community college population.

Little state or college data exist to track students' entry into college-transition programs, their progress through these programs, and their subsequent reentry into developmental or college-level math. This is particularly the case for transition programs that are offered and funded by funding streams outside the normal community college sphere. Workforce programs and ABE programs have different accountability systems and date-reporting procedures than community colleges. Therefore, the data that are used in ABE programs are generally not easily accessible to colleges and vice versa, making it difficult to track students who may transition across these systems. Program administrators who were interviewed in each of the states profiled in this report also noted that no systems currently exist for tracking lower-skilled students referred to alternative programming, even when those programs or services are located at the college.

⁷The nine states were Connecticut, Florida, Ohio, New Mexico, North Carolina, Pennsylvania, Texas, Virginia, and Washington.

⁸In Bailey, Jeong, and Cho (2010), this percentage refers to students attending colleges that offer courses three levels or more below college-ready. However, 18 colleges (of the 57 in this study) do not offer courses three levels or more below college-ready, so the number of students assigned to courses three levels or more below college-ready is lower or higher than 33 percent.

⁹Bailey, Jeong, and Cho (2010).

While little reliable data exist, MDRC’s interviews and review of online reports on Connecticut’s and Colorado’s revisions confirm that significant numbers of students are affected by policies that reroute low-scoring students to alternative services and programs. For example, in a 2015 report on Colorado’s developmental education redesign, at least 12 of the state’s 13 community colleges had created services for low-skilled students on their campuses or made connections with local ABE or workforce centers to develop programs for these students off-site.¹⁰ Similarly, a 2014 report analyzing Connecticut community colleges’ developmental education reforms noted that at least half of the state’s 12 colleges had implemented transition programs for lower-skilled students.¹¹ However, little is known about how many affected students actually enroll in or complete these programs.

Some of these colleges have reported results from these pilots in descriptive studies. For example, one community college in Connecticut noted that 64 percent or more of the students who completed their boot camps had increased their developmental education placement scores by at least one developmental level.¹² Neither Virginia nor North Carolina have done in-depth studies of college-transition programs for low-skilled students, though Virginia noted overall increases in enrollment and completion of gateway college-level math courses after implementing the math modules revisions.¹³

To summarize, little is known about how these transition programs serving low-scoring students are operating, how many students are affected, and, of those, how many are referred to and enroll in them. Even less is known about how such students fare compared with how they might have fared if allowed to enroll directly in developmental courses. This report presents findings from a study of one such program operated at Houston Community College (HCC) in Texas.

The Texas Way

In 2014, the Texas Higher Education Coordinating Board (THECB) released guidelines as part of the Texas Success Initiative (TSI) to encourage the 22 community colleges in the state to re-vamp their assessment and placement practices for incoming students. THECB is a state agency that reports to the state legislature and that oversees all two-year and four-year postsecondary institutions in Texas, as well as adult education programs. Colleges are required to submit student data reports to THECB regularly. As is the case in many other states, THECB can influence policy and practice, but its ability to mandate policy is limited. As one state official noted, there is often considerable confusion among local institutions about what is a mandate and what is not — as was the case for the TSI passed by Texas legislators in 2013. In the end, virtually all the community colleges in Texas did implement significant changes to their assessment, placement, and

¹⁰Michael and McKay (2015).

¹¹Senserrich (2014).

¹²Senserrich (2014).

¹³Personal communication with Virginia’s Community College Office of Institutional Research and Effectiveness, 2014.

education of low-scoring students in response to the TSI, although few of these changes were mandated by the state.

The TSI included both mandates and recommendations that had the potential to lead to fundamental changes in how colleges would assess incoming students and which services should be offered, depending on their proficiency levels in both math and English. The new assessment and placement guidelines would lead to programs that replaced much of the old system, which sorted students with precollege math skills into as many as four different developmental courses depending on the results of their math assessment. The new program led colleges to (1) eliminate the lowest level of developmental math courses, which served students with skills below a ninth-grade level, some with skills below a fourth-grade level; (2) add a new assessment, intended to be more fine-tuned; and (3) use a standardized cut score to sort students into three groups: those ready for college-level math, those with ninth- to eleventh-grade proficiency, and those with below ninth-grade proficiency.

Two elements of the TSI were mandated. First, colleges were *mandated* to use a new assessment, the TSI Assessment (TSIA), that was designed to more accurately assess students' math, reading, and writing skills. TSIA replaced the four tests used by community colleges in Texas at the time. Second, the TSI *mandated* a specific cut score on the TSIA — dividing students into college-ready and not-college-ready groups. In the past, colleges could determine their own cut scores, resulting in wide variation in how college readiness was defined. In 2015, the college-ready cut score was 350. Students who scored below 336 on the TSIA, therefore placing far below college level, were given an additional set of questions called the “TSI Adult Basic Education (ABE) Diagnostic Assessment” (hereafter referred to as the “ABE test”). This test then divided students into six different sublevels, ABE Level 1 through ABE Level 6.¹⁴

The state *recommended* that colleges choose from a list of offerings for students depending on their ABE Levels as follows:

- Students in ABE Levels 1 and 2, equivalent to third-grade proficiency or below, should be redirected from enrolling in developmental education and, instead, be referred to zero or noncredit courses, Adult Basic Education, Continuing Education, or other programs.
- ABE Levels 3 and 4, equivalent to fourth-grade to eighth-grade proficiency, should be redirected from enrolling in developmental education and instead be referred to transition programs or courses such as Bridge.

¹⁴The term “ABE” is not necessarily accurate, since neither the test nor the related programs are necessarily supported by Adult Basic Education funding. Although developmental education courses and ABE courses both serve low-skilled students, ABE programs have traditionally been reserved for those without a high school diploma and generally have differing funding streams, regulations, and accountability systems. THECB adopted this terminology during the early phases of formulating the policy, and its use persisted despite some resistance and some confusion. This report uses the term to be consistent with state and local familiarity with it in association with the policy and program changes that are the subject of this study.

- ABE Levels 5 and 6, equivalent to ninth- to eleventh-grade proficiency, were to be referred to developmental education courses.¹⁵

The TSI, as implemented in most of the Texas community colleges, amounted to “raising the floor” for entry into regular developmental education, mostly because colleges eliminated the lowest-level course in the developmental math course sequence and only students with ninth-grade skills or higher were eligible to take the shortened developmental course sequence that remained. In the past, students whose skills were below eighth-grade levels could still enroll in up to four developmental courses. Colleges began implementing the recommendations as early as 2013, with most launching their programs by fall 2015.

¹⁵Texas Higher Education Coordinating Board (2014).

Chapter 3

Findings for the Houston Community College Program

This chapter begins with context on Houston Community College (HCC) and its four-week math “Bridge” course, including a description of the intended design of the course and how it was implemented during the study period. Students with Adult Basic Education (ABE) scores at Level 3 and Level 4 were referred to the Bridge course; those with placement scores at Level 5 and Level 6 were referred to Foundations of Math — the first full developmental math course. This chapter presents descriptive data on the numbers, characteristics, and outcomes of students whose first test scores were directly below or at ninth-grade proficiency (Levels 4 and 5, respectively). Results in this chapter are presented according to the test scores students received the first time they took the test.¹

A Brief Aside

As noted earlier, in addition to the descriptive analyses discussed below, this study intended to estimate the effect of being referred to the Bridge course compared with being referred directly to developmental math. A strong research design, known as a regression discontinuity design (RDD), was going to be used for these analyses. However, RDD relies on several important, empirically testable assumptions. In this instance, these assumptions were violated.

First, a wide range of students took the placement test at HCC regardless of whether they intended to enroll at HCC or not. Many students who took the placement test did not go on to enroll at HCC; thus they were never exposed to the intended program (the Bridge course or Foundations of Math, depending on their test level). In addition, even among students who did enroll at HCC, many did not enroll in their intended math class. This happened either because a student didn’t enroll in any math course or because the student enrolled in a math class different from the one indicated by the initial placement test score. Collectively, these factors reduced the service contrast between students on either side of the placement cut point. Additionally, some information was missing in available administrative records, with data being more likely to be missing for students who did not enroll at HCC.²

Background

The Houston Community College system consists of six colleges and 21 campuses that serve the greater Houston area. One of the largest community colleges in the country, HCC had more than

¹Eleven percent of students retested and received a higher score prior to or during spring 2016. Not all these retest scores were high enough to facilitate skipping levels.

²Additional details regarding the RDD analyses and validity tests that were conducted are available upon request by e-mailing angela.boatman@vanderbilt.edu.

100,000 college and workforce students enrolled in the 2015-2016 academic year. Approximately one-third of HCC's students are Hispanic and one-third are African American, with the remaining students a mix of white, Asian, and other ethnicities. HCC serves mostly low-income students.³

The placement policy for assignment into Bridge and other HCC math courses during the years of this study is shown in Figure 3.1. In their first semester of enrollment at HCC, students with ABE placement scores at Levels 1 and 2 were referred to career technical education courses, typically offered off-campus for zero credit. Those placing at Levels 3 and 4 were referred to the Bridge course; those at Levels 5 and 6 were referred to the first full-length developmental course, Foundations of Math. HCC offered two courses in its developmental math sequence, Foundations of Math and Developmental Algebra; however, only the former was required for all students who received an ABE score. Given that not all students were required to complete the second developmental math course,⁴ this report focuses on comparing the ABE test-takers who were referred to the Bridge course with those who were referred directly to the Foundations of Math course.

The intended enrollment sequence for students below ninth-grade proficiency (Levels 3 and 4) was to first take the four-week Bridge course for one developmental credit at the start of the semester to sharpen their basic math skills. The content taught in the Bridge course was intended to reinforce basic math concepts normally taught in elementary and middle school, such as fractions, decimals, and percentages. These students could then enroll in an eight-week section of the Foundations of Math course during the second half of the same semester or could wait until the following semester to enroll in Foundations of Math. A passing grade on the final exam of the four-week course qualified students to enroll in Foundations of Math, where they were to apply their learned math skills to solve arithmetic operations using numbers in various formats — basic geometry, polynomials, and linear equations. Students who did not pass the Bridge course during the first four weeks of the semester could take it again in the next four weeks and still have a chance to enroll in an eight-week section of Foundations of Math starting in the second half of the semester as long as seats were available within those sections. In contrast, the intended enrollment sequence for students with ABE placement scores at Levels 5 and 6 was to enroll directly in Foundations of Math at the start of the semester.

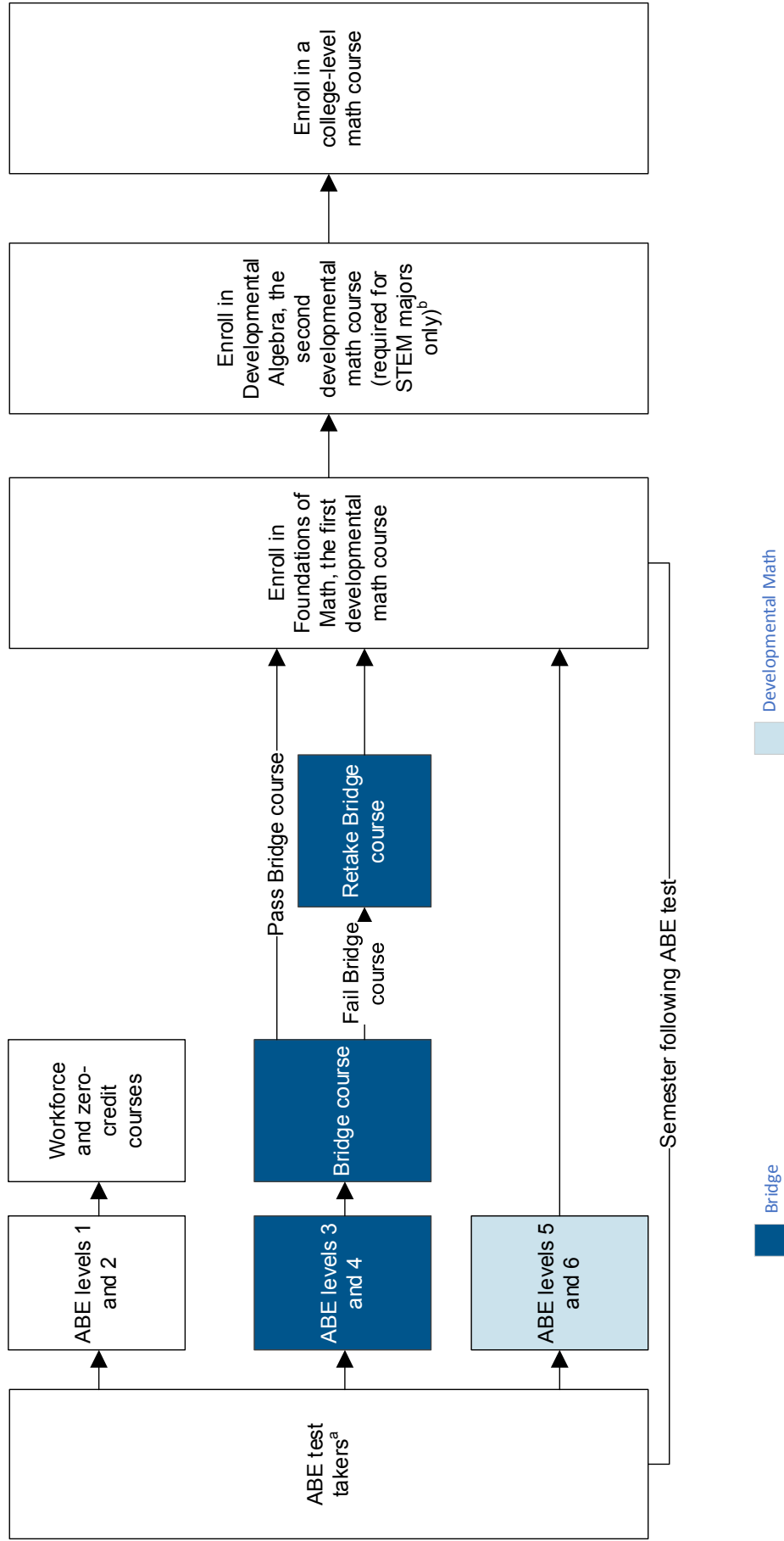
Distinctions Between Bridge Math and Foundations of Math

Several distinctions between the two courses should be noted. First, most Bridge sections were offered two days per week, for two hours per class, for a total of 16 hours of instructional time. A

³Data from the 2015-2016 academic year reported to the Texas Higher Education Coordinating Board as part of the Perkins Basic Grant Program showed that 81 percent of students were economically disadvantaged. This percentage was calculated using various factors, including students' annual income, eligibility for food stamps or certain other public assistance programs, or receipt of a Pell Grant.

⁴Developmental Algebra was an additional requirement only for students with science, technology, engineering, and math (STEM) majors.

Figure 3.1
The Placement Program for Students at Houston Community College



NOTES: Students who passed the Bridge course within the first eight weeks of the semester had the option of enrolling in Foundations of Math in the second eight weeks of the semester, or waiting until the following semester.

^aThe Adult Basic Education (ABE) test is a component of the Texas Success Initiative (TSI) and is meant to be completed by students who scored below 336 on the TSI.

^bSTEM is science, technology, engineering, and mathematics.

few sections had a four-hour, once-a-week format. In contrast, the Foundations of Math course offered 64 hours of instructional time, whether the section lasted eight weeks or a full semester. Thus, if students referred to the Bridge course followed the intended path (Bridge Math followed immediately by Foundations of Math), they would complete 80 hours (16 in Bridge and 64 in Foundations) of instructional time in a single semester — 16 more hours than students referred directly to Foundations of Math.

Second, Bridge students had the opportunity to retake the course in the same semester if they failed it, whereas students who failed Foundations of Math typically had to wait until the following semester to retake their course (unless they failed the first eight-week session and chose to enroll in the second eight-week session in the same semester, which very few students did). Moreover, while the Bridge course did not have attendance requirements, regular attendance in Foundations of Math was required and counted toward a student's final grade for the course.

Third, Bridge course instructors designed their own content materials, lectures, and classroom activities as they saw fit within the four-week period, leading perhaps to greater variation in instruction. Much like the Bridge course, sections of the Foundations of Math course were largely taught by adjunct instructors in the Developmental Math department. Although no standard textbooks or syllabi were uniformly used across the Bridge course sections, some instructors worked together to share worksheet packets, online videos, and other instructional materials. Meanwhile, Foundations of Math instructors generally followed the same textbook and pacing across all sections — an online learning software (MyMathlab) supplemented course lectures and was typically utilized across the course sections of Foundations.

The paragraphs above describe the typical experience of students enrolled in Bridge or Foundations of Math. However, as is covered in more detail below, many students did not enroll in their initially assigned courses. Moreover, the small subset of students assigned to the Bridge course who took and passed it rarely went on to take the Foundations course in the same semester.

Given its shortened course length, the Bridge course alone, as it was most commonly experienced, offered substantially less “seat time” than the Foundations of Math course. That noted, a student who took the Bridge course and Foundations of Math within the same semester would have substantially more seat time than a student who only enrolled in Foundations of Math, which just didn't happen that often.

With this background in mind, this research sought to answer two questions:

1. To what extent did students who were referred to Bridge or Foundations of Math enroll in their assigned math course during the 2015-2016 academic year?
2. Did test-takers referred to the Bridge course pass Foundations of Math and enroll in subsequent math courses at different rates than test-takers assigned directly to Foundations of Math during the 2015-2016 academic year?

The first question is of interest because for the referral policies to have a chance of achieving their intended effects, students must comply with the referrals. If there is compliance, then

understanding the effects of these different placements is important. If compliance is very low, then the institution may want to consider other options for how to proceed.

The second question does not attempt to get at the *effect* of being referred to Bridge compared with being referred to Foundations of Math. It simply attempts to describe any *differences in outcomes* between the two groups with different scores. Such differences may be related to or caused by a variety of factors, including variations in the student populations receiving higher or lower test scores. Examination of any differences may provide the institution with more insights for future decisions on placement and assessment practices, particularly for math.

Do Students Scoring at Level 4 Enroll in Bridge?

Most HCC students referred to the Bridge course did not comply with their referral. HCC designed the Bridge course to be completed in four weeks so that students could then enroll in the Foundations of Math course within the last eight weeks of the same term. Among HCC enrollees who were first scoring at Level 4, 25 percent attempted Bridge as their only math course in their first semester after referral. Even fewer, 9 percent, took both the Bridge Course and Foundations of Math (the intended sequence) in their first semester after referral. According to interviews with HCC administrators and staff, they faced several implementation challenges that may have contributed to fewer students moving from the Bridge course to Foundations of Math in the same semester:

1. Not all HCC academic advisers were fully aware of the expectation that students who passed a Bridge course were expected to immediately enroll in Foundations of Math in the same semester.
2. Registration in these second-half semester courses was logistically difficult, as the automated enrollment systems sometimes would not allow automatic enrollment for such students, requiring students to seek help from their advisers.
3. Some students who passed the Bridge course reported not being able to enroll in the Foundations of Math course because they could not find an open section later in the semester or could not make the open sections fit with the rest of their class or work schedules.
4. Instructors sometimes failed to inform students of what they needed to do to enroll in the Foundations of Math course.

To address problems associated with enrolling in Bridge and Foundations consecutively, HCC's math department made changes to its spring 2016 course scheduling so that the Bridge course and the Foundations of Math course sections would be taught back-to-back by the same instructor during the same semester. However, the rates of enrolling in Bridge and Foundations together were similar across the fall 2015 and spring 2016 cohorts, as shown in Appendix Table A.1.

Not surprisingly, some Bridge course instructors who were interviewed said that they struggled to fit all of the necessary content into a compressed, four-week course. Some instructors noted that many of their students quickly accumulated absences early in the course, inevitably making them fall behind with very little time to catch up. Students who participated in focus groups reported varying experiences with the content, with some finding the course too easy and boring, while others finding it too hard — highlighting the challenge of teaching a course to students whose math abilities range from fourth-grade to eighth-grade proficiency.

Numbers and Characteristics of ABE Test-Takers

In this section, student records are used to document the numbers, characteristics, and math course and college enrollment patterns of students whose first test scores indicated proficiency levels at and below the ninth-grade level. All students who applied to the college and did not qualify for waivers or exemptions were required to take the Texas Success Initiative (TSI); students who received low enough scores were automatically administered an additional assessment, the ABE test, to determine a more precise grade-level proficiency. As mentioned above, students whose math skills were assessed at third grade or below (Levels 1 and 2) were to be referred to zero- or low-credit courses, including workforce programs typically offered at a workforce training site located off-campus. Students whose math skills were assessed between fourth and eighth grade (Levels 3 and 4) were referred to the Bridge course. Students whose scores indicated proficiency between ninth and twelfth grade (Levels 5 and 6) were to be referred to the Foundations of Math course. Some retesting was done, but only 7 percent of students retested and received higher scores prior to their first expected enrollment semester (with 11 percent retesting through spring 2016), and not all of these scores were high enough to place students into higher-level math classes.

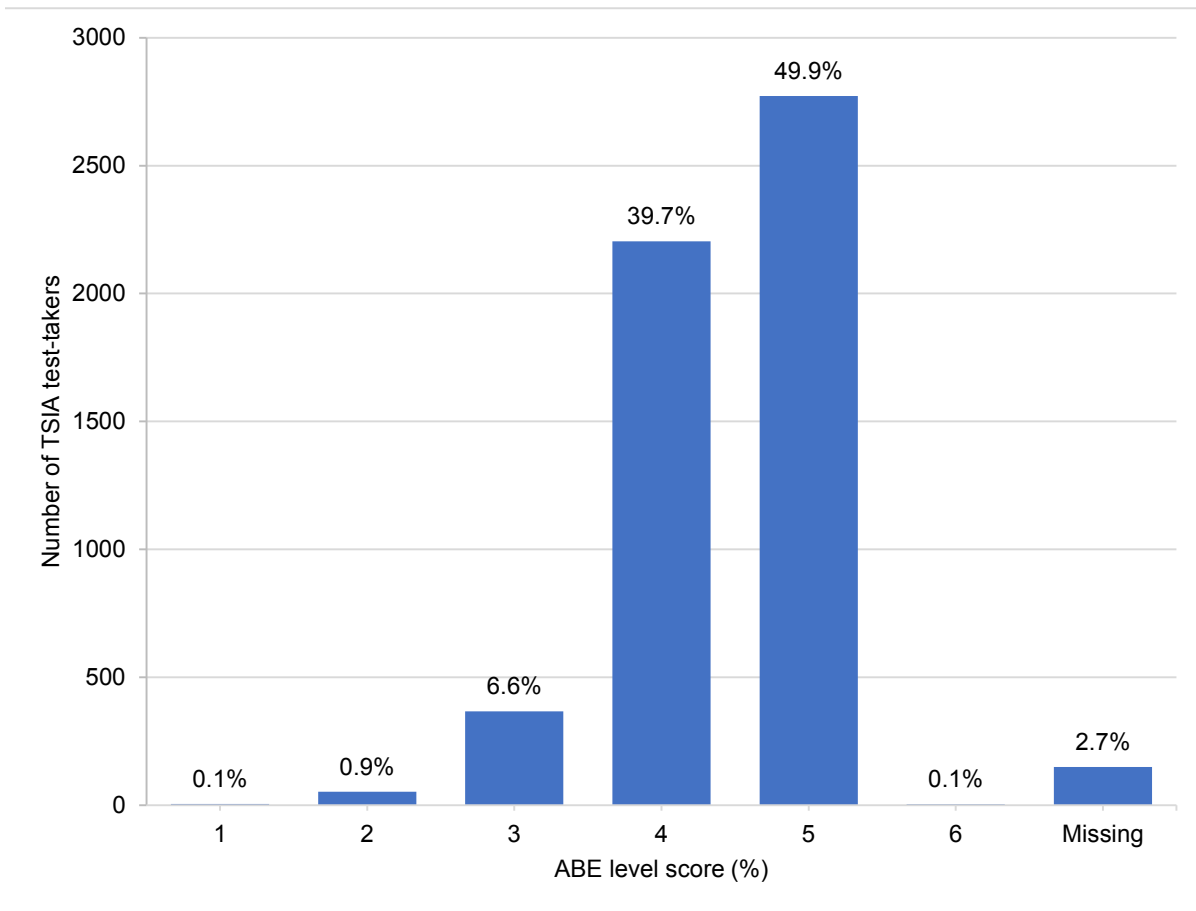
Approximately 14,000 individuals first took the TSIA during the time frame for this study. From this group, 5,552 — approximately 40 percent — scored far enough below the “college-ready math skills” cutoff that they were then administered the ABE Diagnostic.⁵ The distribution of ABE Diagnostic scores is shown in Figure 3.2. Of these 5,552 students who took the ABE assessment, 2,628 scored below ninth-grade level, which corresponds to an ABE Level 4 or lower, indicating below developmental math level. These 2,628 students represent just under 20 percent of the total number of students who took the TSIA and just under half of the students who took the ABE. In other words, one-fifth of all TSIA test-takers were affected by the new assessment and placement policies by achieving a score that placed them below the cut point for developmental math.

As a reminder, this study examines differences in college enrollment and math course-taking behavior among ABE test-takers who first scored at Level 4 and 5, where most scores are distributed. As shown in Table 3.1, of the full sample, 43 percent of Level 4 and 5 test-takers were

⁵Scores ranged from 310 to 390. The college cutoff was 350; students who scored 335 or below were required to take the ABE Diagnostic.

Figure 3.2

Math Test-Takers, by ABE Level, Houston Community College (HCC)



SOURCE: Calculations from placement data from Houston Community College and the College Board. Derived from data provided by the College Board. Copyright © 2013-2019 The College Board. (www.collegeboard.org)

NOTES: This sample includes all individuals with a first reported TSIA (Texas Success Initiative Assessment) score below 336 between February 1, 2015, and January 31, 2016. A total of 13,957 people took the TSIA during this window. Those scoring below a 336 were required to take the ABE test. A total of 5,552 (approximately 40 percent) out of 13,957 TSIA test-takers scored below a 336, thus also taking the ABE test. The percentages above each bar capture the percentage of students at each ABE level. Data include an individual's first TSIA and ABE score only, and includes all test-takers at HCC, regardless of subsequent enrollment.

female, with 32 percent missing gender data; the remaining students (approximately 25 percent) were male. This large gender gap may reflect differences in “missingness” by gender or also may reflect some national trends where females enroll in college at higher rates than males.⁶ Reflecting

⁶ Lopez and Gonzalez-Barrera (2014).

Table 3.1
Demographic Characteristics of ABE Test-Takers,
Houston Community College

Characteristic	All ABE Level 4 and Level 5 Test-Takers (1)	Level 4 (2)	Level 5 (3)
Number of test-takers	4,976	2,204	2,772
Female	43%	42%	43%
Gender missing	32%	36%	28%
White	6%	4%	7%
Black	31%	35%	27%
Hispanic	25%	17%	31%
Other race	6%	7%	5%
Race missing	32%	37%	29%
Low English proficiency	5%	8%	3%
English proficiency missing	33%	37%	30%
Single parent	10%	11%	9%
Single parent missing	33%	37%	30%
Took 4 years or more of high school math	34%	30%	37%
Years of high school math missing	48%	52%	45%

SOURCE: Data on gender, race, English proficiency, and single-parent status are from Houston Community College demographic datasets. Some race data and all data on high school math experience are self-reported from the College Board's placement data. Derived from data provided by the College Board. Copyright © 2013-2019 The College Board (www.collegeboard.org).

NOTES: Each cell presents the percentage of ABE test-takers. Data are pooled across cohorts 1 and 2, which includes all individuals with a first reported ABE score of Level 4 or Level 5 between February 1, 2015, and January 31, 2016.

the diversity of HCC, a total of 31 percent of Level 4 and 5 test-takers identified as black, 25 percent as Hispanic, 6 percent as white, 6 percent as another race, and again 32 percent did not report a race. Five percent of test-takers had low English language proficiency, and 10 percent were single parents, according to school records; for one-third, data on English and single-parent status were missing. Notably, there are differences in missing data across the two levels of ABE

test-takers, shown in Table 3.1, which may be due to Level 5 students enrolling more often and, therefore, having more complete demographic information.⁷

Course Enrollment Behavior

Table 3.2 describes the college and math course enrollment behavior for students who first scored at ABE Levels 4 and 5 at three different points in time within the study time frame: at the end of the first semester after taking the ABE assessment, the end of the second semester after taking the assessment, and by the end of the fourth semester.⁸ The first two columns apply to Level 4 and 5 ABE test-takers regardless of whether they actually enrolled at HCC. Columns 3 and 4 apply only to those students who enrolled in their first expected semester.

Unsurprisingly, students first scoring at ABE Level 4 were less likely to be enrolled at HCC, less likely to enroll in math at all, and less likely to enroll in their assigned math class than Level 5 students. This was true in the first semester and also up to two years after first taking the test. For example, columns 1 and 2 of panel 2 show that 40 percent of test-takers first scoring at ABE Level 4 and 33 percent of those first scoring at ABE Level 5 still had not enrolled at HCC by the end of the second semester after taking the ABE assessment. By the end of four semesters, the gap between students who originally scored at Level 4 and Level 5 is still apparent, with 35 percent of Level 4 and 29 percent of Level 5 test-takers still not enrolling at HCC. The high number of ABE test-takers who do not enroll at HCC is due, in part, to many high school students taking the test for diagnostic purposes and who may or may not have ever intended to enroll at HCC. Some of this drop-off also likely represents students who were interested in HCC (or college more generally) but still failed to enroll.

To better understand why test-takers decided ultimately not to enroll at HCC, MDRC administered a survey to low-scoring students who had enrolled in at least one ABE or continuing education class but decided not to reenroll at HCC for the fall 2016 semester, asking students to explain their reasons for not enrolling. Among students who responded to the survey, most cited financial reasons, the need to work, or family responsibilities. However, 15 percent of students cited reasons related to their math test scores and course assignments. Results from the survey need to be viewed with caution, however, as the response rate was low — under 10 percent.

⁷Percentages reported here differ somewhat from the descriptive statistics reported in the last report (Visher et al., 2017) because the sample here was defined more narrowly to identify students for inclusion in the regression discontinuity analysis; gender, English proficiency, and single-parent percentages were calculated among non-missing values only in the earlier publication.

⁸A student's first semester after taking the ABE assessment is fall 2015 for Cohort 1 and spring 2016 for Cohort 2. For Cohort 1 the end of the second semester is summer 2016. For Cohort 2 it is fall 2016. The end of the fourth semester is summer 2017 for Cohort 1 and fall 2017 for Cohort 2.

Table 3.2

College and Course Enrollment Behavior of ABE Test-Takers After One Semester, Two Semesters, and Four Semesters, Pooled Cohorts, Houston Community College (HCC)

Behavior	All Test-Takers		Enrolled Students	
	Level 4 (1)	Level 5 (2)	Level 4 (3)	Level 5 (4)
Number of ABE test-takers	2,204	2,772	1,046	1,444
(1) End of first semester after ABE assessment (%)				
Did not enroll at HCC	53	48	—	—
Enrolled at HCC, did not take any math	2	22	55	41
Enrolled, took Bridge only	12	2	25	3
Enrolled, took Foundations only	5	25	10	48
Enrolled, took both Bridge and Foundations	4	1	9	3
Enrolled, took other developmental math	0	1	1	2
Enrolled, took college-level math	0	1	1	2
(2) By end of second semester after ABE assessment (%)				
Did not enroll at HCC	40	33	—	—
Enrolled at HCC, did not take any math	25	21	40	29
Enrolled, took Bridge	26	5	45	8
Enrolled, took Foundations	18	38	32	62
Enrolled, took other developmental math	5	12	8	19
Enrolled, took college-level math	2	4	2	6
(3) By end of fourth semester after ABE assessment (%)				
Did not enroll at HCC	35	29	—	—
Enrolled at HCC, did not take any math	21	18	32	23
Enrolled, took Bridge	32	7	51	10
Enrolled, took Foundations	26	45	42	68
Enrolled, took other developmental math	10	21	18	29
Enrolled, took college-level math	6	11	9	17

SOURCE: Calculations from transcript and placement data from Houston Community College and placement data from the College Board. Derived from data provided by the College Board. Copyright © 2013-2019 The College Board (www.collegeboard.org).

NOTES: Cohorts 1 and 2 are pooled. A student’s first semester after taking the ABE assessment is the fall of 2015 for Cohort 1 and the spring of 2016 for Cohort 2. For Cohort 1 the end of the second semester is the summer of 2016. For Cohort 2 it is the fall of 2016. The end of the fourth semester is summer of 2017 for Cohort 1 and the fall of 2017 for Cohort 2. “Other developmental math” includes the second course in the developmental math sequence, Developmental Algebra, which was required only for students with STEM majors. The percentages in panels 2 and 3 do not sum to 100, as they capture enrollment outcomes across multiple semesters, over which period many students enrolled in more than one class. The sample for columns 3 and 4 remains constant across panels; students who did not enroll in their first expected semester are excluded from panels 2 and 3, even if they enrolled later.

Many enrolled students delayed taking math in their first semester. Approximately one-fourth of test-takers in both groups (26 percent for Level 4 and 22 percent for Level 5) enrolled at HCC in the first semester but did not enroll in a math course. This rate of delaying taking math is even more striking when one considers that 55 percent of *enrolled* Level 4 students and 41 percent of *enrolled* Level 5 students put off taking math (columns 3 and 4). If completing remediation in math early is important, as some argue, these numbers are cause for concern.

After four semesters, many students still had not enrolled in the math class associated with their ABE score or enrolled in math at all, with even more opting out among those at Level

4. By the end of four semesters, only 32 percent of Level 4 test-takers had enrolled in the Bridge course (column 1) and 45 percent of all Level 5 ABE test-takers had enrolled in the Foundations of Math course (column 2). If this sample is restricted to just those students who enrolled at HCC (columns 3 and 4), the gap between ABE Levels 4 and 5 students remains large. Approximately half (51 percent) of students at ABE Level 4 had enrolled in the Bridge course by the fourth semester, while 68 percent of the Level 5 students had enrolled in the Foundations of Math course. These results are consistent with an emerging pattern: ABE Level 4 students were less likely to enroll in math and specifically in the course associated with their ABE score than Level 5 students in their first semester, but enrollment was low for both groups.⁹

Among enrolled students in the sample, few had enrolled in college-level math by the end of four semesters. As expected, ABE Level 5 students were ahead of ABE Level 4 students, with 17 percent having enrolled in a college-level math course by the end of four semesters, compared with 9 percent of ABE Level 4 students. As described above, HCC administrators who were interviewed stated that students would pass the four-week Bridge course at the start of their first semester and then immediately enroll in Foundations of Math within the same semester. Table 3.2 shows that this successive enrollment pattern rarely happened. Only 9 percent of enrolled Level 4 students passed the course in their first semester and went on to enroll in the Foundations of Math course in the same semester. Interestingly, a total of 6 percent of enrolled Level 5 students took the Bridge course in the first semester, despite not being formally assigned to that course. Approximately half of these students enrolled in Bridge alone, and half enrolled in Bridge and Foundations together (as shown in Table 3.2, column 4). Findings from interviews and focus groups suggest that some students may have wanted a refresher course in basic math prior to taking the first developmental course or that they ended up enrolling in the course because there may have been confusion in advising.

The low number of students who transitioned as expected from the Bridge course into the Foundations course may be due to communication and procedural challenges, resulting in students not being aware of the opportunity or unable to find an available Foundations course section with open seats. This is corroborated by the field research, as HCC administrators who were interviewed described the substantial organizational restructuring that the college undertook during the first semester the Bridge course was offered. This restructuring included a district-wide change to split up the administration of the math department and developmental education, which resulted in some initial miscommunication and misunderstandings about the Bridge course and delays in assigning instructors to teach it. This also caused a temporary shortage of space in the Bridge course, a situation that administrators tried to remedy in the second semester by better aligning the sections of Bridge and Foundations courses.

⁹The Level 4 and Level 5 students received higher scores on retests at the same rate (7 percent during the period prior to their first expected semester, and 11 percent through spring 2016), so retesting does not explain why the Level 4 students were less likely to enroll in their originally assigned course.

Focus groups with students and instructors indicated that some students were not enthusiastic about being assigned to the Bridge course, which could help explain low enrollment.¹⁰ According to a few academic advisers, some students felt embarrassed to be at such a low math level and wanted to retest and wait to take math until they placed at a higher level, which some advisers encouraged them to do.

To summarize, four semesters after taking the ABE math assessment, ABE Level 4 students were still well behind ABE Level 5 students in terms of taking math courses. Among students who enrolled in their first semester after the test (fall 2015 for Cohort 1 and spring 2016 for Cohort 2), 68 percent of those assigned to the Foundations of Math course (ABE Level 5) had enrolled in this course after two years, compared with only 42 percent of those assigned to Bridge math (ABE Level 4). Even after four semesters, the Bridge course students had, on average, failed to catch up to the students assigned to Foundations of Math. Of course, assuming that the ABE assessment accurately reflects math abilities, the Level 4 test-takers were, by definition, less well prepared to succeed in math than those with Level 5 scores. Nonetheless, these data reveal that many students are making a priority of other courses over beginning to address their math requirements.

Table 3.3 examines the course enrollment and math course completion rates for students who enrolled for at least one semester at HCC and assesses outcomes after four semesters.¹¹ The two columns compare students who achieved Level 4 scores with those who achieved Level 5 scores. Among Level 4 students (column 1), 50 percent ultimately enrolled in the Bridge course by the end of four semesters. However, only 32 percent of Level 4 students eventually passed the Bridge course within that time frame. The pass rate among those who took Bridge was just 64 percent. Among all Level 4 students, 40 percent (567 students) eventually made it to the Foundations of Math course within four semesters, 35 percent (200 students) of whom enrolled in Foundations of Math — having skipped the Bridge course. Only 9 percent eventually enrolled in a college-level math course by that time. By the end of four semesters, 21 percent of all Level 4 students had passed Foundations of Math and 6 percent had passed a college-level math course. As mentioned previously, HCC offered one other developmental math course: Developmental Algebra, which was required for STEM (science, technology, engineering, math) majors after first completing Foundations of Math. Conditional on completing Foundations of Math, 65 percent of Level 4 students went on to enroll in Developmental Algebra.

As expected, Level 5 students progressed further through the math sequence over the course of four semesters, though their persistence through the math sequence was still low. Among Level 5 students (column 2 of Table 3.3), 63 percent had enrolled in Foundations of Math

¹⁰MDRC researchers attempted to recruit HCC students eligible for Bridge but who did not enroll in the course in order to better understand their reasons for not enrolling. However, none from this group agreed to participate in focus groups.

¹¹Panels 3 and 4 of Table 3.2 follow students who enrolled in the first expected semester and remained through four semesters. In contrast, Table 3.3 follows students who enrolled at any point.

Table 3.3**Course Enrollment and Passing Behavior of Houston Community College (HCC) Students Through Four Semesters, by ABE Level, Conditional on Enrolling in At Least One Semester**

Course Enrollment and Passing Behavior	ABE Level 4 (1)	ABE Level 5 (2)
Total number of ABE test-takers	1,425	1,979
Ever took Bridge (%)	50	9
Passed Bridge	32	7
Ever took Foundations (%)	40	63
Passed Foundations	21	33
Ever took other developmental math (%)	16	29
Ever passed other developmental math	11	19
Ever took other developmental math, among those who passed Foundations (%)	65	67
Ever passed other developmental math, among those who passed Foundations	47	45
Ever took college-level math (%)	9	16
Passed college-level math	6	11

SOURCE: Calculations from transcript and placement data from Houston Community College and placement data from the College Board. Derived from data provided by the College Board. Copyright © 2013-2019 The College Board (www.collegeboard.org).

NOTES: Cohorts 1 and 2 are pooled. Sample is restricted to students who enroll at HCC for at least one semester and is tracked through four semesters (a larger sample than columns 3 and 4 of Table 3.2). For Cohort 1 they are tracked through the summer of 2017 and for Cohort 2 through the fall of 2017. The pass rate for an individual course is the percentage passing over the percentage who ever took the course. For example, the pass rate for Foundations among ABE Level 4 test-takers is 52.5 percent (0.21/0.40). Passing Bridge Math is the equivalent of reaching ninth-grade math skills. The “among those who passed Foundations” rows are additionally conditional on a student passing the Foundations course. For ABE Level 4, the sample size is 294, and for ABE Level 5, the sample size is 661.

by the end of four semesters and 16 percent had enrolled in a college-level math course. Thirty-three percent of Level 5 students had passed Foundations of Math within four semesters compared with 21 percent of Level 4 students. With 11 percent passing college-level math, there was a 5 percentage point difference in the rate of Level 5 students compared with Level 4 students passing college-level math by the end of four semesters. In sum, very few students who first scored at either Level 4 or Level 5 were able to progress through even the first level of college math within the two-year follow-up period.

The Effect of Course Referral on Progress To and Through Developmental Math

In addition to the descriptive data presented above, this study endeavored to estimate the effect of being referred to the Bridge course versus being referred to the Foundations of Math course on subsequent student outcomes for students with similar math abilities. The goal was to use a regression discontinuity design to identify and estimate that effect. Under certain conditions, an RDD estimator is unbiased. After working with the data and understanding the implementation of the program, however, the research team determined that conditions

ultimately could not be met for the proposed analysis and, as a result, decided not to include the RDD analysis in this report.¹²

¹²A technical supplement detailing the attempted RDD analyses is available upon request by sending an e-mail to angela.boatman@vanderbilt.edu.

Chapter 4

Conclusion and Policy Implications

Community colleges across the country are experimenting with new approaches to serving students who enter college with math skills so low that they cannot meet the prerequisites for many college-level courses, including college-level math, as many students are not well served by traditional placement methods and developmental course sequences.¹ Many students fail to enroll in such developmental courses, and, when they do, fail to pass them — especially those with skills below ninth-grade proficiency levels. As a result, colleges are increasingly implementing alternatives to this model, including shortening the sequence, providing extra support to students, and allowing students to co-enroll in developmental courses and college-level courses.

This study examined a model implemented at Houston Community College (HCC) that required students to enroll in a four-week Bridge course to raise their math skills to the ninth-grade level before they enrolled in a full developmental math course. Starting in fall 2015, the Bridge course was offered to students whose math test scores ranged from the fourth-grade level to the eighth-grade level. Students who completed the four-week Bridge course had the opportunity to immediately enroll into the first course of the developmental math sequence to work toward raising their skills to twelfth-grade proficiency.

A descriptive analysis of student records for two cohorts of HCC test-takers in the 2015-2016 academic year yielded several findings about the behavior and outcomes of students who tested near the ninth-grade cut point (at Adult Basic Education [ABE] Diagnostic Levels 4 and 5), including enrollment in college, enrollment in math courses, and progress to and through developmental math.

1. **The new placement policy, which targeted students who tested below the ninth-grade level, affected one-fifth of students in the sample of placement test-takers.** Of the approximately 14,000 students who took the math assessment test, almost 40 percent scored substantially below twelfth-grade proficiency and were automatically administered the ABE Diagnostic to determine their math course placement. The majority of these (nearly 90 percent) tested at Level 4 and Level 5, corresponding to below and above ninth-grade proficiency, respectively. Level 4 students (along with the small percentage assigned to Level 3) were referred to the Bridge course — a change from the course they would have been referred to under the former policy. Level 5 students (along with the handful of students assigned to Level 6) were referred to Foundations of Math, the first full course in the developmental math sequence. The few students whose proficiency was assessed below fourth grade (Levels 1 and 2) were referred to workforce or other programs. In total, one-fifth of all Texas Success Initiative (TSI) test-takers were affected by the new assessment and

¹Adelman (1999).

placement policies by receiving a score (4 or below) that placed them below the cut-off point for developmental math.

2. **Many students did not enroll at HCC after taking the test.** One semester into the study period, 53 percent of students who first tested at Level 4 and 48 percent of students who first tested at Level 5 had not enrolled in HCC. By the end of four semesters, 35 percent of Level 4 and 29 percent of Level 5 test-takers had still not enrolled at HCC. Although some of these test-takers were high schoolers who did not intend to enroll, some of this drop-off also likely represents students who were interested in HCC (or college more generally) but still failed to enroll.
3. **Even among students who enrolled at HCC, many delayed taking math.** More than half (55 percent) of enrolled Level 4 students and 41 percent of enrolled Level 5 students did not enroll in a math course during their first semester. This finding is consistent with other research that has shown that developmental students tend to put off enrolling in math.
4. **Many students did not enroll in their assigned math course.** Although test-takers with scores at Level 4 were somewhat more likely to enroll in Bridge Math and less likely to enroll directly into Foundations of Math in the first semester, compliance with course referrals was generally low across both groups. After four semesters, many students still had not enrolled in the math class associated with their ABE score. By the end of four semesters, 51 percent of enrolled students who first tested at ABE Level 4 had enrolled in the Bridge course, while 68 percent of students who first tested at Level 5 had enrolled in the Foundations of Math course. A limited portion of this noncompliance may be due to students retaking the assessment test and being placed into a higher-level class; however, this applies to, at most, 11 percent of the sample who retested and received a higher score. Findings from the field research suggest limited awareness among advisers and some instructors about the department's intentions to have successful Bridge completers enroll in Foundations consecutively and within the same semester — which likely played a role in most students not knowing to do so.
5. **Many students did not complete the developmental course sequence.** After four semesters, a total of 21 percent of all Level 4 students had passed Foundations of Math and 6 percent had passed a college-level math course. Students originally testing at Level 5 fared only slightly better, with 33 percent passing Foundations and 11 percent passing a college-level math course.

Policy Implications

The descriptive results summarized above may help inform community colleges' decisions about options for serving students who enter college with very low math skills. The data and evidence presented in this report suggest that, although some students enrolled in the four-week Bridge

Course gained the math skills to prepare for the Foundations course, the majority of those students referred to the Bridge course did not enroll in the course, and those who did enroll did not necessarily move on to take or pass Foundations. The study reveals the difficulty of helping these low-scoring students. What do these findings mean for postsecondary policymakers and practitioners as they weigh their options for serving college applicants with math skills at the primary and middle-school levels?

Several implications for the field from this study are worth noting. First, many students who score below ninth-grade proficiency fail to enroll in college and, even if they do enroll, fail to enroll in their assigned math course. If the goal is to help students gain math literacy and move on to college-level courses, the first step — not taken by a surprising number of students — is to get them to enroll in math courses. Colleges could consider revising the “messaging” around the importance of taking the math course through traditional advising and orientation sessions, as well as through information provided on their websites and social media outlets. Colleges might also consider requiring students to enroll in developmental classes immediately upon entry or establish a default scheduling approach so that students have a narrower, yet clearer, set of courses that direct them through their intended majors or fields of study.

College decisions about how to serve students with low math scores can be informed by further research on the academic behaviors and outcomes of this group of students. The current study is purely descriptive; institutional researchers can conduct similar analyses of common characteristics tied to students who score low in math placement tests, common “stop out” points during their enrollment process, and the distribution of scores within and between the math placement cut scores. Additional analyses can inform decisions about how to structure placement guidelines, the number of seats needed to accommodate different groups of students, and instructor deployment.

Third, colleges already know that new programs and courses, especially those that deviate from the normal or typical offerings, often require more time than expected to fully implement. This study documents that familiar story. As found in the field research, students, instructors, and advisers were not initially uniformly aware of the new placement policies and program changes. This contributed to lower-than-expected enrollment rates in the Bridge course and still lower transition rates to the developmental course for those who passed the Bridge course. Clear vertical and lateral communication among the administration, advisers, instructors, and students might have alleviated this situation. In particular, access to high-quality advising that consistently communicates course requirements, sequencing, and options is essential for promoting student success generally and is particularly critical when a major change in placement rules such as this one is implemented, affecting so many incoming students’ chances at making it to and through developmental math and going on to earn their college credentials.

Appendix A

**College and Course Enrollment Behavior of
ABE Test-Takers After One Semester, by Cohort,
Houston Community College**

Appendix Table A.1

College and Course Enrollment Behavior of ABE Test-Takers After One Semester, by Cohort, Houston Community College (HCC)

Behavior	Cohort 1 (Expected Start Fall 2015)		Cohort 2 (Expected Start Spring 2016)	
	Level 4 (1)	Level 5 (2)	Level 4 (3)	Level 5 (4)
Number of ABE test-takers	1,490	1,926	714	846
Behavior at end of first semester after ABE assessment (%)				
Did not enroll at HCC	55	52	47	39
Enrolled at HCC, did not take any math	25	20	28	26
Enrolled, took Bridge only	10	2	16	2
Enrolled, took Foundations only	6	24	3	28
Enrolled, took both Bridge and Founda- tions	4	1	5	3
Enrolled, took other developmental math	0	1	1	1
Enrolled, took college-level math	0	1	0	1

SOURCE: Calculations from transcript and placement data from Houston Community College and placement data from the College Board. Derived from data provided by the College Board. Copyright © 2013-2019 The College Board (www.collegeboard.org).

NOTES: Cohorts 1 and 2 are pooled. A student's first semester after taking the ABE assessment is the fall of 2015 for Cohort 1 and the spring of 2016 for Cohort 2. For Cohort 1 the end of the second semester is the summer of 2016.

References

- Adelman, Clifford. 1999. *Answers in the Tool Box: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment*. Washington, DC: U.S. Department of Education, Office of Research and Improvement.
- Attewell, Paul A., David E. Lavin, Thurston Domina, and Tania Levey. 2006. "New Evidence on College Remediation." *Journal of Higher Education* 77, 5: 886-924.
- Bailey, Thomas, Dong Wook Jeong, and Sung-Woo Cho. 2010. "Referral, Enrollment, and Completion in Developmental Education Sequences in Community Colleges." *Economics of Education Review* 29, 2: 255-270.
- Developmental Education Working Group. 2014. *Developmental Education Working Group Report*. Topeka, KS: Kansas Board of Regents. Website: www.kansasregents.org/resources/PDF/3100-REPORT_DevelopmentalEducationWorkingGroup_June2014.pdf.
- Goodman, Madeline, Robert Finnegan, Leyla Mohadjer, Tom Krenzke, and Jacquie Hogan. 2013. *Literacy, Numeracy, and Problem Solving in Technology-Rich Environments Among US Adults: Results from the Program for the International Assessment of Adult Competencies 2012: First Look*. NCES 2014-008. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.
- Lopez, Mark Hugo, Ana Gonzalez-Barrera. 2014. "Women's College Enrollment Gains Leave Men Behind." Washington, DC: Pew Research Center. Website: www.pewresearch.org.
- Michael, Suzanne, and Heather McKay. 2015. *The Transformation of Colorado's Developmental Education Program: Observations and Findings*. Piscataway, NJ: Rutgers Education and Employment Center.
- Missouri Department of Higher Education. 2017. *Annual Report on Best Practices in Remedial Education*. Jefferson City, MO: Missouri Department of Higher Education and Workforce Development. Website: <http://dhe.mo.gov/cbhe/boardbook/documents/BestPracticesRemediationReport.pdf>.
- Senserrich, Roger. 2014. *Developmental Education Reform: Ensuring Success for All in Connecticut*. Hartford: Connecticut Association for Human Services.
- Texas Higher Education Coordinating Board. 2014. "TSIA ABE Diagnostic Test — Level Descriptors." Website: www.thecb.state.tx.us/tsi.
- Visher, Mary G., Oscar Cerna, John Diamond, Elizabeth Zachry, Kayla Reiman, and Dominique Dukes. 2017. *Raising the Floor: New Approaches to Serving the Lowest-Skilled Students at Community Colleges in Texas and Beyond*. New York: MDRC.

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