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# BUILDING BASIC MATH SKILLS

## Boot Camp at Tarrant County College

*Community colleges continue to increase their efforts to better serve students who enter their institutions with limited basic math, reading, or writing skills. In 2015, MDRC partnered with the Texas Coordinating Higher Education Board on a study to examine how colleges implemented state guidelines for students scoring below ninth-grade proficiency in math, reading, or writing on their course placement exams. This brief presents findings from a study of a “Boot Camp” program at Tarrant County College, which was designed to reinforce basic mathematics functions that prepare students for developmental-level courses. Findings from MDRC’s field visits revealed three special features that made the Boot Camp unique: computer-assisted, self-paced learning; a focus on individual learner progress; and in-class help from college-readiness advisors. The brief also provides reflections of the college’s staff and students who experienced the implementation of the Boot Camp program.*

**S**andy started taking classes at Tarrant County College (TCC), in Texas, in the spring 2016 semester.<sup>1</sup> Years after spending time in the workforce and starting a family, she now found that she needed to relearn basic math functions to continue advancing in her career as an allied health care provider, and she had concerns about what she would have to remember from back in high school. Moreover, she needed to balance the study time necessary to do well in her classes with her personal and family obligations. “I’m part time [in school], work part time, but full time at home...I have five kids, so...”

Sandy’s story is one of thousands that reflect the experience of many community college students who are employed while taking courses, and therefore must juggle their academic responsibilities with work and family priorities.<sup>2</sup> Their busy schedules often interrupt or delay the time necessary to complete what is, for many, an already lengthy path toward attaining a degree or certificate. Nationwide, about 75 percent of incoming community college students deemed as having limited academic preparation took developmental (or remedial) courses

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**1** “Sandy” is a pseudonym.

**2** The National Center for Education Statistics estimates that about two-thirds of all community college students are employed at least part time while taking courses, with many working 35 hours per week or more (2013).

during their college years, but those who could not complete their developmental course sequence were less likely to move on to college-level courses, persist through college, or earn a degree or credential.<sup>3</sup> Many who do begin the developmental math sequence, which sometimes includes three courses or more, struggle to pass even the first developmental course.<sup>4</sup>

In recent years, this pattern has fueled important policy and program changes affecting how community colleges serve the needs of incoming students who have limited basic math, reading, or writing skills. In 2013, the Texas Higher Education Coordinating Board (THECB) issued a set of policy guidelines for community colleges as part of the “Texas Success Initiative” (TSI) for assessing incoming students’ college readiness and for placing them into college-level or developmental courses. The TSI guidelines sought to reduce the number of developmental education courses that colleges offered — which at some colleges included four to five levels of developmental education — to two course levels. This action essentially eliminated the lowest course level of the developmental math sequence (which primarily served students with skills below the ninth-grade level)<sup>5</sup> and

introduced the policy guidelines in conjunction with a new “TSI Assessment,” which was designed to identify students whose skills were below college level.<sup>6</sup> The new policy recommended that all colleges use a standardized “cut score” (a minimum score, or cut-off point, for determining a student’s skill level) to assign students into three groups: those ready for college-level math (that is, twelfth-grade proficiency or higher), those with ninth-grade to eleventh-grade proficiency, and those with proficiency below the ninth-grade level. Students who scored below the ninth-grade level on the TSI Assessment were given an additional test called the “Adult Basic Education (ABE) Diagnostic,” which divided test-takers into six different levels instead of only three — ABE Level 1 (performing below a second-grade level) through ABE Level 6 (performing at a twelfth-grade level),<sup>7</sup> with the state recommending a different offering for students at each level.

In 2015, MDRC partnered with THECB on a study to examine how colleges in Texas implemented state policy guidelines for students whose scores on their math assessment placed them below the ninth-grade level. During the 2015-2016 and 2016-2017 academic years, MDRC conducted field visits

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**3** Xianglei Chen and Sean Simone, *Remedial Coursetaking at US Public 2- and 4-Year Institutions: Scope, Experiences, and Outcomes*, NCES 2016-405 (Washington, DC: National Center for Education Statistics, US Department of Education, 2016).

**4** Shanna Smith Jaggars and Georgia West Stacey, *What We Know About Developmental Education Outcomes*, Research Overview (New York: Columbia University, Teachers College, Community College Research Center, 2014).

**5** THECB’s definition of ninth-grade-level math skills is the ability to perform basic math functions with whole numbers, decimals, and fractions, and to interpret simple algebraic equations, tables, and graphs. [OK/correct as edited? If no, please modify as needed. Wording wasn’t quite clear as originally written.]

**6** College for All Texans, *Texas Success Initiative Assessment* (Austin: Texas Higher Education Coordinating Board, 2017).

**7** The term “ABE” — which stands for “Adult Basic Education” — is not necessarily accurate here, since neither the test nor the related programs are supported by Adult Basic Education funding. ABE programs have traditionally been reserved for those without a high school diploma, whose funding and guidelines generally differ from those for low-skilled students in college who are pursuing a degree or certificate. The THECB adopted this terminology during the early phases of formulating the policy, and it is used here to stay consistent with the policy and program changes that the state was making.

to TCC to research the implementation of its “Boot Camp” program — a voluntary, free, noncredit program offered by the college to develop and reinforce basic mathematics skills that students need for developmental math courses.<sup>8</sup> MDRC researchers interviewed TCC senior administrators and conducted focus groups with instructors, advisors closely associated with the Boot Camp program, and students like Sandy who registered for the program.

This brief presents findings from MDRC’s study of the Boot Camp program at Tarrant County College. The purpose of this brief is to highlight the key aspects of the Boot Camp model implemented by TCC to direct those students who score under ninth-grade-level proficiency into courses that could help them build their basic math skills before enrolling in a developmental math course.

## TCC’S BOOT CAMP DESIGN

As a result of the THECB policy guidelines, TCC and other community colleges directed students like Sandy to programs on campus that could help them master basic math functions, while also eliminating the need to offer multiple levels of required developmental math courses. TCC chose to offer a Boot Camp program for its incoming students whose test scores were below the ninth-grade level — that is, ABE Levels 4 and below. TCC directed those students who scored at the ninth-grade level or above to enroll in the first of the three levels of developmental math.

The Boot Camp was designed to increase and reinforce basic mathematics skills — as well as reading and writing basics if needed — in order to better prepare students for developmental-level course curricula.<sup>9</sup> Students in Boot Camp were required to navigate online module lessons that focused on the four math operations (addition, subtraction, multiplication, and division) and basic arithmetic (fractions and decimals).<sup>10</sup> They could decide which module lesson to start with, although some higher-level modules, such as basic fractions, required a solid understanding of the more basic modules. After completing each module, a student automatically received an assessment that was embedded in the program software. Students who passed the assessment could proceed to the next module; if they did not pass, they were directed to repeat the module lesson. After successfully completing all the Boot Camp modules, students were given a post-Boot Camp assessment test to determine whether they were ready for developmental math.

Although students registered for Boot Camp “sections” that took place during blocks of one and a half to two hours — much as they would for college-level or developmental-level credit course sections — the Boot Camp sections were open entry and open exit, meaning that students could start the program at any time after the beginning of the semester and remain for however long they needed to reach ninth-grade proficiency.<sup>11</sup> If they scored at the ninth-grade level or higher in their post-Boot Camp assessment test early enough in the semester, they could enroll in the lowest level of developmental math in the same semester, thereby

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**8** Since the Boot Camp was noncredit and was not an official academic course at TCC, students that registered could not use the program to count towards degree requirements, transfer credit, or financial aid eligibility.

**9** Students could take other, non-math developmental courses or college-level courses for which they were eligible while enrolled in Boot Camp, as some did have higher levels of reading or writing proficiency.

**10** TCC’s Boot Camp program used the Plato instructional software to deliver course content; see <http://info.plato.com>.

**11** Boot Camp was offered during blocks of one and a half to two hours in the TCC course schedule. Although students had to register for a specific day and time, they were permitted to use the lab any time it was open.

in theory gaining the opportunity to fulfill their remedial needs faster than under the old system, — in which multiple semester-long developmental math courses were required and — could take two or even three semesters to complete. Moreover, students who did not reach the ninth-grade level in one semester were free to take more time as needed. The course was tuition-free but did not offer college credit or count toward financial aid eligibility.

Boot Camp sections took place inside computer lab classrooms across the five TCC campuses. Students had to register for, and were expected to, attend the lab on a specific day and at a specific time, although they were also permitted to use the lab anytime it was open and seating was available. Each section had one math instructor and one reading instructor available in the lab to assist students as they worked. The goal for students was to master all four basic math operations and to perform basic fraction and decimal operations. Instructors were tasked with helping students to determine areas where they had mastered content and areas where they needed more attention to reach mastery. “College-Readiness Advisors” were also assigned to work with Boot Camp students during and after class to teach them test-taking strategies and to discuss their educational and career pathways, and to encourage students to enroll in and regularly attend Boot Camp and refer them to academic and student services on campus or in the local community.

Findings from MDRC’s field visits revealed three special features that made the Boot Camp unique and set it apart from other TCC offerings: self-paced learning, a focus on individual progress, and help from the College-Readiness Advisors. These features are described in the following pages, along with the reflections of the TCC staff and students who experienced the implementation of the Boot Camp program.

## SELF-PACED LEARNING

The Boot Camp program was designed to allow students to work at the speed and intensity that was most conducive to their making progress and building their skills. Time in the lab for Boot Camp sections was flexible, but for enrollment purposes, students still needed to formally register for one Boot Camp section that best fit into their overall schedule. While they were expected to primarily attend Boot Camp and work on the associated lessons during their assigned section times, students were also permitted to attend any morning, afternoon, or evening sections to work independently on their modules if space and computers were available. Some students who enrolled in Boot Camp seemed to appreciate the chance to adjust their lab time according to their unique schedules. One student noted, “If I have more homework, then I come back [to the lab] at other times, like evenings or whenever else I might have time.” Another explained, “If you get out of one of your classes early, most of the teachers that are in the [morning] sections will allow you to get an extra hour in [the lab].”

Because Boot Camp was an open-entrance/open-exit, self-paced program, students registered for sections as late as the last month in the semester. They could begin and eventually complete the program before the end of the semester, or theoretically leave the program at any point in the semester if they believed that they had mastered the content needed to retake and pass the TSI placement test. For instance, students could choose to retest and possibly place into the next level of math — typically the first developmental math course — after only one week in Boot Camp, or at any point thereafter. Some students who were interviewed noted the convenience of not always having to attend the program during their designated days in the lab, which enabled them to accommodate any changes to their work schedules or have time avail-

able for job interviews. As one Boot Camp student put it, “The flexibility is just great.”

While the program was open to anyone scoring below a ninth-grade proficiency level, some advisors considered the course to be of special benefit to older students in particular (if their scores made them eligible for Boot Camp) — like Sandy, whose story begins this brief — who were returning to college or coming in for the first time after years in the workforce. A TCC advisor described the advantage that the Boot Camp’s flexible model afforded to returning students in this way:

*For those adult learners who are returning, maybe it’s been 15 years since they’ve been in school, haven’t used some of those skills in a while, they need to brush up. The ones that come in third-, fourth-, fifth-grade level, they’re going to be open entry and open exit for quite a while before they get there.*

Another advisor noted the course’s role in lifting students’ spirits for eventually completing their math requirements:

*I’ve had students [in Boot Camp courses] come to me and say, “You know what? I attended TCC years ago and I couldn’t get through the math. And so now I can. I have hope that I may be able to make it through math and graduate.”*

## A FOCUS ON INDIVIDUAL PROGRESS

**A**s mentioned earlier, TCC administrators designed the Boot Camp course so that two instructors could be available inside computer labs to help students with the online lessons and to interpret module assessments that summarized how well a student mastered particular areas of basic math competency and identified which areas needed further attention.

Boot Camp instructors noted that the computer-generated assessments offered each student the opportunity to make improvements in areas of math where they struggled most, thereby making a “program that’s fit just for them.” Boot Camp students who were interviewed confirmed that their Boot Camp instructors helped them interpret their diagnostic assessment scores so that they knew which modules to go back to and attempt more practice problems. Some students mentioned the importance of having instructors on hand in the lab to explain or clarify their assessment scores or the skills that the online program recommended they further hone. When asked how his instructor helped him, one student stated, “Wherever you’re struggling, that’s where you work. They’re not going to mess with the things that you already know about. They’re just going to have you concentrate on the things that you need to work on more.” Added another, “It’s custom[ized] to you, because no matter what subject you’re having difficulty with, [they] will help you with it and improve your skills more than what you already have done.”

The diagnostic assessments provided within each module lesson also gave instructors a reference for how prepared students were to test into a higher level of math. Boot Camp instructors reviewed the list of recommended module lessons with students from the assessment summaries that were generated after a student attempted a module test. Since each module assessment indicated how close a student was to scoring above the ninth-grade proficiency level, Boot Camp instructors encouraged students who scored close to the ninth-grade level to retake the TSI placement exam so they might test out to the next level. Recalling how his Boot Camp instructors approached him about progressing to the next level, one student explained, “They told me that if I can brush up ... then when the next semester comes along, I could pass the [placement] test and get into college [level]. They just pointed me in the right direction. I’m so grateful for it.”

## HELP FROM COLLEGE-READINESS ADVISORS

College-Readiness Advisors were assigned to contact students who were eligible to register for Boot Camp (based on their score of Level 4 or below on the ABE test), and each student in the Boot Camp was assigned to an advisor. Along with the task of recruiting eligible students like Sandy to enroll in the Boot Camp, the college-readiness advisors also encouraged students to adopt good academic habits and to attend Boot Camp regularly. These advisors monitored the timing of enrolled Boot Camp students' course sequences (that is, how long after enrolling they began the course), followed students' progress through the program's online module assessments, and provided additional academic and career referrals to other campus or community services when needed.

In the Boot Camp labs, the college-readiness advisors made 15-minute presentations at least three times during the semester — right at the beginning, right before midterms, and right before finals — that focused primarily on honing academic skills, identifying campus resources, and registering students for the subsequent semester, respectively. Most advisors attended Boot Camp sections at least once a week to check in with students and with the instructors to find out whether additional guidance or service referrals from them were needed. Advisors were also available to meet with Boot Camp students outside of class to enroll them into other campus services and to help them make informed decisions about course planning for future semesters.

One of the unique responsibilities that the college-readiness advisors had was to offer individual guidance to students about the academic options that awaited them once they successfully completed Boot Camp, such as deciding what partic-

ular math course to take — that is, either moving toward the developmental math sequence or taking a different pathway toward certificate programs that may not require more math or may fit their career interests better. One advisor described how she works with Boot Camp students to “present to them the various educational options that they have here at TCC — certificates, technical associate’s degrees, transfer degrees — making sure that they know all the different things they can do here.” Some administrators spoke about how the advisors provided students with guidance on career pathways and “stackable” certificate or degree paths — which consist of multiple, sequential certificate or degree awards that allow students to earn successively higher-level credentials.<sup>12</sup>

Many students in the Boot Camp program found their assigned advisors helpful with obstacles or barriers they experienced both in and out of class, such as helping them find additional financial support or helping them enroll in veteran or disabilities services that were available on campus. A few students mentioned that their advisors also provided additional resources that they may not have been aware of: “Sometimes she’s sending us a scholarship opportunity, workshops, and everything going on around the campus. She makes sure everybody [in class] got her message. And she is communicating in class, which is really very helpful.”

## IMPLEMENTATION CHALLENGES

While the Boot Camp program did provide several advantages to students — flexibility, customized guidance, and additional services — the implementation of the program did not occur without some challenges. For one, advisors and instructors mentioned how they struggled to “sell” the Boot

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<sup>12</sup> Thomas Bailey and Clive R. Belfield, *Stackable Credentials: Awards for the Future?* CCRC Working Paper No. 92 (New York: Columbia University, Teachers College, Community College Research Center, 2017).

Camp to students — which, unlike developmental courses, was not required, given that it was a noncredit program.<sup>13</sup> Thus, for many students, according to one advisor, taking a Boot Camp course was “like taking a class that doesn’t count.” Some advisors also pointed out the difficulty of convincing students to take Boot Camp because many of them needed to reach a certain number of credited hours in the semester to maximize their financial aid amount. Despite regular encouragement by both instructors and advisors, the college had difficulty keeping students enrolled through successful completion, given students’ general reluctance to treat the noncredit Boot Camps as they would a credited course.

Some advisors mentioned that less individual help was available for students during the more fully enrolled morning Boot Camp sections, for which most students registered at the start of the semester. Because only two instructors were available in the lab at any given time, students in the earlier sections, which typically consisted of 20 students or more in the lab at the same time, received less individualized attention. Conversely, the afternoon and evening sessions, which regularly had far fewer students in attendance, offered students more time to interact and work with their instructors. The more crowded morning sessions also posed some difficulties for instructors, given the wider range of skill levels that Boot Camp students represented, as opposed to other courses in which most students had similar skill levels.

Finally, although successful Boot Camp students finished the program before the semester ended and scored at the ninth-grade level or above when they retook the TSI test, many still had to wait to enroll in the first developmental math course until the start of the following semester because of developmental sections already being filled by the middle of the semester, thus leaving them a gap

of time. Although instructors tried to encourage these “early completers” to stay in the Boot Camp course through the end of the semester, students had no real incentive to do so, thereby risking a decline in their newly acquired math skills.

## CONCLUSION

Despite some implementation challenges, TCC administrators considered the Boot Camp program as a successful venture for adhering to the state policy guidelines for revamping assessment and placement practices and for providing incoming students with the additional help they needed to be successful in their transition (or returning) to college. One administrator surmised that many students would have otherwise “dropped out and stopped going, but they have the option of Boot Camp and they have instructors with the patience to work with them.”

Offering students the opportunity to sharpen their basic math skills at their own pace, along with additional supports that provided customized learning (via the module assessments) and guidance (via the college-readiness advisors), the Boot Camp program served to be more responsive to the varied math competency levels and educational goals that Boot Camp students embodied. And for students like Sandy, whose story began this brief, the extra convenience and attention that the program provided allowed her to simultaneously receive both old and new math knowledge. As she reflected,

*I can't do this by myself. In order for me to progress and move forward, I've got to get help. So, I thank God for the Boot Camp program, because it's given me the opportunity to better myself and to pursue what I've been trying to get for many, many years.*

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<sup>13</sup> Developmental education courses were required for some students, whereas Boot Camp is completely voluntary. In addition, some developmental education courses are credit-bearing, which means they count toward financial aid eligibility.

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