



Best Practices, Innovation, and Success in a Texas Star Award Developmental Education Program

By C. Denise Lujan & D. Patrick Saxon

The University of Texas at El Paso (UTEP), located in one of the largest binational communities in the world, is home to a majority Hispanic student population. Many of these students are the first in their families to attend college. UTEP and its Developmental Mathematics Department serve an approximately 80% Hispanic population (UTEP, 2017). UTEP's Developmental Mathematics Department has an annual enrollment of approximately 1,000 students and reports to the Office of the Provost (Lujan, 2017). The department's administration supports the university's goals of access and excellence by offering new and creative approaches to preparing students for academic success. The Department is committed to providing students an opportunity for efficient completion of developmental math requirements and preparing them for success in college level math.

The faculty in the department work to design individualized paths for students to complete math requirements. They also provide various means of academic and affective support. Developmental education support for math students begins prior to entrance into UTEP and continues to completion of their first college level math course. The department offers some unique approaches to assisting students with developmental mathematics courses. These practices are relatively new and innovative, and they have proven themselves in the form of increased student success rates.

In 2014, the program was honored with The Texas Higher Education Star Award. This award was established by the Texas Higher Education Coordinating Board (THECB; 2017) in 2001 to recognize exceptional contributions toward achieving one or more of the goals of the long-range Texas higher education plan, *Closing the Gaps by 2015*.

The Path to Program Improvement and Student Success Data

In 2010, administrators in the Developmental Math Department made a conscious choice to address the issue of student success directly by taking a more holistic approach in their work with students. With the backing of the Provost's Office, nearly every aspect of the program was critically reviewed, and many changes were made. Among the changes were

- new mission and vision statements;
- revised course descriptions;
- redeveloped curricula and content;
- new programs and student services;
- a redefined role of faculty from lecturers to coaches; and
- new standards for faculty interaction with students.

Results were achieved by taking a slow, progressive approach. New programs and services were piloted before being implemented on a large scale. The performance of these programs was monitored and evaluated by program faculty. Faculty development was emphasized as an imperative for success, so professional development became a priority.

Faculty were provided with coaching and mentoring training, were engaged in team building workshops, and were provided opportunities to cross train by attending classes taught by other faculty. An evaluation tool was developed to collect information from students regarding the faculty and the new programs, laying the foundation for ongoing, systematic formative evaluation.

By designing and implementing innovative programs and putting student success as the benchmark measure of importance, pass rates in developmental math have substantially increased (See Table 1). Pass rate percentages have increased by about 39% for Beginning Algebra from 2009 to 2013 and by approximately 15% for Intermediate Algebra from 2009 to 2015. The department's administration has found that embracing innovation, offering a range of student-centered solutions, and purposefully looking for ways to assist students in overcoming challenges have increased success rates in developmental mathematics.

Table 1

<i>UTEP First-Time/Full-Time Student Developmental Math Pass Rates by Course and Year</i>							
Class	2009	2010	2011	2012	2013	2014	2015
Beginning Algebra	54%	50%	54%	70%	75%	NA	NA
Intermediate Algebra	65%	64%	68%	75%	87%	78%	80%

Practices Attributable to Program Success

As seen in recent years, the UTEP Developmental Mathematics Program has substantially improved. There are several practices now in place that have likely contributed to program success. This report lists and describes those practices.

Diagnostic Assessment, Individualized Instruction, and Mastery Learning

All students advised to take developmental math receive course work based on the results of their initial skills assessment and tailored to their individual learning needs and preferences. The ALEKS® system, which applies adaptive assessment and principles of mastery learning, is used for assessment and teaching (McGraw Hill Companies, 2016). The system determines quickly and precisely what students know and what they need to learn. Then an individualized learning path with embedded mastery level criteria is devised for the student. So students entering with developmental math needs are diagnostically assessed and given a unique starting point for skills development. Because of this individualized path for learning, instructors can create timetables for students to complete courses, and the contact hours can be adjusted. Furthermore, strict policies are developed that emphasize student responsibility and promote time management.

Final exams for students in developmental math are also available on an individualized basis. Finals are offered twice a month in the mathematics laboratories. Students who complete their work early may take the final

immediately; and students who fail the final may redo the work and retake the final. Students who stick with the program and complete at least 90% of their instructional plans are highly likely to pass the final.

These components of the program are supported by research. Tong, Saxon, Boylan, Bonham, and Smith (2012) reported that McGraw Hill Companies, the producer of ALEKS® software, demonstrated the product's efficacy in a few single-institution studies. The company claimed that students using the product (versus those not using it) had substantially higher pass rates in mathematics. They also showed that student performance for ALEKS® users was higher than the national average in general studies math, and that pass rates were in the 90th percentile for students using the product in a self-paced learning environment.

Other principles of the UTEP model are also supported by the research. Kulik and Kulik (1991) reported that about 60% of all studies available at that time showed significantly higher test scores for students in individualized instruction environments. In meta-analyses of about 40 areas of educational research, Kulik and Kulik (1991) described a stellar record of results when applying mastery learning procedures. They stated "Very few educational treatments were associated with achievement effects as large as those produced by [mastery learning]" (p. 16). This success was attributed to student placement based on assessment results, frequent testing for learning, and achievement of mastery criterion.

Clearly Defined Attendance Policy and Course Progression Benchmarks

Developmental math students may miss up to two weeks of class before being dropped. However, they are allowed to make up six hours of absences. If students miss class, it is their responsibility to arrange for and make up the absence. Their options include attending another class section taught by their instructor, attending a section taught by another faculty member, or going to the laboratory for tutoring. This policy seems effective for motivated students that experience conflicts with attendance, such as work-related duties, family, and health issues.

The importance and purpose of attendance policies in developmental classes are debated in the literature (Higbee & Fayon, 2006; Higbee, Schultz, & Goff, 2006). Higbee and Fayon (2006) pointed out in their research, however, that attending class does have an impact on student performance. They also reported that developmental education classes with no attendance policies tended to have substantially high absenteeism. Thus, the flexibility afforded to students in the UTEP developmental math program seems beneficial, especially in the context of the clear expectations for class attendance.

In addition to having clear expectations for attendance, the UTEP program has clear performance expectations. Boylan (2002) documented the importance of setting and communicating classroom and program expectations as a best practice in developmental education programs. Particular areas of concern with regard to student expectations at UTEP are setting semester-long benchmarks for course content completion percentages and weekly online hours of course engagement. The benchmarks are based on entering assessment scores and are provided to the student at the beginning of the semester. Students must meet, at minimum, one of the benchmarks to remain on target. Their progress is tracked closely at the classroom and department levels. Students that miss benchmarks in both measures for two weeks in a row are dropped from the class. Historically at UTEP, students who get behind will fail the course. By having clear expectations and a strict drop policy, students are encouraged to stay on track and complete their work.

For students that have been dropped from developmental education, there is one recourse. Though they have been dropped, they may continue working on their course. If they complete their course work, they may take their final exam. If they pass this exam with a 70% or better, they are reinstated and given a passing grade. This policy has been in effect since Fall 2012, and during this time approximately 20% of dropped students

were reinstated. Although this may not seem particularly substantial, for those who finish there are multiple benefits. They include keeping financial aid intact, advancing to the next math course, and continuing progression towards a degree. In many cases work, sick children, or other life-related issues get in the way of students completing their course benchmarks. The reinstatement policy allows faculty to be strict on dropping students but flexible in working with those who chose to earn their way back to course completion.

Faculty Coaching and Mentoring of Students

Another important component of the UTEP model is an emphasis on faculty advising, coaching, and mentoring of students. Some primary discussion points include course progression, topics completed, time online, time management, number of hours working, and goals such as progression towards degree completion and continued full-time enrollment. This program had initial support from the UTEP Human Resources Department which provided coaching and mentoring training for faculty. The coaching element was based on a broader employment and life skills approach (Kimsey-House, Kimsey-House, Sandahl, & Whitworth, 2011). This approach appears to have manifested in faculty applying more creative and individualized approaches with students. Some examples include

- allowing a student who has completed a substantial number of hours on the individualized laboratory component, but is progressing slowly, more time to complete the work;
- offering (or requiring) a student who is falling behind the ability to attend other course sections in order to get caught up;
- lecturing in a flexible manner to ensure student learning and tailoring instruction to small student groups with particular skills needs;
- working with students to structure a weekly laboratory time completion calendar; and
- scheduling tutoring time with students who fall behind.

Faculty are consistently in contact with students via email, text, and phone about their attendance and progress. They provide encouragement, program and class information, and warning notifications when students are not passing and in danger of being dropped.

Communication is vital to student success in the program. All students provide the faculty with their phone and email information, the number of credit hours they are taking, and number of hours they are working. With this information, faculty can determine how busy students will be during the semester and work closely with them to plan and monitor progress.

Faculty involvement in advising and mentoring and its contribution to student success has support in the research literature. In Tinto's (1993) proposed retention model, he concluded that a student's sense of belonging is directly related to his or her decision to remain in school. He surmised that the sense of belonging is increased or decreased through interaction with the academic environment of the college. Advising, coaching, and mentoring are, therefore, important interactions. In earlier work, he also concluded that out-of-class contact between faculty and students had powerful positive effects on the persistence of at-risk students (Tinto, 1975). Pascarella and Terenzini (1991) described a richly interactive academic relationship whereby students viewed faculty as *role models* for learning rather than simply experts teaching in the classroom. Lending support to the thesis that faculty-student interaction benefits students is Astin (1977) who reported, "Student faculty interaction has a stronger relationship to student satisfaction with the college experience than any other variable, student characteristic, or institutional characteristic" (p. 223).

Extender Program

The department provides a two-week extension at the end of the semester for students who fail the final exam or do not complete their work. These students can retake the final exam and/or continue working on their course assignments. This program, now in operation for over

five years, was developed in conjunction with the UTEP Registrar. It is a Non-Course Competency-Based Option (NCBO). NCBO's are flexible academic interventions approved by the Texas Higher Education Coordinating Board (THECB) for formula funding. They allow for individualized instruction that is tailored to account for content that students have already mastered and to target and accelerate the instruction needed to master areas of weakness (THECB, 2014).

The requirements to enroll in this program are not considered lenient. Students must demonstrate substantial effort in order to qualify. The requirements for enrollment in the Extender Program NCBO are as follows:

- Students must have completed 55% of their math topics by the end of the semester.
- Students must have completed 55 hours of the laboratory component in the same semester.
- Students must attend the Developmental Math Lab a minimum of three hours per day during open lab time. They must attend until they have taken and passed the final exam.
- Students must complete 90% of their math topics, take a final exam, and pass it with 70% or better by the end of the Extender Program period in order to receive credit.

As noted, the program requires planning and coordination with the Registrar. The following are logistics of the program:

- Students receive a failing grade for their current semester course. Upon completion of their work in the Extender program, a grade change form is processed, and a failing grade is changed to passing.
- Students are registered in the program by faculty and the Registrar.
- Students receive a grade of either satisfactory or unsatisfactory for the program.
- The grade appears on their transcript and serves as documentation of the prerequisite for their next math course.

The program is of obvious benefit for students that have invested time and effort in the course but wind up in need of some flexibility in order to finish successfully. Prior to this program, some students would simply fail and be required to retake the course. With the advent of this NCBO, students also benefit with regard to expense. UTEP funds this program at approximately \$8,000 for faculty salary or approximately \$65.00 per student. The rates for participation, passing, and student cost savings are provided in Table 2.

Table 2

<i>Results of 2-Week Extender Non-Course Competency-Based Option</i>					
Term	Students eligible for NCBO (n)	Students who attended NCBO (n)	No. that Passed (n)	Pass Rate	Cost Savings to Students
Fall 2011	240	181	130	72%	\$97,500
Spring 2012	106	88	81	92%	\$60,750
Fall 2012	168	153	132	86%	\$99,000
Spring 2013	142	102	83	81%	\$62,250
Fall 2013	161	140	115	82%	\$86,250
Spring 2014	73	63	55	87%	\$41,250
Fall 2014	116	110	89	81%	\$66,750
Spring 2015	50	40	30	75%	\$25,350
Fall 2015	152	109	107	98%	\$90,415
Spring 2016	34	29	21	72%	\$17,745

Note. Tuition for course estimated at \$750

Though research investigating the longer term learning outcomes of this NCBO is not available, certain benefits to students are noteworthy. The noted cost savings would obviously be of benefit to financially disadvantaged students. Those on financial aid would spend less of their funding on this particular area of college preparation. The program also contributes to lessening the attrition rates of developmental math students

at UTEP. Bailey, Jeong, and Cho (2009) reported that 29% of students that fail a developmental mathematics course exit the developmental course sequence. As the UTEP statistics show, substantial numbers of students that would otherwise fail enroll in the extender program. Pass rates for the program are consistently high as well, ranging from 72 to 92%.

Mad Dog Math Summer Bridge Program

The Math Department offers a preparatory bridge program to first-time freshmen. The Mad Dog Math (MDM) summer bridge program operates primarily to reduce the time to degree by moving students through developmental math in the summer prior to fall enrollment. Successful students in the MDM program are allowed to enroll in a higher developmental math course or a college-level math course during their first freshman semester. The program is designed to focus on the individual needs of learners. The instruction is individualized, and the content is targeted as such to provide a strong foundation in mathematical concepts in weaker student skill areas.

The program runs from mid-June to mid-August following the UTEP new student orientation schedule each summer and has a rolling start and end. The first group of students starts after completing the first orientation week. The second group of students starts after completing the second week of orientation, and so forth. There is a multi-step process to determine which students are eligible for the MDM program. It begins with students taking the skills assessment test at orientation. If placed into developmental math, students can attend a six-hour review course. After the review, they can retake the assessment test. Once receiving their second assessment exam results, they receive advising. The MDM program is then explained to them in detail, and interested students can begin the program the next day.

A key element of the program is guidance and individually-paced learning using a technology-based laboratory component (ALEKS®). Initially, faculty assist students in registering and learning the software program. Students then start working on their initial assessment with the goal of completing it on the first day. Thereafter, students are required to attend the lab for a minimum of seven hours per week and work an additional seven hours per week on ALEKS® at home.

The program is offered at no cost to students. They receive an access code to the laboratory software and a parking permit that is \$35 in value. It has been estimated that faculty salaries for the program are about \$28,000. The cost for the software access is \$3,500. As of 2015, the MDM program had operated for seven years and served nearly 1000 students. It has been estimated that those who participated and completed the program saved about \$492,000 in tuition costs. Results of the MDM program and subsequent college-level mathematics are provided in Tables 3 and 4.

Table 3

<i>Results of the Mad Dog Math Summer Bridge Program for Developmental Math by Year</i>									
MATH 0310 Beginning Algebra	2007	2008	2009	2010	2011	2012	2013	2014	2015
No. Students	54	42	40	44	31	60	82	NA	NA
No. Completed	36	38	32	24	22	39	72	NA	NA
% Completed	67%	90%	80%	55%	71%	65%	88%	—	—
MATH 0311 Intermediate Algebra	2007	2008	2009	2010	2011	2012	2013	2014	2015
No. Students	47	56	135	70	80	71	52	29	105
No. Completed	35	44	88	44	61	60	61	25	95
% Completed	75%	79%	65%	63%*	76%	85%	85%	86%	90%

Table 4

<i>Pass Rates in First Attempt at College Level Math for Mad Dog Math Students by Year</i>									
Course	2008	2009	2010	2011	2012	2013	2014	2015	
MATH 1319 Math for Liberal Arts	100%	100%	67%	50%	100%	67%	100%	50%	
MATH 1320 Math Soc. Sciences	87%	69%	88%	83%	95%	88%	84%	72%	
MATH 1508 Pre-calculus	97%	71%	69%	76%	87%	83%	83%	73%	
STAT 1380 Math for Education	NA	NA	100%	100%	NA	NA	NA	100%	

All students that participate in the MDM program are first-time freshmen, and their demographics mirror the UTEP student population. They are nearly 80% Hispanic and average 18.2 years old. Forty-three percent have a family income of less than \$20,000, and a majority of them work while enrolled in school. The majority are first-generation college and speak English and Spanish. Some of these characteristics are associated with lower success in college outcomes, and the MDM program is an intervention designed to promote equity with regard to those outcomes. It appears to be working, as students completing the MDM program have a reasonably high chance of succeeding in the next higher level mathematics course.

The MDM bridge program may be promoting what Jenkins and Bailey (2017) referred to as gateway momentum. This is the importance of (among other items) students completing college-level math requirements in their first year. Doing so leads to substantially higher college graduation rates. Jenkins and Bailey (2017) recommended that colleges apply acceleration strategies for developmental education in order to promote gateway momentum. The MDM program appears to offer students a quick, targeted path for completing developmental education requirements prior to enrolling in college.

Discussion and Conclusion

In order for the UTEP developmental math faculty to implement these innovative programs, they have worked collaboratively with several other areas of the college. These nontraditional programs have required establishing working relationships with the provost, registrar, testing center, and advising offices. Boylan (2002) described the importance of effective coordination of developmental education with other campus services. This is especially the case for the effective development of programs that are outside the traditional scope of a semester-based course. In the case of UTEP, some courses now begin prior to the semester and others extend past the typical term. These require unique recruiting, registration, billing, funding, and learning support.

A primary benefit to students from these interventions is cost savings. As seen in the NCBO example, students are offered the flexibility of finishing a course which they otherwise would need to repeat entirely. Students who succeed through the bridge program do so free of charge. They can now quickly complete a course or courses at no charge. In a traditional curriculum, those courses would cost time and money. These programs have saved students hundreds of thousands of dollars during the short period in which they have operated.

Finally, the UTEP Developmental Math program demonstrates how an emphasis on student support, accelerated developmental education, and innovation can yield positive outcomes. Student pass rates in developmental mathematics have substantially increased and students are advancing and succeeding in college-level mathematics at a faster pace. Diagnostic skills assessment and instruction that is individualized allow faculty and support staff to provide instruction that is flexible and tailored to meet the learning needs of individuals. Innovations such as the accelerated summer bridge program and the NCBO Extender program allow for flexibility in completing assignments and class requirements. Faculty now work with students more closely to keep them on track. It appears that there is a clear student-centric philosophy in place. Ultimately, the UTEP Developmental Math department now has a program that maintains high standards and offers flexibility and a focus on individual learners.

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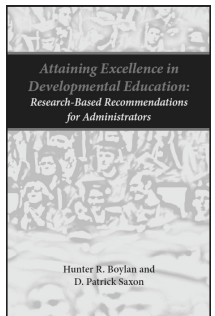
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Attaining Excellence in Developmental Education: Research-Based Recommendations for Administrators

By Hunter R. Boylan, Ph.D. and D. Patrick Saxon, Ed.D.

Applying lessons learned from years of studying research and best practices in developmental education at high performing institutions, **Attaining Excellence** is designed to provide recommendations to administrators that will contribute to excellence in the developmental education classroom. It is organized into two sections. Section One recommends actions that cost little or nothing to implement. Section Two recommends actions that involve the expenditure of resources and provides justification for doing so. Appendices are provided which include noncognitive assessment instruments, recommended readings for developmental educators, and a checklist for administrators to use in determining the extent to which they have made decisions and assigned the resources necessary for excellence in developmental education.



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