PROMISING PRACTICE

The Evolution of the T-Section: Angelo State University's Approach to the Corequisite Model

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As the state of Texas transitions its developmental programs to the corequisite model, the faculty at Angelo State University (ASU) are adjusting their corequisite model, which was implemented 5 years ago. This article traces the origin and development of the current model of corequisite learning at ASU, as well as illustrate best practices that are found in our university.

ASU moved towards a corequisite model several years before the implementation of House Bill 2223. Prior to our current corequisite model, ASU followed a traditional two-semester sequence for our remedial mathematics program. Students who did not meet TSI requirements would be placed into MATH 130A. Topics for this course included fundamental operations involving whole numbers and fractions, decimals, ratios and proportions, interpretations of graphs, metric and nonmetric geometry, counting, combinations and permutations, and an introduction to algebra. Upon successful completion, the students moved on to MATH 130B. This course consisted of topics including axioms and properties of the real number system, fundamental operations involving algebraic expressions, first degree equations and inequalities in one variable, products and factoring, algebraic fractions, exponents and radicals, quadratic equations, functions and graphs, systems of equations, and applications of these topics. To achieve successful completion for both of these courses meant the student had to achieve a grade of C or higher. Once a student completed this entire sequence with a grade of C or higher, the student was considered TSI complete and could then register for their college-level freshman math course required by their degree.

This original two-semester sequence had a couple of advantages, which were primarily administrative. For example, both MATH 130A and 130B were standard 3-hour credit courses. Being a 3-hour credit course meant that scheduling was both straightforward and flexible. These courses could follow the traditional Monday, Wednesday, and Friday or Tuesday and Thursday course layout. Another advantage for this two-semester format was that any student who was not TSI complete was required to take this remedial sequence their first semester at ASU. The sequence was not discipline specific, meaning any student regardless of major could take the same two-course sequence. However, the topics and rigor of the sequence were designed to prepare the student for success in College Algebra (MATH 1314) whether students were on track for that course or not.

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One consistent issue with this sequence was the low rate of success. In Fall 2011, 130A had a success rate of 35% and 130B of 31%. Fall 2012 had no improvement with 130A passing 35.6% and 130B passing 29%. These pass rates were common for the 130A/130B sequence. These pass rates had traditionally been regarded as acceptable by mathematic department faculty as well as the university administration. It was generally felt that no changes to the sequence were necessary, because if a student could not pass this sequence, they were probably not college-ready and needed to follow a different path.

This mindset began to change when the new dean of the College of Arts and Sciences, who was a previous chair of the mathematics department, and the provost initiated a review of the developmental program which specifically looked at the math side of the program. The primary objective of their review was to improve pass rates and allow for more student success. It came to their attention that most of the students who enrolled, being not TSI complete, were not STEM majors. This began to play a substantial role in the initial restructuring of the program. The main objective of their first reform was to improve retention in two primary ways: increase pass rates and streamline the sequence. Schudde and Keisler (1999) recent research also supports this mindset, they found that students in an accelerated developmental education program are more likely to pass college level mathematics. The challenge with implementing a new program was to achieve these two goals without sacrificing content or rigor, so students would still be prepared for future math coursework.

The initial change to the program was the development and implementation of a one-semester course called MATH 130C. Topics for this course included elementary and intermediate algebra and functions, geometry and measurement, data analysis, statistics, and probability. A major difference between this course and the previous two-course model was the means of content delivery. MATH 130C was an Assessment and Learning in Knowledge (ALEKS)-based course. ALEKS was selected because research indicated positive results with respect to decreasing student anxiety as well as increasing positive learning outcomes (Taylor, 2008). ALEKS is a web-based, interactive system which is presented in a computer lab. For MATH 130C, an instructor supervised and assisted students as necessary, along with conducting brief lectures on selected topics. The program was self-paced, which made it possible for students to complete the required course material before the end of the regular semester. To complete this course successfully, a student was required to work through all the assigned materials, as well as complete a standard final exam with an average of C or higher. MATH 130C was structured as a traditional 3-hour course, but each class required the use of a computer lab. Given the nature of our labs, class sizes were limited to around 20 students, where previous classes could contain 35 to 45 students depending on the classroom used. This led to scheduling conflicts, as well as issues regarding seat availability. It was a concern that the small computer labs available would not be able to adequately support the full population of our developmental students. In its initial semester, MATH 130C showed an improvement over the previous sequence, with the pilot yielding a pass rate of 51.8%. Although these results were well-regarded, the pass rates were not the results being sought after. The main benefit to this 130C course seemed to be the one-semester format.

Given that the results of MATH 130C were not as positive as expected, a new program was developed. In Fall 2013, a linked class, similar to paired courses already being implemented at other colleges, called the T-section was introduced at ASU. The "T" denoted the course as a linked course for non TSI complete students, and also indicates that completion of this course satisfied the requirements for a student to become TSI complete. Research being done at this time supported the implementation of a more streamlined, paired course model. According to Hern (2012), accelerating the remedial math program leads to improved retention. Initially, one section of MATH 1342 (Elementary Statistics), named MATH 1342T was started. This course became known as a T-section. It was run along a corequisite model, with a total of 6 contact hours in the classroom. The course consisted of review and exercises of the developmental math topics, along with the traditional college-level statistics material. After successful completion of the class with a grade of D or higher, the student became TSI complete. In addition, the student would earn three credit-hours of college level math for 1342. Initially, this program was run as a single pilot section along with multiple sections of MATH 130C. The pilot T-section course had 14 students enrolled, all who passed with a grade of D or higher.

In Fall 2014, T-sections were permanently implemented in 3 different freshman math courses: MATH 1332 (Introduction to Contemporary Math- a standard math for liberal arts), MATH 1314 (College Algebra), and MATH 1324 (Finite Math). All non-TSI complete students were either placed in a T-section that fit their degree plan, or in a non-course based (NCBO) option using the ALEKS computer system. Students were only placed in the NCBO course if all the seats in their appropriate T-section course were filled. For this initial implementation, MATH 1314T saw a success rate of 21.5%, while MATH 1324T was 35.8%, and MATH 1332T was 65.6%. Through some minor revisions, the success rates climbed to 46.8%,

59.3%, and 85.4% respectively in Fall 2015. Fall of 2016 and 2017 showed continued increase in success for both MATH 1324T and MATH 1332T. However, the success rates for MATH 1314T stayed stagnant.

In Fall 2018, another major revision was implemented. An algebra review section was included in the MATH 1332T curriculum and the MATH 1314T course was eliminated. The objective of this change was to have a majority of developmental math students placed in MATH 1332T since a large majority of non TSI complete students were not pursuing degrees that required college algebra. This coincides with research by Gayles and Ampaw (2014) that indicated about 20% of students planning to major in the sciences reported needing remedial math. The additional algebra review was implemented to ensure that students gained basic algebra skills after successful completion of MATH 1332T as preparation for additional math courses if needed.

At ASU today, our corequisite T-sections can be found in three different formats. A majority of our classes meet for multiple successive class blocks: on Monday, Wednesday, and Friday for two 50-minute blocks, or on Tuesday and Thursday for two 75-minute blocks. However, a few of our sections meet every day: Monday, Wednesday, and Friday–for a standard 50-minute block and Tuesday and Thursday for a standard 75-minute block. This gives the students an estimated three hours of lecture and instruction, as well as three hours of lab and practice time. According to Atkins and Beggs (2017), the learner-centered support provided by the corequisite model has been shown to increase mastery of college-level mathematics. The way each individual class is broken up into lecture versus practice varies by topic and by instructor. Upon completion with a grade of D or higher, students receive credit for their college-level math (typically 1332), as well as become TSI complete.

From the student perspective, a T-section course shows up as six hours on their schedule, as lab time is mixed within the lecture time. For example, if a student was registered for a class that met Monday, Wednesday, and Friday from 1:00 to 2:50 p.m., the computer would show that entire time as booked. This schedule prevents a student from registering for another class that conflicts with the scheduled T-section. However, from the transcript side, only three hours are recorded in the form of a letter grade the student receives for their specific math course. Currently, there is no designation on a student's transcript that denotes a T-section as such.

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From an administrative perspective, this T-section model can cause some problems regarding classroom allocation and scheduling. Class sizes are capped at 35 students to allow effective remediation to occur. In addition to the smaller class sizes, the unusual lengths of the courses can cause conflicts within the scheduling. Another administrative issue with the T-section model is funding. Students only pay for three hours of tuition, as that is what they receive on their transcripts. However, instructors teach for 6 hours a week. ASU's administration made the decision to compensate each T-section instructor for the full six hours they are in the classroom, despite the university only receiving payment for three hours from the students.

Our T-section courses are designed where one instructor is responsible for the entirety of the class meetings. The institution does not have separate labs that are staffed by graduate assistants or adjunct professors. To help the instructors answer questions and guide students, Angelo State has agreed to hire student assistants for each T-section course. These assistants are undergraduate students who fit into one of the following categories: mathematics majors or minors, education majors who have displayed a strength in math, or students who have previously excelled in the designated T-section. These assistants have the primary job of assisting with immediate remediation and answering questions during both the lecture and lab times. Students hired as assistants are held to a high standard and must be able to effectively explain their mathematical thinking and problem-solving skills. They must also be reliable enough to attend each class meeting in its entirety. These student assistants are paid by the Freshman College, as are other tutors in our additional tutoring center. These student assistants play an imperative role in the success of our courses. "Vygotsky (as cited in Finlayson, 2014) suggested that learners can be assisted by working with others who are 'more knowledgeable' A range of knowledge may be out of reach for the individual to learn alone but is accessible if the learner has the support of peers and more knowledgeable others" (p. 22).

Another key aspect of the T-section is the small-group collaboration and work. While we do not necessarily assign group projects or assignments, it is common to find students in groups of two or three,

all working together during the lab portion of class. Hodara (2011) found that "...the act of explaining material to another student is one method of cognitive elaboration, which facilitates the retention of information" (p. 6). Additional research indicates that when students have the chance to work in groups, they are given an opportunity to discuss mathematics in an environment where they can share their thinking and work. Having peers with whom they can discuss and practice math was found extremely useful as opposed to working alone (Finlayson, 2014).

Finlayson (2014) also went on to discuss that working in groups allows the students to ask questions and get them immediately answered by peers, which helped reduce math anxiety. Within our T-sections, the instructors at ASU have noticed a trend of increased math anxiety in our students. These students have typically struggled with math throughout their entire educational career and have a mindset that they will never be successful in math. Using strategies such as a peer tutor and allowing group work can help to reduce this anxiety, allowing the students to experience success in math, possibly for the first time.

In conclusion, we believe that our corequisite practices of student aids, group work, and scheduling options at ASU are setting our students who arrive as not-TSI complete on a path towards success. Research supports our methods, and our department is committed to continually evaluating and adjusting our program to best meet the needs of our students.

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