



# **An Online First-Year Seminar for Students in Developmental Mathematics: Early Findings and Recommendations**

Forrest C. Lane

Sam Houston State University

Research  
Supported by:



GREATER TEXAS  
FOUNDATION

*The opinions expressed in  
this report are those of the  
author(s) and do not necessarily  
reflect the views of  
Greater Texas Foundation.*

## FYS FOR DEVELOPMENTAL MATHEMATICS

### An Online First-Year Seminar for Students in Developmental Mathematics: Early Findings and Recommendations

There is a need to increase the number of students nationally who earn degrees and certificates. The Texas Higher Education Coordinating Board (THECB) reported the state of Texas will need “approximately 60 percent of 25- to 34-year-olds to hold a quality certificate or degree by 2030” in order to remain globally competitive (THECB, 2015, p. 2). The problem is a high school diploma is not a guarantee that a student will be college-ready (Strong American Schools, 2008). As many as 40% of college and university students nationally (Adams, 2012; Mitchell, 2014) and 77,000 students within the state of Texas (Complete College America, 2013) are placed into remedial or developmental courses, which they must pass in order to enroll in college-level reading, writing, or mathematics courses. Many of these students fail to complete developmental course sequences and persist to graduation (Bailey Jeong, & Cho, 2010; Levin & Calacagno, 2008). This requires colleges and universities to explore ways to better support students who are placed into developmental education.

First-year seminars can provide students with the academic and social support needed to be successful in college. These seminars can be paired with an academic course to support student learning. An example of a paired first-year seminar is the *Frameworks for Mathematics and Collegiate Learning* course, developed by The University of Texas Dana Center as part of the Dana Center Mathematics Pathways (DCMP) project. Colleges that implemented the DCMP model gains in college-level statistics course completion rates (Rutschow & Diamond, 2015). As the number of online courses and degree programs continues to grow, however, supporting programs such as *Frameworks* and other first-year seminars are not always available in an online format. This paper details the development and implementation of an *online* first-year seminar

for students placed into developmental mathematics. Preliminary findings and implications are discussed.

### **Summary of Relevant Literature**

Developmental education is a comprehensive set of strategies and approaches used to support intellectual, social, and emotional growth and development in college (NADE, n.d.), but is often more narrowly associated with remedial courses in college. It is reported that between 30 and 40 percent of all students are academically underprepared for college and are placed into some level of developmental or remedial coursework (Adams, 2012; Mitchell, 2014; Radwin, Wine, Siegel, & Bryan, 2013). The challenge for educators and policy makers is that many students placed into remedial courses often fail to complete prescribed coursework (Bailey, Jeong, & Cho, 2010). The remedial course completion rate is 49% at public 2-year institutions and 59% at public 4-year institutions (Chen, 2016), and this can negatively affect degree completion.

One approach that may support the academic success of underprepared students is the use of learning communities. Learning communities are small groups, or cohorts, of students who are placed together based on shared common academic goals. The purpose behind these learning communities is to improve relationships with other students and faculty, facilitate greater levels of academic engagement, and improve the level of support provided to students. Learning communities are reported to have a positive effect on the persistence of college students (Bailey & Alfonso, 2005).

First-year seminars are an example of a learning community intended to support the successful transition of students into the college. Student development theory suggests that a student's commitment to learning is dependent upon both the skills and knowledge they bring to

## FYS FOR DEVELOPMENTAL MATHEMATICS

the institution as well as the college environment (Hunter & Linder, 2005). First-year seminars provide students with the academic and social support needed to be successful in college.

Research suggests that first-year seminars are positively linked to persistence (Lang, 2007; Pascarella & Terenzini, 2005; Schnell, & Doetkott, 2003; Porter & Swing, 2006) and grade performance (Blackett, 2008; DeRoma, Bell, Zaremba, & Albeee, 2005). As a result, first-year seminars are commonly offered at most colleges and universities. Young and Hopp (2014) reported that 86% of 2-year institutions and 91% of 4-year institutions offered a first-year seminar in 2012.

Although first-year seminars largely began as extended orientations, Barefoot (1992) identified five basic types first-year seminars offered by colleges and universities: a) extended orientation seminars, b) academic seminars with generally uniform academic content, c) academic seminars on various topics, d) paraprofessional seminars, and e) basic study skills seminars. According to data from the 2012-2013 National Survey of First-Year Seminars, the most common type of first-year seminars were those that serve as an extended orientation (Young & Hopp, 2014). Some institutions offered more academically-oriented seminars including special sections for students who are academically underprepared, but few colleges reported that students placed into developmental education were required to take them (Young & Hopp, 2014).

The success of students placed into developmental education is complicated by the growth of online programs across colleges and universities. As many as 37% of all college and university students take at least one online course, with 14% taking all of their courses online (Allen, Seaman, Poulin, & Straut, 2016). Students placed into developmental courses are reported to have higher withdrawal and failure rates in online courses (Jaggars, Edgecombe, &

## FYS FOR DEVELOPMENTAL MATHEMATICS

Stacey, 2013). Online courses help provide flexibility for students, but institutions must be prepared to offer readiness skills, online tutoring, advising and technical support for online students (Jaggars, Edgecombe & Stacey, 2013). First-year seminars can help to provide skills development but are rarely offered in an online format. This places online students in need of academic support at a distinct disadvantage relative to their peers.

*Frameworks* is a 3-credit-hour, college-level student success course developed in 2013 by the Dana Center with support from Greater Texas Foundation and Achieving the Dream (Charles A. Dana Center, 2014a). *Frameworks* uses learning theory to support students' development of the mindset, skills, and behaviors necessary "so that they can succeed in mathematics, in other college coursework, and in their future careers and lives as citizens" (Couturier & Cullinane, 2015, p. 4). *Frameworks* was developed as part of the larger New Mathematics Pathways project which focused on identifying pathways through traditional college math sequences. *Frameworks* was also designed to be paired with a quantitative literacy-based course (Foundations of Mathematical Reasoning). A review of the project by the MDRC found that institutions that implemented the New Mathematics Project model realized gains in the percentage of students who had completed a college-level statistics course by the end of the spring semester (Rutschow & Diamond, 2015).

Despite the success of *Frameworks*, it was not developed for an online format. Online courses present different challenges for both instructors and students. For example, students must be familiar with certain technologies and learning management systems (i.e., Blackboard or other LMS). Instructors must also adjust teaching and learning strategies to reflect differences in the engagement patterns of online students. Best practice in digital pedagogy suggests that faculty must reconceive how they teach in an online environment. This often means creating shorter

## FYS FOR DEVELOPMENTAL MATHEMATICS

videos (6-8 minutes or less) and using multiple synchronous and asynchronous materials (The University of Chicago, 2018).

The purpose of this project was to create an online first-year seminar and explore the effects of this delivery method for students placed into developmental courses. Results from this study may inform how first-year seminars can be successfully delivered online and paired with developmental courses to improve pass rates and completion of gateway courses.

### **Course Development and Pilot**

#### **Institutional Context**

This study was conducted at Sam Houston State University, a 4-year public institution categorized as a "Doctoral Research University" by the Carnegie Commission on Higher Education. The university is located in rural southeast Texas about 70 miles north of Houston and reported a fall 2018 enrollment of 21,025 students. Of these students, 18,429 were enrolled at the undergraduate level and 2,883 were first-time enrolled freshman. The institution reported that 44% of the student population were students of color (22.9% Hispanic/Latino, 18.1% Black, and 3.1% Bi-racial), 80% lived-off campus or commuted, 26% enrolled part-time, and 16% were over the age of 25. Approximately 9.6% of students at the institution enrolled in fully online programs with another 39.0% of students reported to have taken one or more courses online at the institution. It was also reported that 61.7% of undergraduate students at the institution were determined to have a financial need in 2018.

#### **Developmental Mathematics and Course Placement**

The project targeted students who were placed into developmental mathematics. Students are placed into developmental courses based on their standardized test scores from the Texas Success Initiative (TSI) assessment. The TSI assessment in mathematics is a multiple-choice

## FYS FOR DEVELOPMENTAL MATHEMATICS

assessment that covers a) elementary algebra and functions, b) intermediate algebra and functions, c) geometry and measurement, and d) data analysis, statistics, and probability.

Students who score below 350 on the TSI mathematics assessment are required by the state of Texas to be placed into developmental mathematics. In addition to these placement criteria, the 85th Texas Legislature placed parameters around how instruction would be delivered to students. The state of Texas required a certain percentage of students placed into developmental education receive this instruction as part of a corequisite model (HB 2223, 2017). Corequisite models allow students to enroll in a college-level mathematics course but also require that students concurrently receive academic support (developmental education). The institution in this study placed students who earned a TSI score of 340 – 349 into the corequisite model while those who scored below 340 were placed into a traditional developmental mathematics course (MATH 0333).

During the fall 2018 semester, a total of 704 students at the institution were placed into developmental mathematics based on state mandated criteria (Table 1). Of these students, 398 qualified for participation in the corequisite model and 306 were placed into a traditional developmental mathematics course (MATH 0333). Because passage of HB 2223 (2017) was new at the time of this project and implementation of this policy at the institution was ongoing, participation in the paired UNIV 1301 course was limited to those students enrolled in the traditional developmental mathematics course (MATH 0333). Content in this course was delivered using a modularized computer-based learning approach, Assessment and Learning in Knowledge Spaces (ALEKS), which allowed students to master content one unit at a time.

## FYS FOR DEVELOPMENTAL MATHEMATICS

Table 1

*Placement of Students in Fall 2018 Based on TSI Mathematics Assessment Scores*

<b>Level</b>	<b>TSI Score</b>	<b>Placement</b>	<b>N</b>
Passing	350	College Level Ready	
Developmental Coursework Required (Co-Requisite Model Available)	340-349	MATH N032, N014, N024, N084, and N069	398
Developmental Coursework Required	0-339	MATH 0333	306

### **Participants**

Students placed into the traditional developmental mathematics course (MATH 0333) during the fall 2018 semester were invited to participate in the project. Enrollment in a first-year seminar is not a requirement of students at the institution. To help recruit participants, information about the project was given to the university's advising center. Entering freshman are required to meet with a program advisor prior to enrollment in courses at the institution. The course was also promoted as a first-year learning community within the First-Year Experience office. Students at the institution apply to participate in a learning community and take two or three classes together as a cohort. This project was advertised as the Math Frameworks Learning Community and 10 students of the 366 students enrolled across all sections of the university's first-year seminar (UNIV 1301) agreed to participate. Of these, 7 were classified as freshman, 1 was a sophomore, and 2 were juniors. Four of the students enrolled in the Math Frameworks Learning Community were also enrolled in an integrated reading and writing (IRW) courses.

### **Frameworks for Mathematics and Collegiate Learning**

The *Frameworks for Mathematics and Collegiate Learning* served as the curriculum of the first-year seminar course in this study. The *Frameworks* course was developed in 2013 and field tested in partnership with nineteen community colleges across Texas (Version 1.0). After



## FYS FOR DEVELOPMENTAL MATHEMATICS

field-testing, the course was revised based on suggested adjustments from the instructors who taught the course (Version 2.0). The revised version of *Frameworks* consisted of thirty 75-minute lessons centered around four primary content areas: building community and connecting to campus resources, b) motivation, c) strategies and skills, and d) finding direction in college. Curriculum for the *Frameworks* course was freely available from the UT Dana Center Mathematics website at <http://www.dcmathpathways.org/>. Permission was obtained by the UT Dana Center to use the *Frameworks* course for the purpose of this study.

### **Online First-Year Seminar Course Development**

To help reconceive the *Frameworks* course for a digital learning space, instructional designers and faculty development specialists employed by SHSU Online provided approximately 300 hours of support in course development. The online course was built over a time period of about 4 months extending from February 2018 to June 2018. The process began by thematically grouping lessons together so that they could be collapsed into 15 units with approximately equal levels of course content and activities. This also required reordering certain lessons. For example, it was necessary to move the lesson titled “Tackling technology fears and frustrations” to the beginning of the course in order to help students better acclimate to a digital learning environment. This resulted in an expanded technology lesson that included information about online learning, etiquette, ethics, and how to use various online course tools (e.g., Turnitin, video conferencing software). A comparison of the original lessons from *Frameworks* and units from the online first-year seminar (UNIV 1301) course is provided in Table 2.

# FYS FOR DEVELOPMENTAL MATHEMATICS

Table 2

*Comparison of Frameworks Lessons and UNIV 1301 Course Units*

<i>Frameworks</i>		<i>UNIV 1301</i>	
<b>Lesson</b>	<b>Topic</b>	<b>Unit</b>	<b>Topic</b>
5	Tackling technology fears and frustrations	1	Technology Orientation
1	Building a foundation for our success	2	Building a foundation for our success
2	Finding the support to be successful		
3	The plastic brain and smart thinking	3	The plastic brain and smart thinking
10	Metacognition: Financial advisor visit		
4	Getting ahead with better note-taking	4	Getting ahead with better note-taking
6	Meeting an academic advisor and career counselor	5	Academic advising and career counseling
7	Building success teams and identify your world impact	6	Creating motivating goals
8	Creating motivating goals and the career project		
9	Managing priorities and time	7	Managing priorities and time
15	Preparing to do well on exams	8	Preparing to do well on exams
16	Where we've been, where we are going		
17	Midterm		
11	Build a better memory: Attention to deep processing (Part 1)	9	Building a better memory
12	Build a better memory: Attention to deep processing (Part 2)		
13	Identifying important information as you read	10	Critical thinking & reading strategies
14	Critical thinking strategies		
19	Working in groups	11	Library resources
20	Site visit: Library resources		
21	Using library resources and group presentation preparation		
22	Effective oral communication and using evaluation rubrics	12	Effective communication
23	Career project sharing		
24	Presentations	13	Success Team Presentations
25	Presentations		
26	Success team presentations		
27	Dear Frameworks	14	Final Exam
28	Final Exam		
29	Final Exam Debrief	15	Course Wrap-up & Reflection
30	Where will you be in 10 years?		

## FYS FOR DEVELOPMENTAL MATHEMATICS

Blackboard was used as the learning management system for delivery of online instruction. The Blackboard course shell was updated to provide a current look and feel for online students. This included updating course graphics as well as the course layout and design format. For example, students had access to a virtual office and live meeting space. A total of 50 videos were produced to supplement lessons delivered in the face-to-face version of the course. Videos were professionally captured and edited using SHSU multi-media services. Most of these videos were recorded in studio, although some were filmed on site such as those that involved career services and the advising center. Videos were also transcribed to ensure that course videos were ADA compliant.

The course was reviewed by instructional designers using the SHSU Online course design rubric. This rubric was developed using research-based quality assurance standards related to essential components of online course design and was reviewed by SHSU faculty, the Blackboard Exemplary Course Rubric Committee, instructional designers, and digital learning practitioners. This rubric<sup>1</sup> evaluates practices in the following areas: general course information, presentation of course content, collaboration and communication, assessment strategies, course technology, learner support, and accessibility and ADA Compliance.

The first section of the UNIV 1301 Math Frameworks Learning Community was offered in fall 2018. The primary instructor was the principal investigator to help maintain course integrity. A doctoral candidate in the Ed.D. in Developmental Education Administration was employed as a teaching assistant to support the course. This doctoral program is fully-online

---

<sup>1</sup> More information about the SHSU Online course rubric can be found on the following website: <https://online.shsu.edu/campus/faculty-services/quality-commitment/shsu-online-course-design-rubric.html>

## FYS FOR DEVELOPMENTAL MATHEMATICS

which allowed the course to be supported by a graduate-level student with online learning experience as both a student and instructor.

### **Course Assessment**

The project will recruit, enroll, and assess student outcomes for two years. All students placed into developmental mathematics course (MATH 0333) were assessed at baseline as part of this study. Assessed outcomes included course performance in developmental mathematics (MATH 0333) as well as various attitudinal outcomes associated with college student academic performance including engagement in critical thinking, level of academic motivation, and belief in their ability to complete mathematics tasks (mathematics self-efficacy). As students matriculate through their academic course work, the project will also assess students on other attitudinal domains as well as completion of college level mathematics (MATH 1314, MATH 1324, MATH 1332, MATH 1384).

**Attitudinal Survey Measures.** Engagement in critical thinking was measured using the Need for Cognition Scale. The *Need for Cognition Scale* is an 18-item scale that measures how much people enjoy engaging in cognitive activities (Cacioppo, et al., 1996). Students who report a higher need for cognition "are more likely to seek, acquire, and reflect on information" in order to make sense of behaviors and experiences (Padgett et al., 2013, p. 139). This measure has been used previously in Wabash National Study of Liberal Arts Education (2006 -2012). The *Academic Motivation Scale* is an 8-item scale that measures students' motivation (Pascarella & colleagues, 2007). Academic motivation includes their willingness to work hard to learn material even if it does not lead to a higher grade, the importance of getting good grades, reading more for a class than required because the material was interesting, their enjoyment of academic challenge, and the importance of academic experiences in college. This study also utilized the

## FYS FOR DEVELOPMENTAL MATHEMATICS

*Sources of Self-Efficacy in Mathematics* scale (Usher & Pajares, 2009). This measure is a 24-item scale that reflects the four sources of self-efficacy as theorized by Bandura (1997). Self-efficacy has been reported to be one of the better psychosocial predictors of academic success (Robbins et al., 2004). These measures were included in an electronic survey that was distributed during the first two weeks of the fall 2018 semester and again immediately following the end of the semester.

**Qualitative Case Study.** As part of the pilot, students were also invited to participate in an interview about their experience in the course. Because the principal investigator served as the instructor of the course, a separate research team conducted the interviews with students to avoid perceptions of coercion. All students enrolled in the course were contacted via an email invitation. Three students agreed to participate in a semi-structured interview that asked about their expectations and perceived outcomes in taking an online first-year seminar paired with their developmental mathematics course. Students were also asked about how their educational needs were met or unmet by taking the course. Interviews occurred between week 11 and 13 of the fall 2018 semester, and were recorded, transcribed and returned to students so that they could review the transcripts and make any corrections to their responses. A constant comparison analysis was used to code data into themes using ADA Minder Version 5.0.23 (Provalis Research, 2016). Pseudonyms (Elena, Isaac, & Tracy) were used to maintain participant confidentiality.

### **Preliminary Findings**

There were 398 students at the institution placed into MATH 0333 at the beginning of the fall 2018 semester. Of these students, 70% received credit for the MATH 0333 course at the end of the semester. In contrast, all of the 10 students co-enrolled in the UNIV 1301 course received credit for MATH 0333. Students who were placed into developmental mathematics (MATH

## FYS FOR DEVELOPMENTAL MATHEMATICS

0333) and co-enrolled in the Math Frameworks Learning Community were more likely to pass their developmental mathematics course at the end of the semester ( $\chi^2 [1] = 4.24, p = .04$ ). All students enrolled in the Math Frameworks Learning Community also immediately enrolled in a college-level math course during the following spring semester.

Students in the Math Frameworks Learning Community were then interviewed about their expectations and perceived outcomes about how their educational needs were met or unmet by participating in the Math Frameworks Learning Community. Coded transcripts revealed five main themes: (a) university integration and support, (b) personal motivation and challenges, and (c) academic confidence and competency.

**University integration and support.** Elena, Isaac, and Tracy each spoke to how their enrollment in the online student success seminar would provide opportunities for them to integrate at their university. Motivations for course enrollment were notably distinct for each participant and included personal identity factors, understanding a new community, and developing awareness of university resources. Isaac explained his motivation for enrolling in the online student success seminar with the following statement:

I enrolled because I felt that it could help me. Being a freshmen [that] never went to public or private school because I was homeschooled kind of felt like a setback. . . . It's making me fit into college life because I never had been in a community setting [before].

While Isaac focused more on the social component of university integration, Elena and Tracy concentrated heavily on the resources they each had hoped to gain from the online freshmen success seminar. Elena stated:

My expectation [of the course] was [receiving] university resources. Learning what are the expectations of college? What strategies do you need for college? What attitude

## FYS FOR DEVELOPMENTAL MATHEMATICS

[should one] obtain in college? All of those things. . . . because [the resources] relate to what I'm doing in other classes. . . . resources like [the university's scholarly article database]. . . . and tutoring. . . have helped the most.

Additionally, each student spoke to the support they each received from the professor or classmates of the online success seminar. Elena and Tracy each noted to how the professor conveyed genuine interest in them, communicated course requirements and expectations effectively and responded timely to any concerns or questions, and challenged students with unique assignments that required critical thinking. Isaac described the support he received from his classmates, highlighted in the following excerpt:

What I learned from it is just how to get together as a group and just do these problems to where it's making me fit into the college life. Because I had never been in a community setting you know. . . . I feel like whenever they put up discussions, I can really find out about a person and their viewpoints and they sometimes have the same viewpoint as I do and I can relate to that somebody I know that I could go to help me with my situation.

**Personal motivation and challenges.** The second theme derived from the interviews with students was that of personal motivation and challenges. Each discussed how enrolling in an online student success seminar would provide opportunities for the development of skills that are essential to college success. Each of the participants discussed personal deficits that they hoped to address and rectify through the online student success seminar, most notably deficiencies related to identifying weakness in a particular subject matter, procrastination, time management, and communication among workgroup members. Tracy shared her motivation for enrolling in the online success seminar in the following account:

## FYS FOR DEVELOPMENTAL MATHEMATICS

It said it would help me with the math because I know that's my weakness. And so [the course] was supposed to [provide a] strategy on how to gain new concepts of studying and learning the different topics and how to study different [subjects]. So that was that's what piqued my interest.

Isaac referenced his background of being homeschooled as a motivation to connect to others in the following statement related to his motivation to enroll:

I was expecting just to get to learn about the social side of the college Just get to work with other kids you know and some of those kids having the same [interests] as me . . . . Now we're getting to the group projects too where we all have to work together communicate through email etc., I just never had to communicate [before].

Later in the interview, Elena further described skills she was developing to minimize procrastination. She mentioned that the online student success seminar “is teaching me to slow down. . . . it's taught me that [I] need to set a schedule for [my] study habits so that [I] have [time] and don't cram on it.” Each of the participants presents a wide range of challenges as motivation in their decision when enrolling in the online success seminar.

**Academic confidence and competency.** Despite complex challenges, Elena, Isaac, and Tracy shared confidence in their educational path. Additionally, each shared how the course had assisted them in feeling competent to be successful in future courses. The confidence and competency come from three primary components: (a) resources, (b) support, and (c) skill development. Elena spoke to her feeling competent in her ability to now handle the rigor of future courses as a result of enrolling in the online student success seminar and the resources received from it.



## FYS FOR DEVELOPMENTAL MATHEMATICS

I would actually recommend some students take this course. Like for those who haven't signed up for the first year learning communities or in the math community. So I would recommend it. . . . Because I know some students. . . .I know they don't know how to have access to those sorts of resources that the course itself offers. You know I've actually had students like come up to me and say “hey, how do we do this?” And “how do I do that?” and it is things that the course has actually taught me. So that's why I would actually recommend it. So students that feel like they're struggling in college and they need to learn more.

Elena also attributed her confidence to be successful in future courses as a result of her participation in the learning community:

Yeah I feel like I would [be successful]. Because I learned some things that I hadn't known before in this course, so it will benefit me like I guess students should take it. So it will benefit them in the future courses they will take.

Both Isaac and Tracy discussed how the curriculum provided multiple resources that allowed them to take an in-depth look at their current skill set and areas they could improve. Tracy spoke directly to how this has enabled her to look closely at her weaknesses and build upon them, increasing her confidence in coursework.

With this class because you have to speak up. . . .you have to actually talk to someone [and] go to your [career advisor] and do a career visit and get these different critiques. You actually have in front of you exactly what you need to take next semester and kind of go over you know the different classes and different areas [skills] that you need to improve in or whatever. So you got to find out a lot more about yourself than what I thought the class was it initially will be about you find out a lot more about yourself,

## FYS FOR DEVELOPMENTAL MATHEMATICS

weaknesses, your strengths, then you learn [how to perform] the SWOT analysis. You end up learning how to I guess how to even though you have those weaknesses you learn from those weaknesses and how to make those in the strengths actually.

In conversation with Isaac, he detailed his perceptions and expectations of the course being mid-way into the semester stating, “I've gotten a lot out of this curriculum that I'm taking right here and it's helped with a lot of things and uh, expectations are pretty high on it. So they haven't really changed.”

### **Discussion**

As many as 30% of all first- or second-year undergraduate students at four-year colleges are required to take developmental courses (Radwin, Wine, Siegel, & Bryan, 2013), and placement into these courses is associated with lower degree attainment rates in comparison to their peers (Bailey et al., 2016; Levin & Calacagno, 2008). First-years seminars can be leveraged to support students placed into developmental education, but as instructional methods for course delivery increasingly shift online, interventions must be tailored to better support the learning of online students. This should include readiness activities, tutoring, advising, and technical support that extends beyond normal business hours (Jaggars, Edgecombe, & Stacey, 2013).

The purpose of this project was to create a first-year seminar that could be delivered online and paired with developmental mathematics to improve pass rates and completion of gateway courses. Using curriculum from the UT Dana Center and New Mathematics Pathways project, an online first-year seminar and Math Frameworks Learning Community was created to support this goal. Data collection for this project is ongoing, but preliminary findings suggested that participants were more likely to pass their developmental mathematics course and immediately enroll in a college-level mathematics course compared to those who did not

## FYS FOR DEVELOPMENTAL MATHEMATICS

participate in the learning community. Immediately enrolling in a college-level mathematics course can increase the odds that a student placed into developmental education will graduate within six years (Zientek & Lane, 2019).

Participant interviews also suggested that students received academic support to facilitate their integration at the institution as well as an increased confidence in their ability to apply learned skills. These findings align with and support student development theory in college. Academic and social integration are important components of student retention (Tinto, 1993) but many students who are placed into remedial courses fail to complete them (Bailey Jeong, & Cho, 2010; Levin & Calacagno, 2008) and, consequently, depart the institution early (Chen, 2016). First-year seminar courses “aim to address non-cognitive skills and behaviors expectations” to support academic and social integration (Karp, Raufman, Efthimiou, & Ritze, 2015, p. 3). This aim is consistent with the mission and goals of developmental education (NADE, n.d.). The themes identified in the qualitative findings both reaffirmed the value of these seminars and ability to maintain that value in an online context.

Developing a quality online course was time-intensive and required support from multiple campus partners. Over 300 hours of direct instructional support were offered to aid technical design of the course. This included activities such as designing the structure of the course, reframing activities for an online environment, video recording, and ensuring ADA compliance. Sam Houston State University employed a staff of more than 40 instructional designers and multi-media service specialists, of which one was specifically assigned to this project. Online courses are reported to require more time and effort compared to traditional face-to-face courses (Li & Irby, 2008). This level of time and resources may not be available to faculty and staff at all institutions. Institutions must carefully consider the feasibility of creating

## FYS FOR DEVELOPMENTAL MATHEMATICS

and implementing an online first-year seminar. A potential benefit of this project is that it may offer institutions a course shell from which to more easily create their own online course.

College courses serve many different students, and not all students have the same needs. The first-year seminar course at this institution was designated as a writing-intensive course, a high-impact practice that increase rates of student retention and student engagement (Kuh, 2008). First-year seminars are also high-impact practices in and of themselves, but the additional focus on writing can present potential challenges for students who are also academically underprepared in their reading and writing skills. To meet common course expectations, writing assignments for the online course developed for this study were shifted from course papers to discussion boards and journal reflections. Students were also given opportunities to work with the writing center on campus to revise and resubmit written assignments. Regardless, the way in which high-impact practices are used within courses should consider the students who are enrolled in them.

First-year seminars typically include activities intended to connect students with resources on campus. For example, the *Frameworks* curriculum contained an assignment that required students to meet with an academic advisor and career counselor on campus. Students were able to meet virtually with advisors at the institution (via Zoom or Skype) but there were still issues with accessibility. Many students take online courses for the flexibility to accommodate work and family schedules. Because most offices on campus were open only during normal business hours, some students were not able to easily access some campus resources. Academic and student services should consider how they support students who attend campuses remotely.

### **Conclusion**

## FYS FOR DEVELOPMENTAL MATHEMATICS

There is a need to grow the number of individuals who earn a post-secondary degree or credential. Unfortunately, many students who enter post-secondary education are underprepared, fail to complete developmental courses, and do not persist to graduation (Bailey, Jeong, & Cho, 2010). This is only complicated by the growth of online programs across colleges and universities, which include developmental courses. First-year seminars can provide students skills development, but these courses are not always offered online. This project leveraged curriculum from the Frameworks for Mathematics and Collegiate Learning course developed by the Charles A. Dana Center to create an online first-year seminar paired with developmental mathematics (Math Frameworks Learning Community). Students who participated in this learning community were more likely to pass their developmental mathematics course at the end of semester. Participants also expressed an increased level of confidence and competency in these areas because of the learning community. Findings from this project may help guide institutions seeking to better support online learners, particularly those placed into developmental courses.

**References**

- Bailey, T. R (2005). *Paths to persistence: An analysis of research on program effectiveness at community colleges*. New York, NY: Community College Research Center, Teacher College, Columbia University.
- Bailey, T., Brashford, J., Boatman, A., Squires, J., Weiss, M., Doyle, W., Valentine, J. C., LaSota, R., Polanin, J. R., Spinnery, E., Wilson, Wl., Yeide, M., & Young, S. H. (2016). *Strategies for postsecondary students in developmental education – A practice guide for college and university administrators, advisors, and faculty*. Washington, DC: Institute for Education Sciences, What Works Clearinghouse.
- Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, 29(2), 255-270.
- Barefoot, B. O. (1992). *Helping first-year college students climb the academic ladder: Report of a national survey of freshman seminar programming in American higher education* (Unpublished doctoral dissertation). College of Willam and Mary, Williamsburg, VA.
- Blackett, K. (2008). *The effects of a first-year success course on student retention and academic achievement at national American university* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3318814).
- Charles A. Dana Center. (2014a). *Frameworks for mathematics and collegiate learning (2.0)*. Austin, TX: The University of Texas.
- Charles A. Dana Center. (2014b). *Frameworks for mathematics and collegiate learning: Course essentials*. Austin, TX: The University of Texas.

## FYS FOR DEVELOPMENTAL MATHEMATICS

- Chen, X. (2016). Remedial Coursetaking at US Public 2-and 4-Year Institutions: Scope, Experiences, and Outcomes. Statistical Analysis Report. NCES 2016-405. *National Center for Education Statistics*.
- Li, C. S., & Irby, B. (2008). An overview of online education: Attractiveness, benefits, challenges, concerns and recommendations. *College Student Journal*, 42(2) 449-458.
- Couturier, L. K., & Cullinane, J. (2015). *A call to action to improve math placement policies and processes: Six policy recommendations to increase STEM student aspirations and success while decreasing racial and income gaps*. Retrieved from <https://files.eric.ed.gov/fulltext/ED559677.pdf>
- DeRoma, V. M., Bell, N. L., Zaremba, B. A., & Albee, J. C. (2005). Evaluation of a college transition program for students at-risk for academic failure. *Research and Teaching in Developmental Education*, 21, 20-34.
- Hunter, M. A., & Linder, C. W. (2005). First-year seminars. In M. L. Upcraft, J. N. Gardner, B., O. Barefoot, & Associates, *Challenging and supporting the first-year student: A handbook for improving the first year of college* (pp. 275-291). San Francisco: Jossey-Bass.
- Jaggars, S. S., Edgecombe, N., & Stacey, G. W. (2013). *What we know about online course outcomes: Research overview*. Community College Research Center, Columbia University, New York, NY. Retrieved from <http://ccrc.tc.columbia.edu/media/k2/attachments/What-We-Know-About-Online-Course-Outcomes.pdf>
- Karp, M., Raufman, J., Efthimiou, C., & Ritze, N. (2015). *Redesigning a student success course for sustained impact: Early outcomes findings*. New York, NY: Community College Research Center for Teachers College: Columbia University.

## FYS FOR DEVELOPMENTAL MATHEMATICS

- Keup, J., & Barefoot, B. (2005). Learning how to be a successful student: Exploring the impact of first-year seminars on student outcomes. *Journal of The First-Year Experience & Students in Transition*, 17(1), 11-47.
- Keup, J., & Petschauer, J. W. (2011). *The first-year seminar: Designing, implementing, and assessing courses to support student learning and success: Vol. 1. Designing and administering the course*. Columbia, SC: University of South Carolina, National Resource Center for The First-Year Experience and Students in Transition.
- Kuh, G. D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.
- Lang, D. (2007). The impact of a first-year experience course on the academic performance, persistence, and graduation rates of first-semester college students at a public research university. *Journal of the First-Year Experience & Students in Transition*, 19(1), 9-25.
- Levin, H., & Calcagno, J. (2008). Remediation in the community college. *Community College Review*, 35, 181-207.
- National Association for Developmental Education. (n.d). Retrieved from <https://thenade.org/Mission-Vision-and-Goals>.
- Padgett, R. D., Keup, J. R., & Pascarella, E. T. (2013). The impact of first-year seminars on college students' life-long learning orientations. *Journal of Student Affairs Research and Practice*, 50(2), 133-151.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students* (Vol. 2). K. A. Feldman (Ed.). San Francisco, CA: Jossey-Bass.



## FYS FOR DEVELOPMENTAL MATHEMATICS

- Permzadian, V., & Credé, M. (2016). Do first-year seminars improve college grades and retention? A quantitative review of their overall effectiveness and an examination of moderators of effectiveness. *Review of Educational Research, 86*(1), 277-316. DOI: 10.3102/0034654315584955
- Porter, S., & Swing, R. (2006). Understanding How First-Year Seminars Affect Persistence. *Research in Higher Education, 47*(1), 89-109.
- Provalis Research. (2016). QDA Miner (Version 5.0.23) [Computer software]. Montreal, Quebec, Canada: Author.
- Radwin, D., Wine, J., Siegel, P., & Bryan, M. (2013). *2011-12 National Postsecondary Student Aid Study (NPSAS: 12): Student Financial Aid Estimates for 2011-12*. First Look. NCES 2013-165. National Center for Education Statistics.
- Relating to Developmental Coursework Offered by Public Institutions of Higher Education Under the Texas Success Initiative, HB 2223, 85th Texas Legislature.* (2017).
- Rutschow, E. Z., & Diamond, J. (2015). *Laying the Foundations: Early Findings from the New Mathways Project*. MDRC.
- Schnell, C. A., & Doetkott, C. D. (2003). First year seminars produce long-term impact. *Journal of College Student Retention: Research, Theory & Practice, 4*(4), 377-391.
- Strong American Schools. (2008). *Diploma to nowhere*. Washington, DC: Rockefeller Philanthropy Advisors. Retrieved from <http://broadeducation.org/asset/1128-diploma%20to%20nowhere.pdf>
- Texas Higher Education Coordinating Board (2015). *60x30TX: The 2015-2030 Higher Education Strategic Plan for Texas*. Retrieved from

## FYS FOR DEVELOPMENTAL MATHEMATICS

<http://www.thecb.state.tx.us/reports/PDF/6664.PDF?CFID=30926137&CFTOKEN=87354132>.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2<sup>nd</sup> ed.). Chicago: The University of Chicago Press.

Valentine, J. C., Konstantopoulos, S., & Goldrick-Rab, S. (2017). What Happens to Students Placed Into Developmental Education? A Meta-Analysis of Regression Discontinuity Studies. *Review of Educational Research*, 87(4), 806-833.

Young, D. G., & Hopp, J. M. (2014). *2012-2013 National Survey of First-Year Seminars: Exploring high-impact practices in the first college year* (Research Reports No. 4). Columbia, SC: University of South Carolina, National Resource Center for The First-Year Experience & Students in Transition.

Zientek, L. R. & Lane, F. C. (2019, February). *Does Completing a Mathematics Course During the First Semester of College Predict College Success?* Paper presented at the 42<sup>nd</sup> Annual Meeting of the Southwest Educational Research Association, San Antonio, TX.