

The Pioneer Prep Model: A Programmatic Approach to Removing Barriers and Improving Persistence for Students

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ABSTRACT

In response to soaring developmental education enrollments in Texas, the Pioneer Prep Program at Texas Woman's University (TWU) was designed as an alternative pathways-to-placement program for students who neither passed the Texas Success Initiative Assessment (TSIA) nor met other college-readiness benchmarks needed to enroll in college-level English and mathematics courses. We hypothesize that our developmental enrollments have remained manageable or trended downward in recent years due to a series of interventions provided by the Pioneer Prep Program, and in this article, we offer a profile of Pioneer Prep as an effective model for student success in developmental education via multiple intervention pathways that accelerate placement into English and mathematics courses. Through our analysis of secondary data, we found that one-year persistence rates for students who successfully completed one of the interventions provided via Pioneer Prep were comparable to students who entered college ready, with only one exception. In all cases, students who successfully completed one of the interventions out-persisted students who were not college ready and did not participate in an intervention. A cost-benefit analysis of the retention of these students indicates a significant financial benefit for our institution.

Keywords: program assessment, intervention, developmental education, and pathways.

Beginning in 2020, developmental education course enrollments at Texas Woman's University (TWU) began soaring—with demand exceeding capacity and no additional instructional resources being allocated to support these students or the faculty teaching developmental courses. Additionally, more students were deemed “not college ready”—students scoring below college readiness benchmarks on the Texas Success Initiative Assessment (TSIA)—or lacked TSIA scores

altogether. A significant number of these students were at risk of “timing out” (unable to stay enrolled at any public Texas college or university, as required by state law) for not having reported TSIA scores by a certain date. At the start of spring 2023, the institution had over 100 students at risk of timing out.

A general trend reported by Ketterer (2024) in the *Houston Chronicle* is a rapid surge in enrollments in developmental courses across many of Texas's university systems. In particular, Ketterer (2024) highlighted the Texas Tech University System, Texas State University System, and University of Houston System.

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students at risk of timing out.

Table 1
TWU Developmental Course Enrollments 2019-2024

Subject	Academic year	Fall	Spring	Summer	Total
English	2019–20	15	0	0	15
	2020–21	26	0	0	26
	2021–22	67	18	0	85
	2022–23	103	53	13	169
	2023–24	96	54	14	164
Mathematics	2019–20	360	199	21	580
	2020–21	246	175	3	424
	2021–22	227	140	3	370
	2022–23	259	187	1	447
	2023–24	231	139	0	370
Total	2019–20	375	199	21	595
	2020–21	272	175	3	450
	2021–22	294	158	3	455
	2022–23	362	240	14	616
	2023–24	327	193	14	534

Note. Data provided by TWU (2024).

However, the TWU system did not experience a similar ascent in developmental mathematics enrollments (see Table 1). In fact, enrollment in developmental mathematics at TWU has mostly trended downward since the 2019–2020 academic year. In contrast, the University of Houston System experienced a growth of developmental mathematics enrollments from approximately 200 students (2019–2020) to 700 students (2023–2024). During the same time period, Texas State University’s System’s developmental mathematics course enrollments more than doubled from approximately 1,000 in 2019–2020 to more than 2,200 students in 2023–2024 (Ketterer, 2024). Although the TWU System experienced over a 10-fold increase in enrollments in developmental English between the 2019–2020 and 2023–2024 academic years, enrollments have plateaued since the 2022–2023 academic year.

In light of this data, we hypothesize that TWU’s developmental enrollments in mathematics have remained manageable or trended downward in recent years due to a series of interventions provided by our Pioneer Prep Program. In this article, we offer a profile of our Pioneer Prep Program as an effective model for student success programming that offers a comprehensive approach to developmental education and multiple intervention pathways for strengthening placement.

Using secondary data analysis, we report on the impact of the program on one-year persistence rates, the acceleration of our placement strategy, the potential for cost savings to students, and the opportunity cost of lost revenue for our institution. We also reflect on constraints with regard to tracking student enrollment practices and the need for more longitudinal data with regard to graduation and retention rates in order to determine the long-term effectiveness of our intervention in supporting these students’ academic performance and their goal of degree completion.

College Readiness

The concept of college readiness is far more nuanced than any singular definition can fully capture, but a frequently cited definition by the American College Testing Association (2018) is “the acquisition of the knowledge of skills a student needs to enroll in and succeed in credit-bearing first-year courses at a postsecondary institutions (as cited by Green et al., 2023, p. 222). The definition emphasizes that success in on-level, credit-bearing courses that will count toward degree completion depends on skills obtained in secondary education contexts. We operationalize this definition for our study, meaning that any student enrolled in developmental education courses is one needing remediation in order to pass college courses, and extend it to our particular context in Texas, where a passing score in the reading, writing, or mathematics portions of the TSIA determines college readiness at TWU. In contrast, a student who is deemed not college ready has taken the TSIA but failed one or more portions of the test, and a student needing developmental education or remediation is one who will need to enroll in a non-credit-bearing course option (NCBO). Our primary NCBO offerings include a corequisite English and mathematics courses, both of which pair the on-level course with a non-credit-bearing course that provides additional instruction and tutoring to students, or our EdReady Program, a self-paced college readiness course product offered by the National Readiness Organization focused on College & Career or the NROC Project. For the latter, TWU funds faculty to facilitate the EdReady Program by coaching students to finish the program and providing assistance in navigating the course.

Literature Review

Of note, some scholars have criticized the concept of college readiness altogether, noting concerns of perceived overreliance on standardized tests to assess readiness for postsecondary coursework, particularly in English language arts. For example,

Noddings' (2010) op-ed in *Education Week* admonished, "When standardization is taken to mean universalization, the result may well be lower achievement for many students" (p. 29). Similarly, Khost et al. (2021) highlighted that "Mainstream US educational culture seems increasingly intent on preparing students for a perpetually (im)pending future while also fetishizing their pace of progress toward it" (p. 25). These critiques are well taken and provide reason to pause before implementing any program-level intervention, forcing faculty and administrators to critically assess the immediate versus long-term risks or benefits of a program aimed at intervening or accelerating developmental students' pace of progress toward earning a 2- or 4-year degree.

For students deemed not college ready, enrolling in developmental and/or corequisite courses and retesting are both positive interventions. Multiple studies have confirmed that enrolling in developmental courses, particularly corequisite developmental courses, can be an intervention bearing fruitful results (Adams, 2020; Douglas et al., 2022; Procknow et al., 2018; Ran & Lin, 2019), with the most remarkable gains achieved by Black and Hispanic students enrolled in corequisite courses (Park-Gaghan et al., 2024). The timing of corequisite courses is also important, as Goudas (2018) noted that "overall attrition is always highest after a student's first semester" (p. 49), which has caused some to question whether or not developmental English and math courses should be eliminated. Goudas critiques this claim as "misguided" for "confusing causation with correlation" (p. 49).

The Community College Research Center (CCRC) has called for alternative, more holistic approaches and interventions for developmental education. Having published several large-scale studies on the developmental student experience, the CCRC's findings confirmed that students are best supported when a corequisite or concurrent developmental course supplements the on-level course they are enrolled in (Ran & Lin, 2019). However, effective corequisite instruction alone is not sufficient. Opportunities to receive additional advising or to retake the TSIA are equally important. An earlier study (Bailey et al., 2010) from the CCRC found that poor advising and academic coaching result in a detrimental effect on students enrolled in developmental courses, with approximately 30% of students never enrolling in

the developmental course they need, making them "less likely to progress through their full remedial sequences" (p. 255).

Considering the landscape of developmental courses and the potential for more effective testing, advising, and placement solutions, offering a multiple measures of assessment (MMA) protocol offers an evidence-based solution for effectively placing students into first-year English or mathematics courses. In Texas, the Texas Higher Education Coordinating Board (THECB) has offered several rounds of grant funding to incentivize and study the effectiveness of MMA programs on college and university campuses. This initiative is connected to Texas House Bill 2223 from the 85th legislature, which aims to "increase corequisite model course

enrollments and outcomes" (THECB, 2021, p. 7), aligning with similar research from Bahr et al. In 2019, Bahr et al. studied over 200,000 students enrolled in the California Community College System and found that cumulative high school grade point average (GPA) was the strongest indicator of potential for success in math and English courses, hypothesizing that there are severe consequences for "under placing" these students, who are often unaware and uninformed about the long-term ramifications of enrolling in developmental courses they may not need. Bearing all of this in mind, it is worth noting the dearth of literature on effective, non-course-based programs as interventions for students deemed developmental. In the next section, a brief overview of our institutional context is provided before profiling the Pioneer Prep Program as an effective model for student success in developmental education through the offering of multiple intervention pathways.

Institutional Context

TWU is located in Denton, Texas. Rapidly growing, TWU is classified as both a Hispanic-serving institution (HSI) and a minority-serving institution (MSI), and recently, TWU became the nation's largest university system primarily for women. Over the last 2 decades, the student population has doubled (totaling 16,338 in the 2022–2023 academic year). The enrollment of female students continues to exceed that of male students—currently sitting at 89%, and in 2021, *U.S. News & World Report* "recognized TWU as having one of the most ethnically diverse student bodies in Texas and nationally,"

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ranking first in Texas and fifth nationally “out of more than 1,500 regionally accredited schools evaluated” (Flores, 2020).

As a minority-serving institution, TWU believes it is imperative to maintain a program that effectively places students into the courses they need while also removing costly barriers to their success and one-year persistence. The National Center for Education Statistics (Chen & Simone, 2016) has previously published research on the disproportionately higher rate at which minoritized students enroll in corequisite courses, which is alarming but mirrors a similar trend on our campus. Institutional data confirms that students of color enroll in developmental courses at a higher rate than their white peers, which again has created an even greater need for effective placement protocols to ensure that students are placed into classes they will be successful in and increase their odds of persisting.

In the summer of 2022, TWU’s support of the dean, several TWU vice provosts, and upper administration, the institution launched a pilot program in 2021 that offered a multiple measures of assessment protocol and testing options to a small sample of eligible students ($n = 21$) needing developmental coursework in English or mathematics. That pilot proved successful—a finding discussed later in this article.

The Pioneer Prep Model

In the simplest of terms, Pioneer Prep is an alternative pathways-to-placement program for entering first-time-in-college TWU students who did not pass the TSIA or meet other college-readiness benchmarks needed to enroll in college-level English and mathematics courses. The program focuses on developmental education, which at TWU consists of a variety of corequisite courses designed to provide additional instructional support to students, as well as evidence-based interventions, such as MMA placement protocols informed by Bahr et al.’s (2019) multiple measures of high school achievement study. Testing options are also made available to students at no cost; the reporting of test scores is mandated in part by the state and required for institutional compliance purposes.

For students who come in as not college ready or those who do not qualify for exemption based on the MMA placement protocol, the program offers students the option to take an EdReady online self-paced course or retake the TSIA at no cost to the student as one significant way of removing barriers to persistence. As a fourth and final option, students needing or preferring corequisite instruction are advised to take corequisite courses strengthened by high-quality teaching staff.

Most students are introduced to Pioneer Prep during the summer orientation season, which is a tricky time for placement, as score reporting and transcript delivery can be delayed for a variety of reasons. The program is promoted via advisors and a QR code directing students to our Pioneer Prep website. From there, students are presented with a menu of options to review and are taken to a form to complete for consideration.

The High School Transcript Option

For students who are able to report a GPA of 3.0 or higher across 4 years of high school English or mathematics courses (but not necessarily both, just one for each respective course) and a cumulative overall GPA of 2.5, they may be eligible to place out of corequisite courses. To do this, TWU has a small team of transcript analysts who review, verify eligibility for exemption, and communicate the exemption so that the hold can be lifted by TWU’s director of Transfer Articulation and Compliance.

EdReady Free Course Option

For students who are not able to report a GPA of 3.0 or higher across 4 years of high school English or mathematics via a transcript, a faculty member affiliated with Pioneer Prep invites them to enroll in a self-paced, fully online, and asynchronous EdReady course. As an NROC product, EdReady English and mathematics college prep courses provide a platform that adapts instruction to a student and also provides 24/7 tutoring services to support the student as they move through the college prep curriculum. Additionally, the program pays two faculty to enroll, coach, and monitor student progress through the course to boost their odds of completing the course. Once they do, they are deemed college ready, and their TSIA hold is lifted so they can enroll in on-level English or mathematics courses. Our program purchases a set number of vouchers each year so that students can participate in this option at no cost.

TSIA Retake Option

Although fewer in number, some students prefer to take the TSIA a second time because they were close to demonstrating readiness and meeting our institutional cut-off scores, and for these students, the program covers the cost of retaking the test at our on-campus testing center. Of course, a few students come through who are missing scores and have no scores to report, and we offer to cover the cost of testing for these students as well.

Corequisite Course Option

Finally, for students who are not eligible or choose not to pursue these options, the program funds pedagogical resources and training designed to strengthen the quality of instruction in TWU corequisite courses. Some students genuinely prefer or feel more confident about their odds of passing on-level courses if they enroll in a corequisite course, thereby giving them the very best odds of passing. The program currently offers one English corequisite course pairing and four corequisite course offerings in mathematics to accommodate a variety of academic interests. To enhance instruction in these courses, funding has been allocated to incentivize instructor attendance at several professional development sessions, to pursue micro-credential certifications in topics related to the teaching of corequisite students, and to host a statewide convening on the topic virtually in 2023 and 2026. The institution has also been able to pay for the development of high-quality curricular and OER materials, and thanks to a grant from the THECB, the institution will soon be able to cover the cost of the TWU coursework software used in the mathematics corequisite courses to eliminate more cost barriers for students.

Also worth noting is that Pioneer Prep funded a team of advising professionals in the summer of 2023 to assist us with transcript analysis and MMA protocol tracking. The success of the program in the summer of 2023 was leveraged to hire a new senior advisor in the summer of 2024, who now works part-time as a retention support specialist dedicated to the program.

Methods

As faculty co-directors of the Pioneer Prep Program, Drs. Jackie Hoermann-Elliott and Shawnda Smith collaborated with Drs. Mark Hamner and Michael Stankey of TWU's Office of Institutional Research and Data Management (IRDM) to get a clearer picture of what our retention successes and

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challenges look like in the pathways noted above and just how much revenue is lost by TWU when the retention of students enrolled in developmental education is not prioritized. For the former, we secured IRB approval to conduct a secondary data analysis in order to identify the entering cohort to which the developmental students (i.e., students who are not college ready as defined earlier in the article) belonged and track their persistence through to the subsequent year (one-year persistence, or P1, discussed in the next section), comparing that rate to students who started their academic journey college ready and to students who needed developmental assistance but did not receive it for whatever reason. To test significance, a two-sample proportion test was used to compare one-year persistence rates. For the latter, we calculated the tuition and state formula funding lost due to students dropping out after their first year and forgoing the remaining semester credit hours they would have generated had they persisted (more on this topic in the "Opportunity Cost of Lost Revenue" section below).

This study aims to evaluate the effect of the Pioneer Prep Model interventions on persistence outcomes with the following research questions guiding the analysis.

1. For not-college-ready entering FTIC students, does participation in a Pioneer Prep Model intervention significantly increase one-year persistence rates over non-participating not-college-ready entering FTIC students?
2. Does the persistence for not-college-ready entering FTIC students who participate in a Pioneer Prep Model intervention differ significantly from the persistence of college-ready entering FTIC students who did not require and did not participate in a Pioneer Prep Model intervention?

Participants

The target population for this study consisted of all first-time-in-college (FTIC) students entering TWU between fall 2020 and fall 2023 semesters (see Table 2). In fall 2023, 92% of the entering cohort were female, 47% were Hispanic, and 60% were Pell eligible. No students were excluded from analysis. The average cohort size during this period was 1,307 students, and the average one-year persistence rate was 71.3%. For this study, one-year persistence is understood as re-enrolling in the following fall semester. The corresponding attrition rate of 28.7% represents the highest single-year negative influence on subsequent 6-year graduation rates. Any successful effort to reduce this attrition is, therefore, very beneficial in promoting 6-year graduation rates.

Table 2
Selected Demographics of Entering FTIC Cohorts

Intervention	Cohort N	Female %	Hispanic %	Pell eligible %
Fall 2020	1,131	93.5	38.4	55.2
Fall 2021	1,273	95.1	40.0	52.7
Fall 2022	1,354	92.5	43.3	56.8
Fall 2023	1,469	92.3	46.6	60.0
Average	1,307	93.3	42.3	56.3

Note. Data provided by TWU (2024).

The entering cohort subgroup that shows higher-than-average risk, along with lower-than-average one-year persistence (average in this analysis pertains to persistence rates, discussed in more depth below), is the “not-college-ready” group of students, who now represent approximately 40% of the entering FTIC population at TWU. Entering students are deemed to be “not college ready” if they have not successfully passed the TSIA for math or writing, or both. This subgroup is slightly more likely than average to be female (95% vs. 92% average), slightly more likely than average to be Hispanic (49% vs. 47% average), but much more likely than average (71% vs. 60% average) to be Pell eligible, which adds to the risk profile of this not-college-ready subgroup. Recent data points to the fact that Pell-eligible students are at much higher risk of not graduating than non-Pell-eligible students (Dynarski, 2003; O’Leary, 2025). At TWU, the average 6-year graduation rate for Pell-eligible students (for Fall 2009 to Fall 2018 entering FTIC cohorts) is only 37.6% compared with a 50.2% 6-year graduation rate for non-Pell-eligible students. In terms of one-year persistence, the average rate for not-college-ready entering FTIC students (between fall 2020 and fall 2023) is 60.9% compared with a 78.9% one-year persistence rate for college-ready entering FTIC students. In the study, then, we are not benefiting from a sample that is biased toward increased graduation or persistence.

Data Analysis

For both research questions, the dependent measure is one-year persistence, which is defined as when a student returns for classes during the fall term following her starting fall term (e.g., for a student starting in fall 2023, she is deemed to have persisted after one year if she returns for classes during the fall 2024 term). The one-year persistence dependent variable is dichotomous, measured as either “yes” or “no.” We associate a value of 1 for “yes” and 0 for “no,” so that the sum of this variable across all individuals divided by the magnitude of the population (or sampled intervention group) produces a rate or proportion. For

both research questions, a two-sample proportion test will be utilized.

For research question 1, we tested the following null and alternative hypotheses:

$$H_0: P_I - P_{NR} = 0$$

$$H_a: P_I - P_{NR} > 0$$

P_I represents the one-year persistence rate parameter of not-college-ready students who participated in a Pioneer Prep Model intervention, and P_{NR} represents the one-year persistence rate parameter of not-college-ready students who did not participate in a Pioneer Prep Model intervention.

For research question 2, we tested the following null and alternative hypotheses:

$$H_0: P_I - P_{CR} = 0$$

$$H_a: P_I - P_{CR} \neq 0$$

where P_I represents the one-year persistence rate parameter of not-college-ready students who participated in a Pioneer Prep Model intervention, and P_{CR} represents the one-year persistence rate parameter of college-ready students who did not require and did not participate in a Pioneer Prep Model intervention. A significance level of $\alpha = 0.05$ was utilized for both tests.

Since the not-college-ready students self-select their intervention option and random assignment to a Pioneer Prep Model intervention was not a realistic possibility, a quasi-experimental design was used. As a result, we compared naturally occurring groups within the secondary data collection.

Table 3
Pioneer Prep Model Sample Sizes and Persistence Rates

Intervention	n^*	\hat{p}^*	$n\hat{p}$	$n(1 - \hat{p})$
MacMath	28	0.71	19.9	8.1**
MMA. English	63	0.71	44.7	18.3
EdReady.Math	24	0.83	19.9	4.1**
CoReq.Math	225	0.75	168.8	56.3
CoReq.English	160	0.66	105.6	54.4
MMA.Math or EdReady.Math	45	0.73	32.9	12.2

Note. n is the sample size, \hat{p} is the one-year persistence rate. **Normal approximation assumption is not met

Table 3 summarizes the sample sizes and one-year persistence rates for the intervention groups involved in the study. The requirement for a sufficiently large sample size to satisfy the normal approximation assumption underlying a two-sample proportion test is that both $n\hat{p} \geq 10$ and $n(1 - \hat{p}) \geq 10$, where n and \hat{p} represent the respective sample size and the one-year persistence rate for each intervention group. With the exception of the EdReady Math ($n = 24$) and the MMA Math ($n = 28$) interventions, all intervention groups met the

sample size requirement (see Table 3 for specific *n* values). For the two intervention groups for which the approximation assumption was not met, statistical power is reduced, making it more difficult to determine statistical significance. Therefore, in addition to testing significance for each intervention group separately, we also combined for analysis the two groups into a larger “MMA Math or EdReady Math” intervention group (*n*=45) that met both assumption conditions.

For the high school transcript multiple measures option (MMA) and the EdReady free course option (EdReady), sufficient data was limited to the entering Fall 2023 FTIC cohort. For the corequisite course options, CoReq.Math and CoReq.English, data was available for the fall 2020 through fall 2023 entering FTIC cohorts, which increased the sample sizes to 225 and 160, respectively.

Results

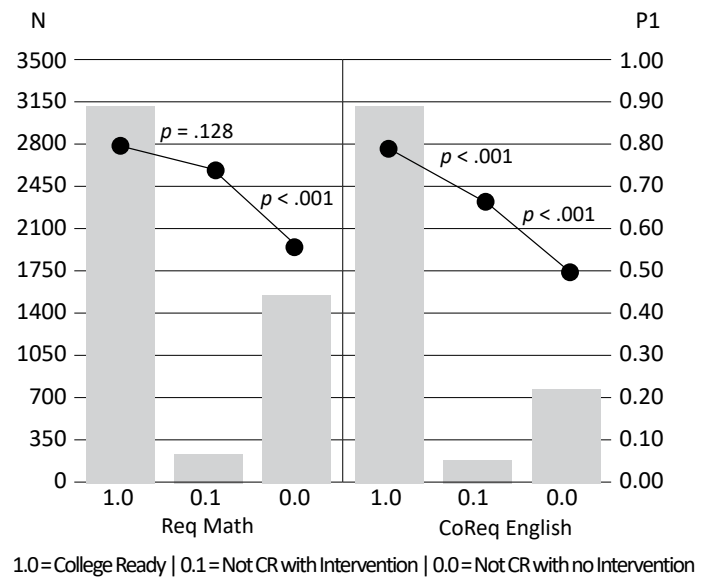
Given the relatively recent advent of the program, longitudinal data is limited; however, we can discuss findings on several dimensions with regard to (a) the impact of Pioneer Prep pathways on one-year persistence, (b) the placement acceleration strategy, (c) the cost savings, and (d) the opportunity cost of lost revenue.

Impact on One-Year Persistence

Overall, we found that one-year persistence rates for not-college-ready entering FTIC students who successfully completed one of the interventions provided via the Pioneer Prep Model were comparable to students who came to us college ready, with only one exception. Also, the one-year persistence rates for not-college-ready students who completed an intervention were significantly higher than for not-college-ready students who did not participate in an intervention. Figure 1 shows this pattern, which was very similar for each of the interventions. For the shown CoReq Math intervention group, the 74.7% one-year persistence rate (black dots and lines) was high (74.7%) and was not statistically different than the 79.0% one-year persistence rate of the college ready group ($p = .128$) but was statistically different than the much lower 55.7% persistence rate of the not-college-ready students who did not participate ($p < .001$, Cohen’s $h = .40$, effect size = small). Also, the pattern of low participation rates is visualized in the gray bars, with the middle gray bar, associated with the intervention groups, always being the very lowest of the set. The only exception to this overall pattern was for the CoReq English intervention group, for whom the 66.3% one-year persistence rate was significantly different statistically than the 79.0% rate for the college-ready group ($p < .001$, Cohen’s $h = .29$, effect size = small), though higher statistically than

the 50.7% one-year persistence rate of the not-college-ready non-participants ($p < .001$, Cohen’s $h = .32$, effect size = small).

Figure 1
Patterns in Participation and One-Year Persistence



The complete set of results is summarized in Tables 4 and 5. In Table 4, the full details of the corequisite course options illustrated above are shown, with the higher number of observations being due to the multiple years of available data. Students who came college ready and did not require an alternate pathway (1.0) persisted at a 79.0% rate, while students who entered not-college-ready and did not pursue the pathways (0.0) persisted at a much lower 50.7–55.7% rate (significant at $p < .05$). As noted above, students who took the mathematics corequisite course (0.1) persisted at a 74.7% rate, which was not significantly different than the 79.0% P1 rate for the college-ready group ($p = .128$) but was significantly higher than the 55.7% P1 rate for the not-ready with no-intervention group ($p < .001$, Cohen’s $h = .40$, effect size = small). Also noted above, the only group for which the response pattern was different was the students who took the English corequisite course whose P1 rate of 66.3% was significantly higher than the 50.7% P1 rate for the not-ready with no-intervention group ($p < .001$, Cohen’s $h = .32$, effect size = small), but their persistence rate was not at the same level as the 79.0% P1 rate for the college-ready group ($p < .001$, Cohen’s $h = .29$, effect size = small), statistically speaking. In other words, students who took the English corequisite course experienced a statistically significant lift in persistence compared to the not-ready with no-intervention group, but not enough to raise them to the same rate as the college-ready group. Still, the significant 15.6% increase in one-year persistence is notable and worthwhile.

Table 4
Test Results for Intervention Groups Meeting Sample Size Requirements

Intervention Group *	CoReq Math			CoReq English			MMA English		
	1.0	0.1	0.0	1.0	0.1	0.0	1.0	0.1	0.0
Proportion (P1)	0.790	0.747	0.557	0.790	0.663	0.507	0.761	0.714	0.408
Observations (n)	3120	225	1548	3120	160	785	821	63	174
Group comparison	1.0 vs 0.1 0.1 vs 0.0			1.0 vs 0.1 0.1 vs 0.0			1.0 vs 0.1 0.1 vs 0.0		
P1 difference	0.043 0.190			0.127 0.156			0.047 0.306		
Hypothesized difference	0 0			0 0			0 0		
z-value	1.52 5.39			3.81 3.59			0.84 4.17		
p-value (one-tail)	n.a. < .001			n.a. < .001 **			n.a. < .001 **		
z critical (one-tail)	n.a. 1.64			n.a. 1.64			n.a. 1.64		
p-value (two-tail)	.128 n.a.			< .001 ** n.a.			.401 n.a.		
z critical (two-tail)	± 1.96 n.a.			± 1.96 n.a.			± 1.96 n.a.		
Reject null hypothesis?	no yes			yes yes			no yes		
Cohen's h value	0.10 0.40			0.29 0.32			0.11 0.63		
Effect size	n.a. small			small small			n.a. medium		

Note. * 1.0 College-Ready with No Intervention, 0.1 Not-College-Ready with Intervention, 0.0 Not-College-Ready with No Intervention; ** Denotes statistical significance

Table 5
Test Results for Intervention Groups Not Meeting Sample Size Requirements

Intervention Group *	MMA Math			EdReady Math			MMA Math or EdReady Math		
	1.0	0.1	0.0	1.0	0.1	0.0	1.0	0.1	0.0
Proportion (P1)	0.761	0.714	0.494	0.761	0.833	0.499	0.760	0.733	0.480
Observations (n)	831	28	348	833	24	359	835	45	331
Group comparison	1.0 vs 0.1 0.1 vs 0.0			1.0 vs 0.1 0.1 vs 0.0			1.0 vs 0.1 0.1 vs 0.0		
P1 difference	0.047 0.220			-0.072 0.334			0.027 0.253		
Hypothesized difference	0 0			0 0			0 0		
z-value	0.56 2.24			-0.82 3.18			0.80 2.87		
p-value (one-tail)	n.a. .013 **			n.a. .001 **			n.a. .002 **		
z critical (one-tail)	n.a. 1.64			n.a. 1.64			n.a. 1.64		
p-value (two-tail)	.574 n.a.			.410 n.a.			.426 n.a.		
z critical (two-tail)	± 1.96 n.a.			± 1.96 n.a.			± 1.96 n.a.		
Reject null hypothesis?	no yes			no yes			no yes		
Cohen's h value	0.11 0.45			0.18 0.73			0.06 0.52		
Effect size	n.a. small			n.a. medium			n.a. medium		

Note. * 1.0 College-Ready with No Intervention, 0.1 Not-College-Ready with Intervention, 0.0 Not-College-Ready with No Intervention; ** Denotes statistical significance

The patterns for the MMA and EdReady options were very similar to the ones revealed above for the CoReq options. In Table 4, the results for the MMA English option, which had a sufficiently large sample size to be evaluated independently, are shown. The not-college-ready students who completed that option persisted at a 71.4 % rate, which was not statistically different from the 76.1% persistence rate of the college-ready group ($p = .401$). However, the intervention group persistence rate was significantly higher than the 40.8% rate of the not-college-ready group who did not participate in the pathway ($p < .001$, Cohen’s $h = .63$, effect size = medium). Table 5 shows the results for the MMA Math and EdReady Math options, evaluated both independently and as a combined group. In all cases, the one-year persistence of the intervention groups was not significantly different from that of the college-ready groups, while the one-year persistence of the intervention group was significantly higher than that of the not-college-ready group who did not participate in the intervention.

Across all six comparisons, then, statistically significant increases were observed in terms of one-year persistence rates between 16–33% due to the Pioneer Prep interventions for students who are not college ready and pursue one of the pathways made available to them (compared to not-college-ready students who did not pursue a pathway). From an effect size standpoint, these differences are showing small to medium practical significance levels (Cohen’s h values), which are acceptable at this early stage of the Pioneer Prep program. We speculate that these values are lower due more to the relative position of the distributions involved in the calculations. It is possible, for instance, to have higher Cohen’s h values (and larger effect sizes) when comparing smaller differences in proportions occurring in the 80–90% range as opposed to those occurring in the 50–75% range observed in this study. The real and perceptible difference of note is that 16-33% more students return for classes after their first year of study due to their participation in a Pioneer Prep intervention.

The biggest challenge in all cases is increasing participation rates, which are notably low, as shown visually in Figure 1 and numerically in Tables 4 and 5. The tallest bars (and largest values) are for students who entered college ready and required no alternate pathway (1.0). By far the shortest bars

and lowest values are for students who were not college ready but pursued the various options made available to them (0.1). The moderately tall bars and values represent the opportunity for making even larger gains in persistence, given the demonstrated effectiveness of the pathways in increasing persistence rates. These bars and values are for the not-college-ready with no-intervention students (0.0).

Discussion

One of the great challenges the institution faced was an inability to offer as many sections of developmental mathematics and English as were needed, which became gravely apparent in the summer of 2022 when our dean began referring to this systemic challenge as “the TSIA Crisis.” With support from our dean and other leaders in upper administration, a small summer pilot program was launched in 2022, offering the multiple measures of assessment protocol and free testing services to a small sample of eligible students ($n = 21$) needing developmental coursework in either English ($n=13$) or mathematics ($n=8$). The pilot proved successful, with participants averaging a 3.33 grade point average in English courses and a 3.14 grade point average in mathematics courses. With this pilot data, the program was launched on a broader scale in the next academic year.

In the summer of 2023, we recruited more students to participate in the program. To give a sense of the scale of the project, the Pioneer Prep Program reached out to 911 students who were either not reporting any TSIA scores or who were missing scores entirely (see Table 6). Institutional reports indicated that, of those 911 students, 400 students were not reporting any English/language arts (ELAR) scores (44%), 388 were not reporting mathematics scores (42%), and 413 students (45%) were not reporting any scores at all. By the end of the academic year 2023–2024, outreach efforts successfully resulted in the exemption of 238 students in total.

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Table 6
Students Not Reporting Scores or Not Ready in 2024

Missing scores or not ready	No TSIA ELAR scores	No TSIA math scores	No TSIA scores
911	400	388	413

In the following academic year (2024–2025), the program adjusted in approach by enlisting more faculty and staff to assist with transcript analysis, and focus was shifted away from marketing to all students lacking scores or who had insufficient scores to focusing on the recruitment of students who had TSIA scores to report but who were not ready in one or more areas. This enabled the program to exempt more students at a faster pace and to ensure steadfast compliance with state law (19 TEX. EDUC. CODE ANN. § 4.53, 2003/2018). Both of these estimates represent cost savings for credit hours that would have resulted in no credit earned toward degree completion, as Texas House Bill 2223 (2017) is understood to limit NCBOs with developmental courses and readiness programs that cannot count toward degree credit (see 19 TEX. EDUC. CODE ANN. § 4.53, 2003/2018).

By September 2024, there was a notable decrease in the overall number of students missing scores or who were not ready in ELAR or mathematics (see Table 1). There are no score reports from September 2023 for comparison, but institutional reports confirm that of the 816 students who could take advantage of the program, 364 were not ready in one of the ELAR areas (approximately 45%), and 693 were not ready in mathematics (85%).

One hypothesis to explain this shift is that the overall number of students who were missing TSIA scores or who were not college ready in one or more subjects by the census date is possibly lower in 2024 than it was in 2023 due to increased efficiency in programmatic processes, more staff, and more communication across campus (i.e., with advisors, compliance officers, orientation leaders). By improving communication and processes, we were able to raise awareness about the need for submitting scores on time and recruit more students to take the TSIA Retake Option, which meant that we had nearly 100 fewer students needing to report scores one year after full implementation. Even so, a significant number of students were still needing the support that the Pioneer Prep Program could provide. By the end of summer 2024, 321 students had been successfully exempted from developmental courses, but a significant number of developmental students remained.

Cost Savings to Students

For students utilizing the program and for the University, there are significant financial benefits to be explored. More specifically, the estimated savings per student were determined by calculating the tuition costs of a three-credit-hour course (approximately \$800). Considering that the program exempted 238 students in 2023, at a minimum, the projected cost savings would equal \$190,400. In 2024, an estimated \$256,800 in savings was netted for 321

students. Both estimates represent cost savings for credit hours that would have resulted in no credit earned toward degree completion, as Texas House Bill 2223 (2017) is understood to limit non-credit-bearing course options (NCBOs) with developmental courses and readiness programs that cannot count toward degree credit (see 19 TEX. EDUC. CODE ANN. § 4.53, 2003/2018). These estimates do not account for ancillary costs, such as textbooks and materials required of students enrolled in developmental courses. When discussing the potential benefits of the program with students, faculty, and staff, we highlight the potential for significant cost savings and underscore how Pioneer Prep eliminates a significant financial barrier imposed by unnecessary NCBO enrollment.

Opportunity Cost of Lost Revenue

There is a compelling argument to be made for the institutional return on investment (ROI) when developmental students stay enrolled at TWU. As discussed in the introduction, substantial increases in developmental enrollments are occurring across the state of Texas, and these increases mirror national trends pre-dating the COVID-19 pandemic and the academic setbacks attributed to that health crisis (Litschwartz et al., 2023, p. 5). As such, there is a substantial cost-benefit analysis to be undertaken, and Table 7 shows the results of a “what-if” analysis designed to estimate the lost revenue to the university for students who do not return after their first year. The “what if” involved was: “What if we could increase the one-year persistence of all not-college-ready students to the same level as entering college-ready students?” The data analysis suggests that it is possible to increase persistence to that level by having students pursue alternate pathways, but the low participation rate stands in the way. What if we could get all not-college-ready students to participate, and what would it be worth to make that happen?

To get a ballpark figure on what it is worth, we looked at the tuition and Texas formula funding generated by a typical student across 8 semesters of coursework in a program requiring 120 semester credit hours for graduation. The gross lost revenue per student was just under \$31,000, but when multiplied by the increased number of persisters expected from the alternate pathway options (in this example, we estimated that 68 more students would persist), the total gross value would balloon to \$2.1 million. There are other reasons why students do not persist further after they return for their second year, so we needed to weight the gross value by the normal expected decay rate (i.e., overall attrition) over the remaining semesters. Still, even after weighting for normal decay, the net lost revenue from just 68 students dropping after one year was just over \$1.3 million.

Table 7
Institutional Return on Investment

Hours Per Semester*	15	15	15	15	15	15	15	15	Total
Tuition at \$238*	\$3570	\$3570	\$3570	\$3570	\$3570	\$3570	\$3570	\$3570	\$28,560
Formula Funding (Lower Division) *	\$1,289	\$1,289	\$1,289	\$1,289					\$5,158
Formula Funding (Upper Division) *					\$1,750	\$1,750	\$1,750	\$1,750	\$7,000
Total Tuition + Formula Funding*	\$4,859	\$4,859	\$4,859	\$4,859	\$5,320	\$5,320	\$5,320	\$5,320	\$40,718
Gross Lost Revenue Not Persisting*			\$4,859	\$4,859	\$5,320	\$5,320	\$5,320	\$5,320	\$30,999
Total Gross Potential Lost Revenue			\$330,442	\$330,442	\$361,757	\$361,757	\$361,757	\$361,757	\$2,107,912
Normal Expected Decay Rate				0.91	0.79	0.73	0.69	0.66	
Total Net Weighted Lost Revenue				\$299,186	\$284,498	\$263,229	\$250,468	\$240,190	\$1,337,571

Note. *Per student

Limitations and Challenges

Tracking Enrollment and Registration

As we reflect on the program, we recognize that it is not without limitations or challenges. For one, there are several reasons as to why tracking the enrollment patterns of developmental students is exceedingly complicated. Many students who take the transcript option do not immediately enroll in the on-level English and/ or mathematics courses they need. Some will delay by a semester or two, and in some advising instances that predate the Pioneer Prep Program, students have been able to sidestep their college readiness requirements up until their senior year. In the latter scenario, this is a repercussion of temporary advising holds being lifted to support students enrolling in courses they need. In these instances, it is possible that academic advisors may have lifted holds with the best of intentions, i.e., wanting to keep students enrolled in courses that interest them, but this practice poses more significant barriers to academic success down the road. To use an example, a senior student needs a developmental mathematics course to complete their business degree but now has extremely limited availability for enrolling in the face-to-face developmental course because they recently moved to take an internship while taking the rest of their courses online. Alternatively, a student enrolls in a chemistry course before they are college-ready in mathematics, which in turn sets the student up for potential failure since chemistry requires demonstrated proficiency in quite a few algebraic concepts. In instances such as these, tracking data longitudinally

is challenging when enrollment and registration practices complicate when and how students take or place out of developmental courses.

Data Entry

Another challenge pertains to data entry. In particular, programmatic processes have taken several years (and the hiring of new personnel) to adjust for the higher number of students coming in as not college ready. When the program first began, it was brought to the attention of the co-directors that the number of students deemed not college ready may actually be lower than reports suggested due to slow, manual data entry of scores. The development of the program has instigated important discussions across campus about data entry and resulted in the hiring of personnel to offset the lag in score entry. This has alleviated numbers slightly, and we continue to discuss ways to make data entry more expedient through support from additional personnel and soon, quite possibly, transcript-reading software that is powered by artificial intelligence (AI).

With regard to AI-powered transcript analysis, as faculty, we are hesitant to hand off all transcripts to AI for analysis because the MMA protocol necessitates that a content-area expert or a well-trained advising professional understand the specific courses or course sequencing that merit placement out of developmental courses. When conducting transcript analysis in English, for example, courses such as poetry or yearbook are not accepted, preferring instead the standard English 1, 2, 3, or 4 sequence, advanced placement courses, and dual credit (in rare cases). In analyzing transcripts

for mathematics readiness, the sequencing or order in which courses are taken matters, as does the approach taken for students pursuing algebraic or non-algebraic pathways. What is more, hiring more personnel helps to accelerate data entry, but it also creates inevitable inconsistencies in how or which waivers are applied, another potential source of interference.

Student and Faculty Reluctance

Finally, a programmatic challenge we face each semester involves understanding why students do not enroll in the developmental courses they need and the shortage of faculty trained and interested in teaching these courses. When it comes time to build developmental course schedules for fall and spring (few to no corequisite courses are offered in summer anymore), data is pulled to show how many students are deemed not college ready, attrition and slow data entry are accounted for, and conservative projections for developmental courses are made. Despite these considerations, students are generally disinclined to enroll in corequisite courses—often putting off enrollment for as long as possible and to their detriment. We are actively exploring the possibility of new one-credit-hour laboratory courses to replace some of our three-credit-hour NCBOs. We have speculated that the lack of credit for a three-credit course could be a potential deterrent, but it will be a while before we can study these interventions.

In terms of staffing challenges, finding qualified, caring faculty to teach developmental students is a tremendous hurdle. A five-year study of English rhetoric and composition job seekers painted an elaborate portrait of the job market and how doctoral students are or are not trained for the positions they are often hired into, and the percentage of advertised positions specializing in developmental or “basic writing” experience remained low and relatively flat (approximately 5.4%) from 1993 to 2018 (Leverenz, 2024). Likewise, developmental mathematics courses tend to be assigned to adjunct faculty and/or graduate students. Jaeger and Hinz (2009) found that part-time faculty teaching over a quarter of FTIC courses negatively impacts retention rates. Given the shortage of qualified, full-time faculty interested in teaching developmental courses, we often find ourselves training current faculty who are willing

to teach the course for a semester or two. The longevity of this approach, however, leaves the program open to high rates of turnover.

Conclusion

Within the extant literature on developmental education and placement reform—particularly in Texas-specific interventions, few studies focus on a series of integrated interventions that collectively form an effective program. In this article, we have chosen to detail the series of interventions that comprise the Pioneer Prep Model because we believe that all of these interventions interact with and inform one another. In this sense, the entire program is an intervention unto itself, and it is a comprehensive one. As described in the previous sections, too, the population studied has stayed relatively consistent from semester to semester, giving us confidence for continued success with these interventions going forward and hopeful that similar results will be realized at institutions bearing similar student demographics to TWU.

Support from upper administration to more formally ensconce the program under the TWU Office of Student Success has been provided, and Pioneer Prep has been able to hire more full-time, developmental education-focused lecturers in English and in mathematics while still working to refine programmatic processes for offering interventions. Though more longitudinal data is needed, these findings speak to the positive impacts of the program already. One major challenge for longitudinal tracking is the shifting fluctuations in developmental course enrollments,

which seem unlikely to cease any time soon. Nevertheless, the Pioneer Prep Model and the series of interventions it provides is designed to fluctuate with enrollment patterns while making an impact on the readiness and success of today’s college and university students. For students who are ineligible for exemptions, course data demonstrates that corequisite courses are effective and beneficial to the success of developmental students. For students who are eligible for exemption, the Pioneer Prep Model accelerates time to degree, at no detriment to academic performance, and with the added benefit of tremendous cost savings to both the student and the institution. When the institution invests in placement reform and developmental education, everyone wins.

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Disclosure Statement

No potential conflict of interest was reported by the authors.

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