Quality Enhancement Plan
2020

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to a √DEGREE
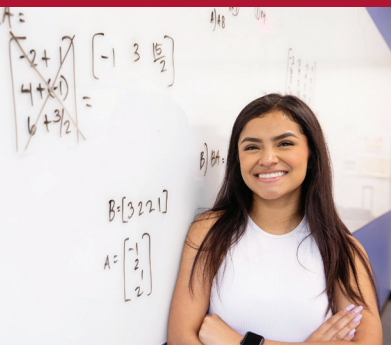
Math to a Degree

Quality Enhancement Plan

Lamar University

April 2020

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Executive Summary

Lamar University's Quality Enhancement Plan fulfills the University's mission to support "student success by engaging and empowering students with the skills and knowledge to thrive in their personal lives and chosen fields of endeavor." Furthermore, Lamar's proposed QEP seeks to improve student performance by reducing barriers to success in mathematics courses by placing students in courses appropriate to their field of study. Placing students in courses that are better aligned with their actual curricular needs can increase student success by removing the barrier of insufficient high school algebra preparation.

Most degree plans at Lamar University require two mathematics courses for Core (general education) completion, often College Algebra and one other course. Among these options are Contemporary Mathematics, Statistics, Trigonometry, Pre-Calculus, and Math for Elementary School Teachers. Students may complete any two courses to meet the Core requirement.

Many Lamar undergraduates enroll in MATH 1314 College Algebra, including those who will not take further coursework in mathematics requiring a knowledge of algebra. For example, among 1,760 Fall 2017 graduates of Lamar, 705 (40%) enrolled in at least one course at the level of college algebra or below during their time at the University, for an average of 5.3 credit hours attempted per graduate. Of those who enrolled in at least one college readiness (i.e. below college algebra) course, the average was 10.8 credit hours attempted per graduate.

As a part of a nation-wide trend, many mathematics departments are offering alternatives to college algebra; however, many faculty resist this trend because they see college algebra as a symbolic proxy for rigor in collegiate-level mathematics (Charles A. Dana Center, 2019). When students enroll in alternatives to College Algebra, the number of hours of college readiness courses required of them can significantly decrease. In compliance with state law, by Fall 2020, 75% of students in college readiness courses must be co-enrolled in a credit-bearing course. Students with major deficits in algebra can now co-enroll in a non-algebra-based course and its corresponding college readiness course, completing their first college-level math requirement in their first semester.

Early success in English and math courses is linked to higher retention and graduation rates. Similarly, community college students in Tennessee who passed required introductory English and math in the first year had a six-year graduation rate of 48%, compared to a rate of 18% for those who had not (Denley, 2016).

Goal: Following consultations with program faculty, each department chair will select a Mathematics Pathway for program majors that aligns with their chosen area of study. Non-STEM department chairs will choose a non-algebraic pathway.

The success of *Math to a Degree* will depend largely on centralized advising that is respectful of students' needs. The systematic process begins when faculty and department chairs agree upon which mathematics pathway best suits the academic and career goals of their majors. By enrolling in the appropriate pathway, students will save time and financial resources on the way to degree completion.

Non-Algebraic Pathways:

- MATH 1332 (Contemporary Math I) and MATH 1342 (Statistics)

- MATH 1342 (Statistics) and PSYC 2317 (Introduction to Statistical Methods)

Algebraic Pathways:

- MATH 1314 (College Algebra) and MATH 1316 (Trigonometry)

- MATH 2311, 2312, 2413, 2414 (Pre-Cal to Calculus track)

- MATH 1324 (Mathematics for Business and Social Sciences) and BUAL 2310 (Business Analysis I)

- MATH 1314 (College Algebra) and MATH 1350 (Math for Elementary School Teachers)

Expected Outcomes:

- By December 2020, all department chairs will sign a Declaration of Intent that identifies a pathway for their students.
- Fall-to-fall retention will improve from a five-year baseline of 61%.
- Percentage of First Time in College (FTIC) students who complete their first college-level mathematics course within the first two semesters will increase from a five-year baseline of 58%.

- Percentage of FTIC students who complete two college-level mathematics courses within the first two semesters will increase from a five-year baseline of 18%.
- Number of college readiness mathematics hours taken by FTIC students will decrease.

Selecting and Developing the QEP

In 2015 Dr. Melissa Hudler initiated a process for selecting and developing Lamar University's QEP in preparation for a 2019 SACSCOC reaffirmation on-site visit. The QEP Committee invited proposals and conducted a vote on three topics, none of which had the support of the campus community. Soon after, Dr. Hudler resigned as QEP Director to return to full-time teaching and Dr. Judith Mann was appointed to the position in January 2017. Dr. Mann formed a new broad-based Steering Committee that proposed a new QEP titled *WINGS of Success*. The Steering Committee decided *WINGS of Success* would focus on providing support systems for students struggling in math courses, including co-requisite, as opposed to pre-requisite, college readiness math classes. Data showed low math scores on the Texas Success Initiative (TSI) assessment challenges associated with retention and timely graduation.

During the 2017-2018 academic year, events unfolded that raised concerns about the proposed *WINGS of Success* QEP. First, SACSCOC Standard 7.2 changed to focus on student success or student learning outcomes, which did not align with the student support focus of *WINGS of Success*. Next, as mentioned previously, a new state law required the use of co-requisite college readiness courses, making *WINGS of Success* a legal mandate and no longer eligible as a QEP. Finally, in October 2018 the Provost appointed Dr. Jeremy Alm QEP Director.

Under his leadership Dr. Jeremy Alm constituted a third steering committee, reviewed the requirements for a QEP under the revised SACSCOC Standard 7.2, and chose to keep the mathematics focus. The Committee sought input from students, administration, college deans, department chairs, faculty, staff, and student support services. Outside consultants, Dr. Brian Loft from Sam Houston State University and Dr. Rebecca Goosen from San Jacinto Community College provided their professional guidance about establishing mathematics pathways as they relate to student achievement. Following discussions the QEP Steering Committee proposed *Math to a Degree* to University leadership.

As of 2012, most incoming Lamar students were advised into MATH 1314 College Algebra or one of its pre-requisites. Those students found "TSI restricted" in mathematics were advised into one of three College Readiness Math courses (CRMA), depending on their TSI score. The following four-semester sequence of courses culminates in College Algebra:

- CRMA 0370 College Readiness Pre-Algebra (TSI score below 336)
- CRMA 0371 College Readiness Algebra I (TSI score between 336 and 344)
- CRMA 0372 College Readiness Algebra II (TSI score between 345 and 349)

For example, among the 1,674 FTIC undergraduates starting in Fall 2012, 1,466 (87.6%) entered the College Algebra track.

Success by Cohort

This four-course sequence frequently led to disappointment rather than success and created a financial burden for many students. Of the 319 students in the Fall 2012 cohort who entered the CRMA-College Algebra pipeline with a TSI-restriction, only 108 (33.8%) ever attempted a college-level MATH course, and only 85 (78.7%) of those passed MATH 1314 on the first attempt. Furthermore, the earlier a student begins in the sequence, the less likely the student is to complete College Algebra. (See Appendix A for data)

Percentages for Fall 2012 Cohort Who Started in a CRMA Course

Percentages for Fall 2013 cohort who started in a CRMA course

Percentages for Fall 2014 cohort who started in a CRMA course
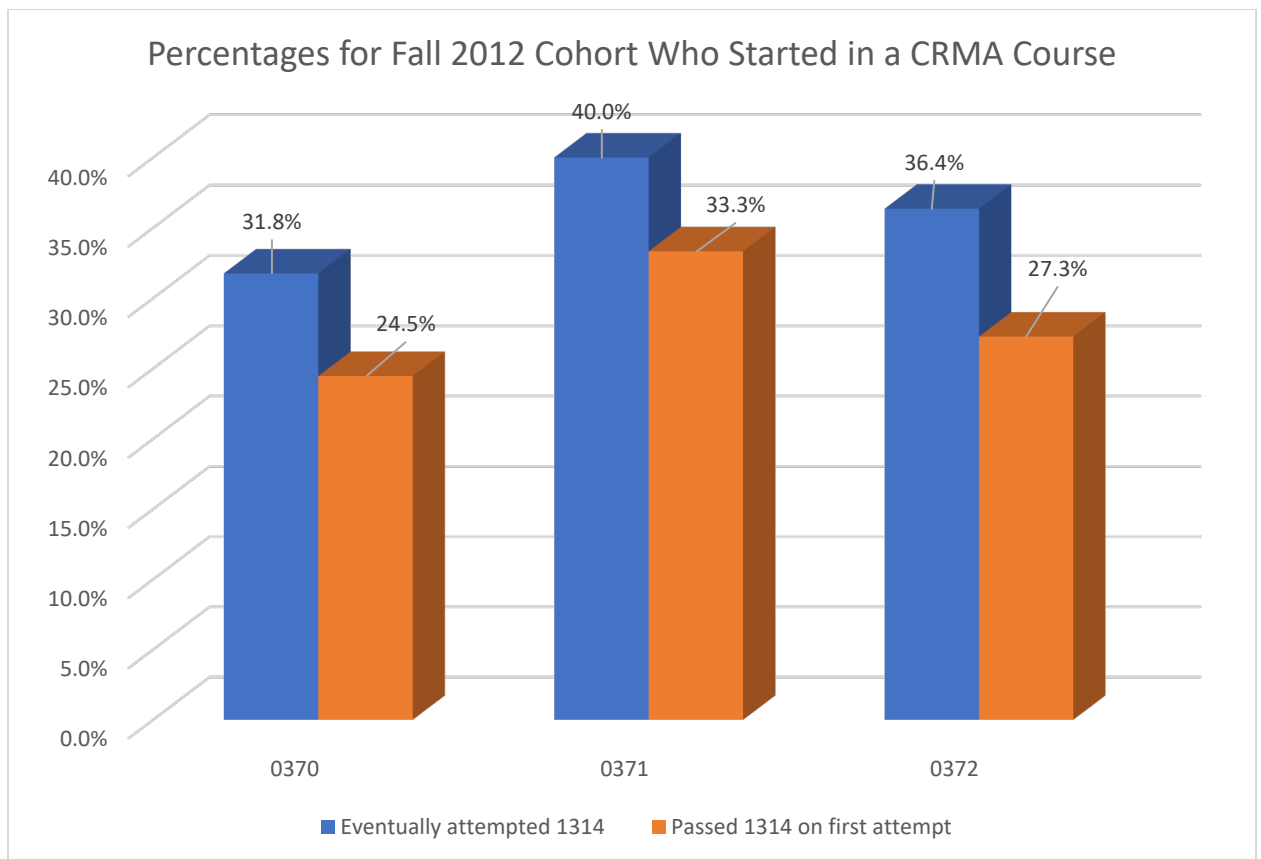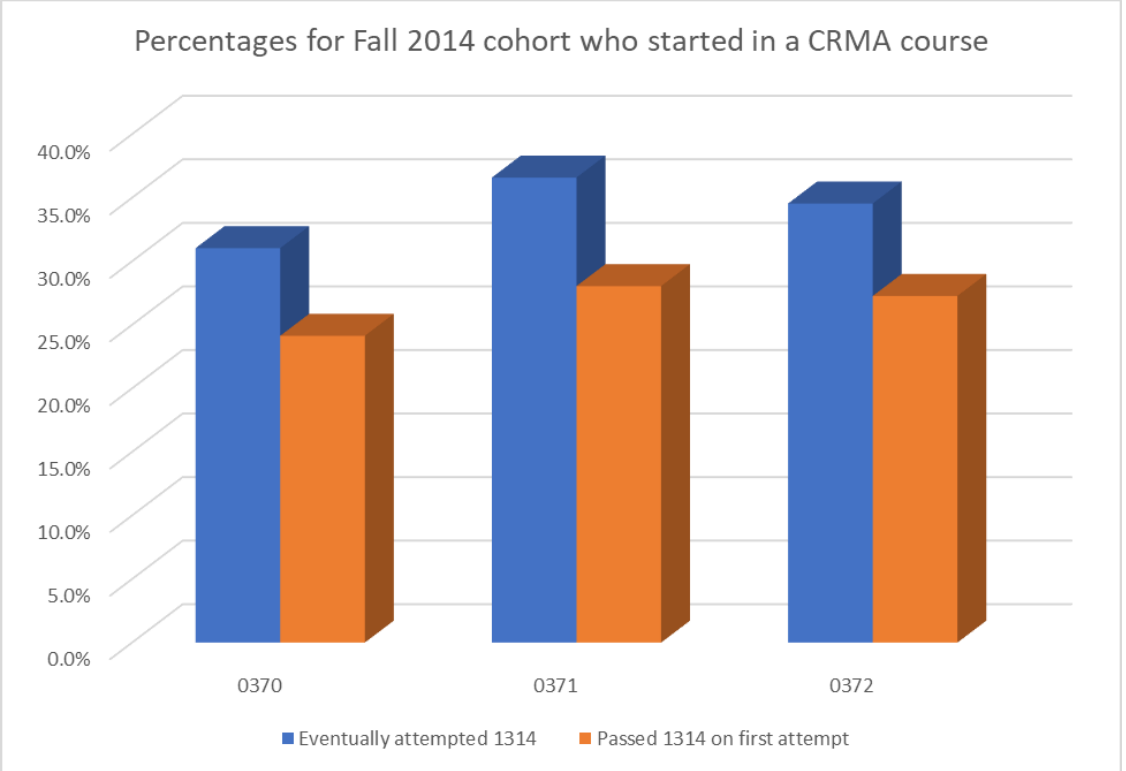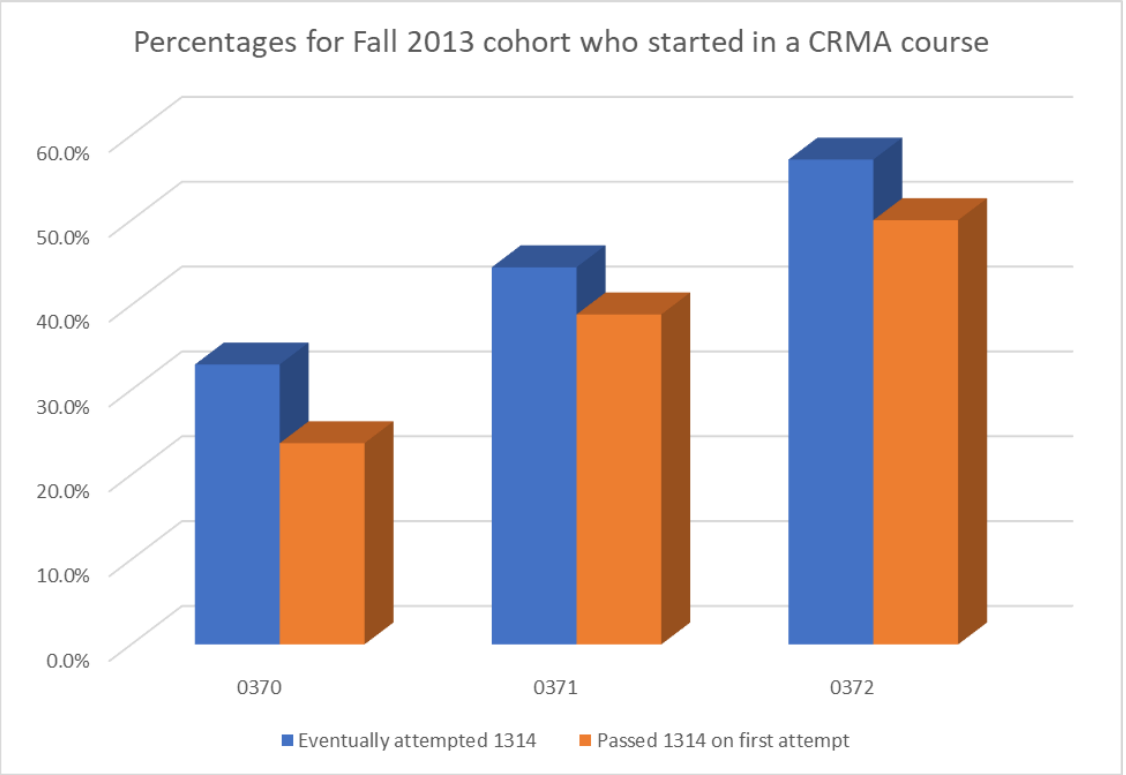
Those TSI-restricted students who eventually progressed to MATH 1314 passed at a comparable rate to those without a TSI restriction who matriculated straight into College Algebra.

1314 Passing Rates

Passing rates by year:

Year	TSI-restricted, took a CRMA course	No TSI restriction, went straight into 1314
2012	78.7%	73.2%
2013	78.6%	77.5%
2014	77.6%	72.1%
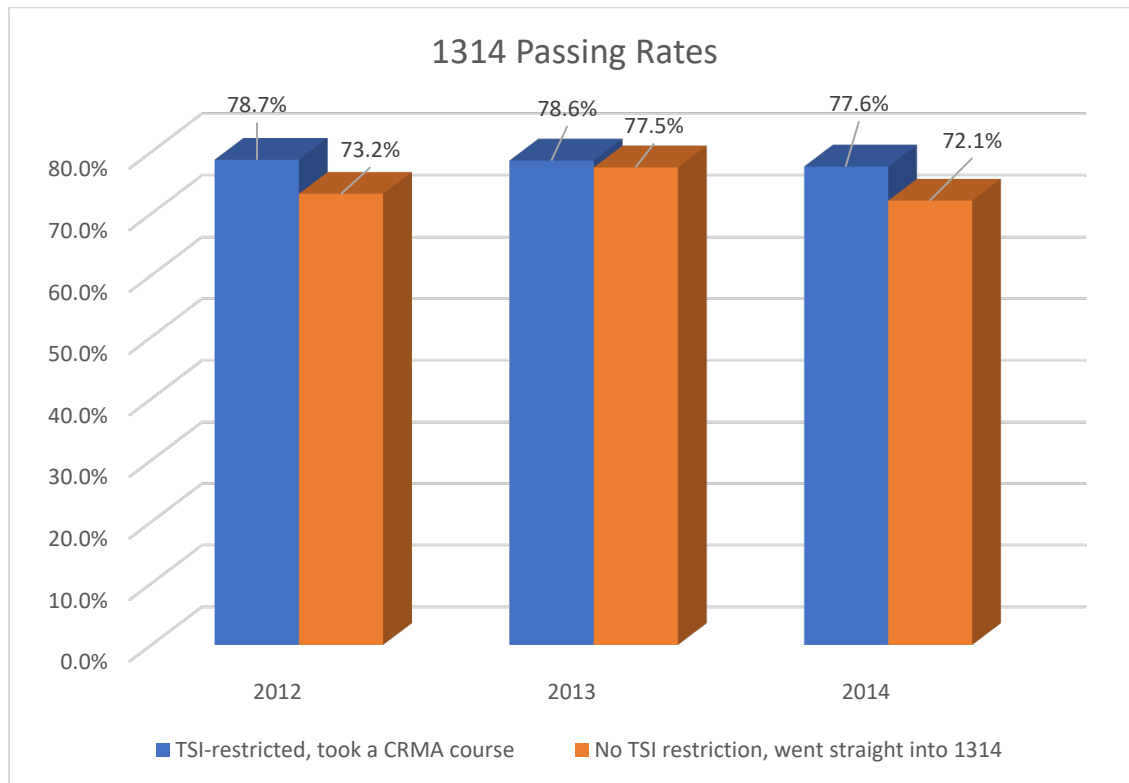
College readiness intervention revealed a positive effect on students who eventually enrolled in MATH 1314, but the number was undesirably low. The algebra pipeline was revealing itself as a barrier to success with predictable negative effects on four- and six-year graduation rates for students entering the pipeline with a TSI-restriction.

Fall 2012 Graduation Rates for TSI-Restricted Students Starting in CRMA Courses

Course	4-yr	6-yr
0370	2.1%	12.9%
0371	5.3%	16.0%
0372	9.1%	27.3%
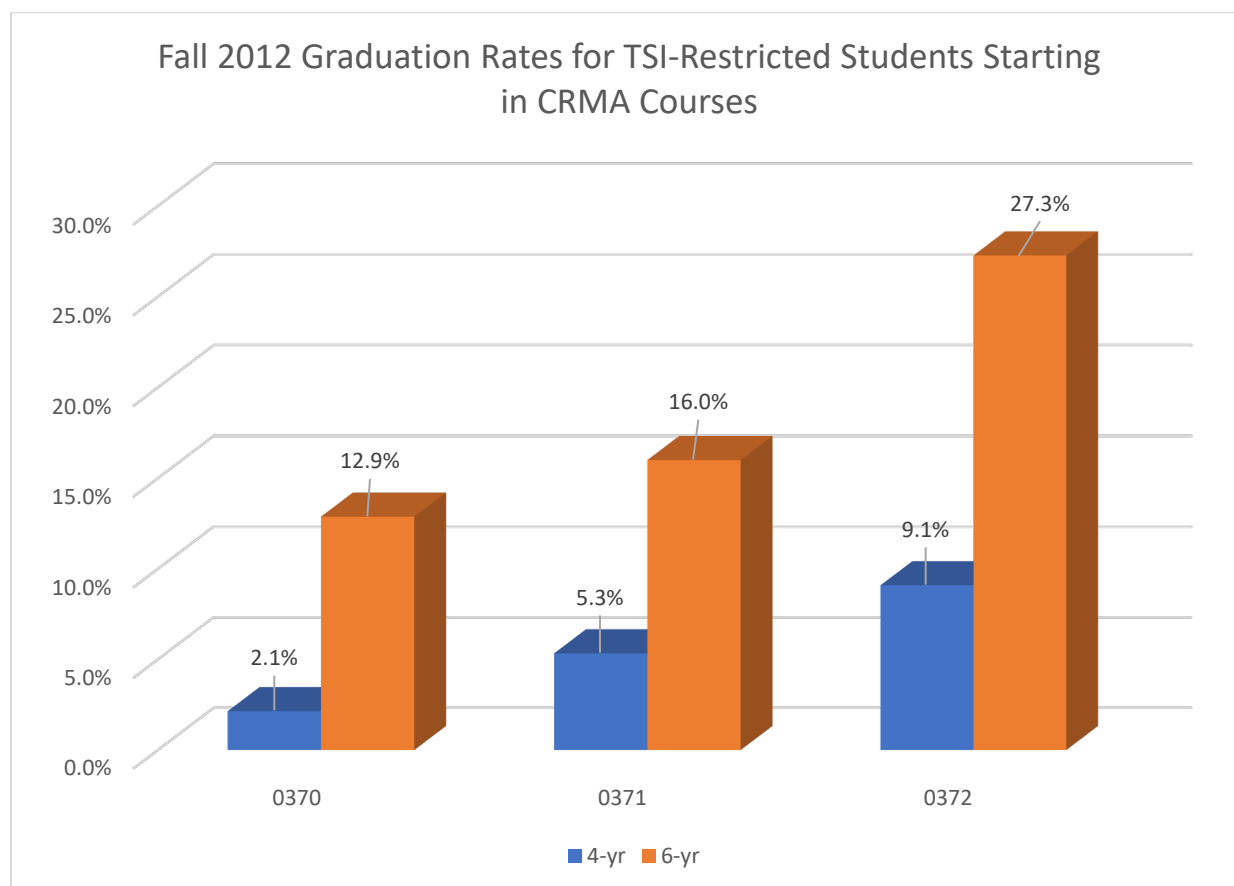
Of the 233 students from the Fall 2012 cohort who started in CRMA 0370, the lowermost course in the CRMA sequence, 105 were unsuccessful in their first attempt at 0370. Of those 105, only four graduated within six years.

Success by Race

Lamar University's student body is racially diverse, and no specific racial demographic constitutes a majority. Success metrics by ethnicity are shown and summarized in the pages that follow.

Combined Fall 2012, 2013, and 2014 Cohorts by Reported Race

- Black, Non-Hispanic — 1655
- American Indian/Alaskan — 75
- Asian Pacific Islander — 158
- Caucasian — 1935
- Hispanic-Other — 203
- International Non-resident — 103
- Mexican — 118
- Puerto Rican — 3
- Race Unknown/Not Reported — 89
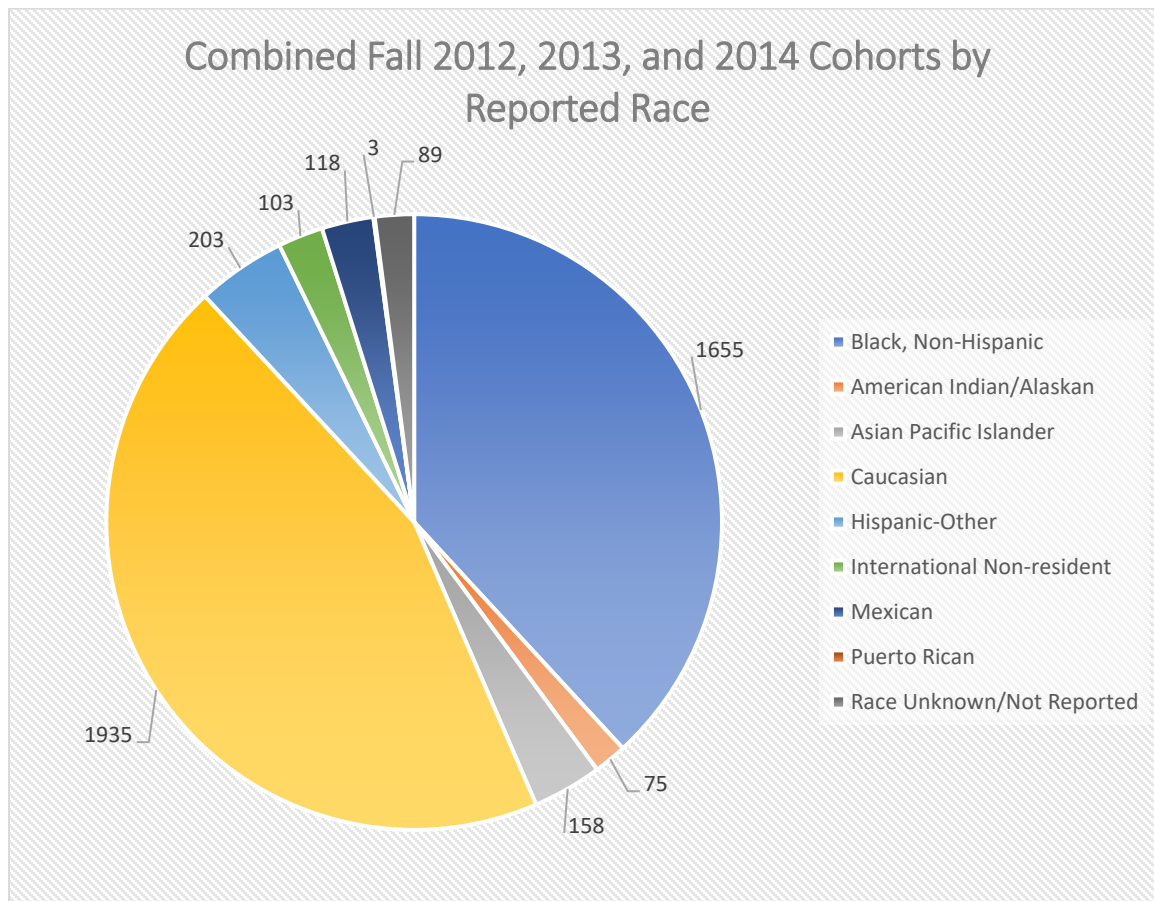
Students of color repeated courses in the CRMA 0370-0371-0372-MATH 1314 sequence at higher rates than Caucasian students and were therefore disproportionally disadvantaged. (See graphic below.) For example, students who identified as "Black Non-Hispanic" comprise 38.1% of the combined cohorts but represent 58.2% of the second-or-more attempts at courses in the sequence.

Repeated Courses by Race

Race	% of combined cohorts	% of repeated courses
Black, Non-Hispanic	38.1%	58.2%
American Indian/Alaskan	1.7%	2.8%
Asian Pacific Islander	3.6%	1.1%
Caucasian	44.6%	26.6%
Hispanic-Other	4.7%	5.0%
International Non-resident	2.4%	4.3%
Mexican	2.7%	0.7%
Puerto Rican	0.1%	0.7%
Race Unknown/Not Reported	2.1%	0.7%
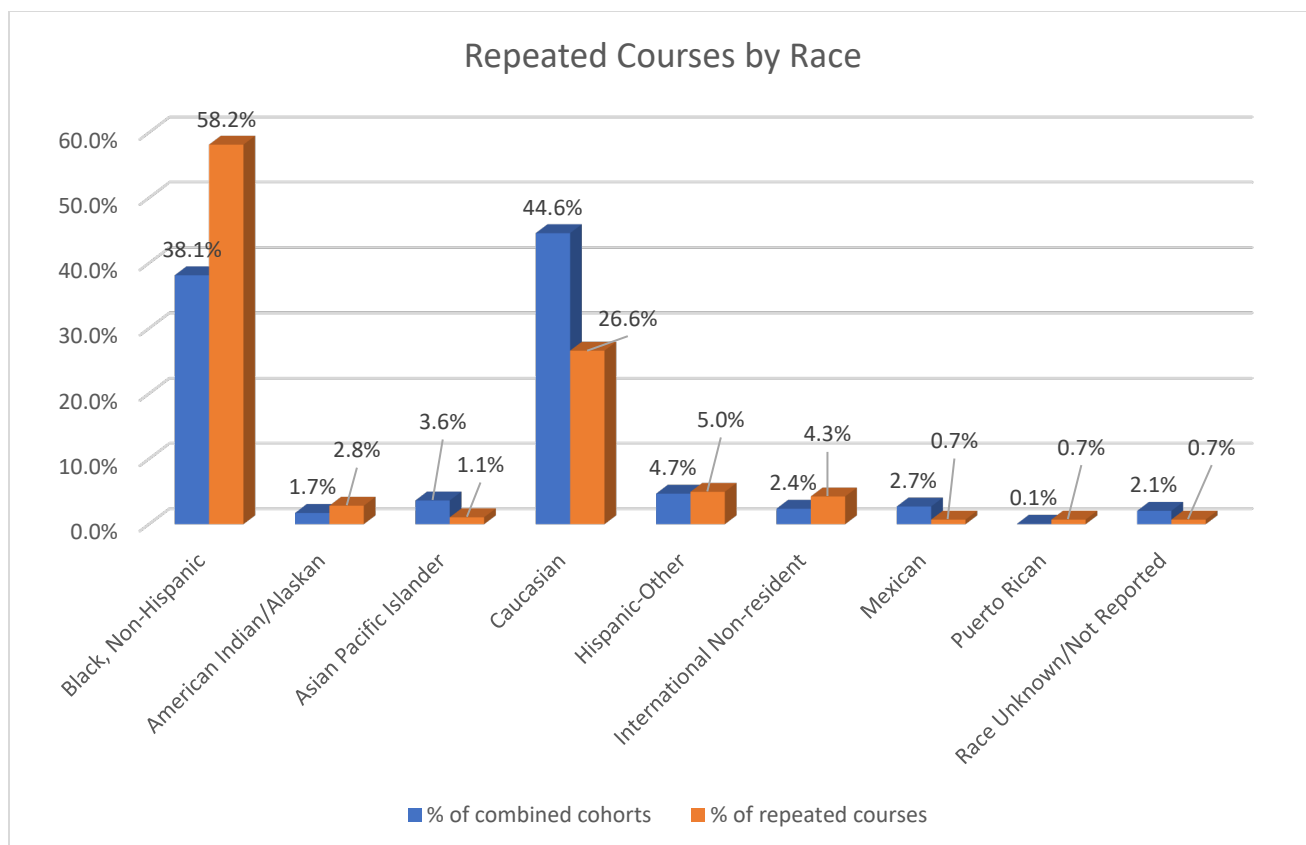
Rates were lower at which students of color who started in a CRMA course and persisted through MATH 1314 with a C or better. (Note that in the next two charts, all populations but "Black, Non-Hispanic" and "Caucasian" are comprised of fewer students. (See Appendix B for population sizes and bootstrap resampling intervals).

Persistence Rates Through MATH 1314

	started in some CRMA, passed 1314	started in 0370, passed 1314
Black, Non-Hispanic	25.1%	21.9%
American Indian/Alaskan	11.1%	16.7%
Asian Pacific Islander	33.3%	50.0%
Caucasian	35.8%	36.0%
Hispanic-Other	11.1%	8.3%
International Non-resident	20.6%	16.4%
Mexican	25.0%	33.3%
Puerto Rican	0.0%	
Race Unknown/Not Reported	46.2%	16.7%

■ started in some CRMA, passed 1314   ■ started in 0370, passed 1314
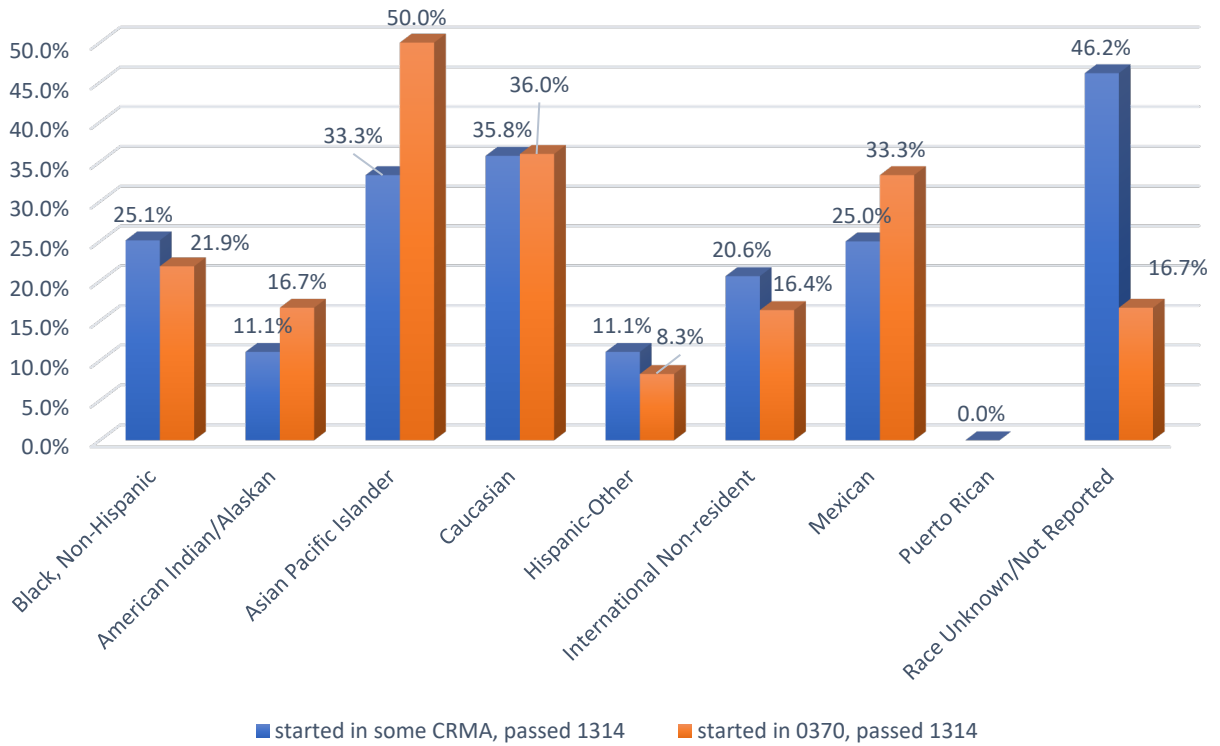
As indicated in the graph below four and six-year graduation rates for students starting in CRMA courses with a TSI-restriction reflect similar characteristics.

Graduation Rates by Race

Race	4-year	6-year
Black, Non-Hispanic	5.0%	12.6%
American Indian/Alaskan	0.0%	0.0%
Asian Pacific Islander	0.0%	16.7%
Caucasian	7.9%	20.5%
Hispanic-Other	0.0%	0.0%
International Non-resident	3.2%	7.9%
Mexican	16.7%	25.0%
Puerto Rican	0.0%	0.0%
Race Unknown/Not Reported	0.0%	15.4%
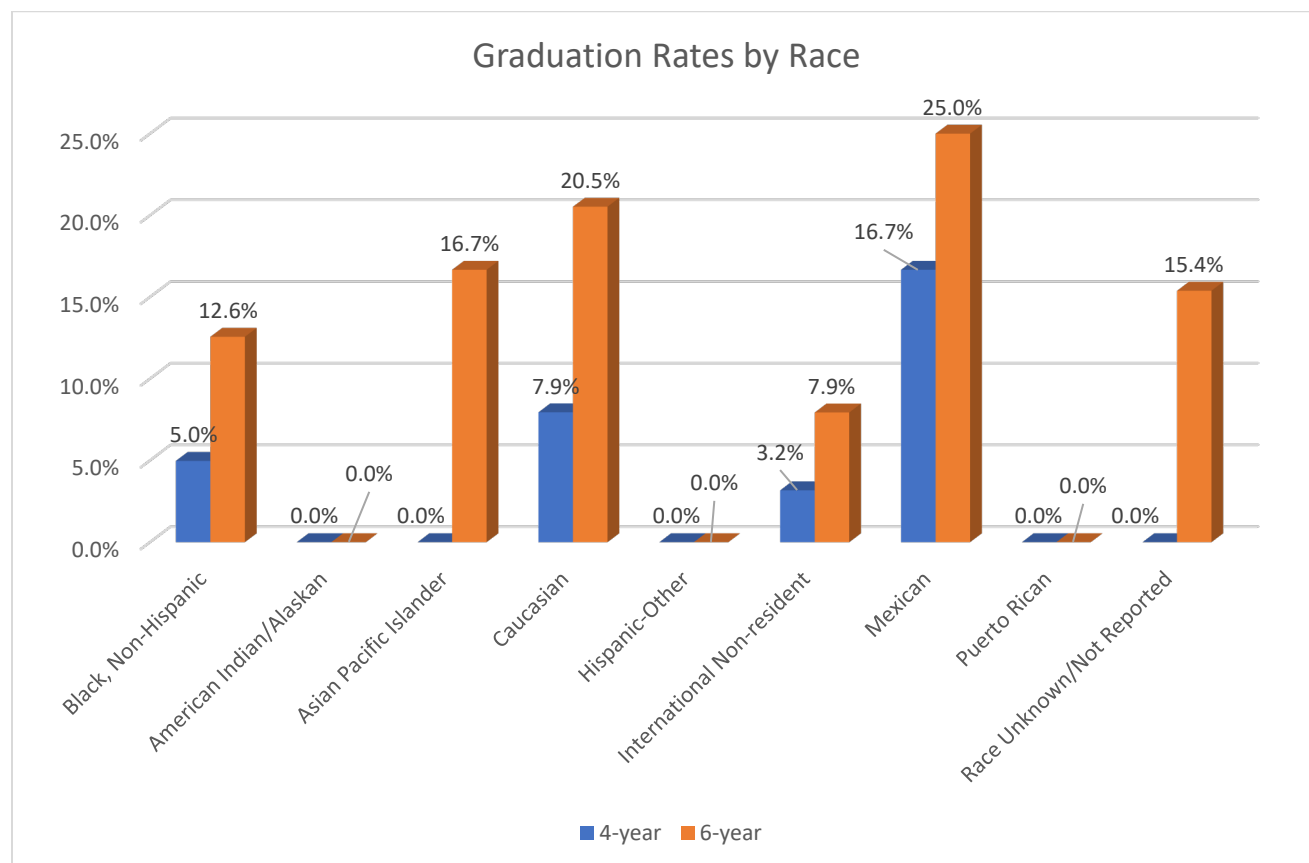
Success by Gender

The combined three cohorts include 1,981 full-time male students, 2,379 full-time female students, with one student classified as "Unknown." From among the TSI restricted students required to enroll in CRMA courses with a TSI-restriction, 278 were male and 383 were female. Within this group, female students persisted and graduated at higher rates.
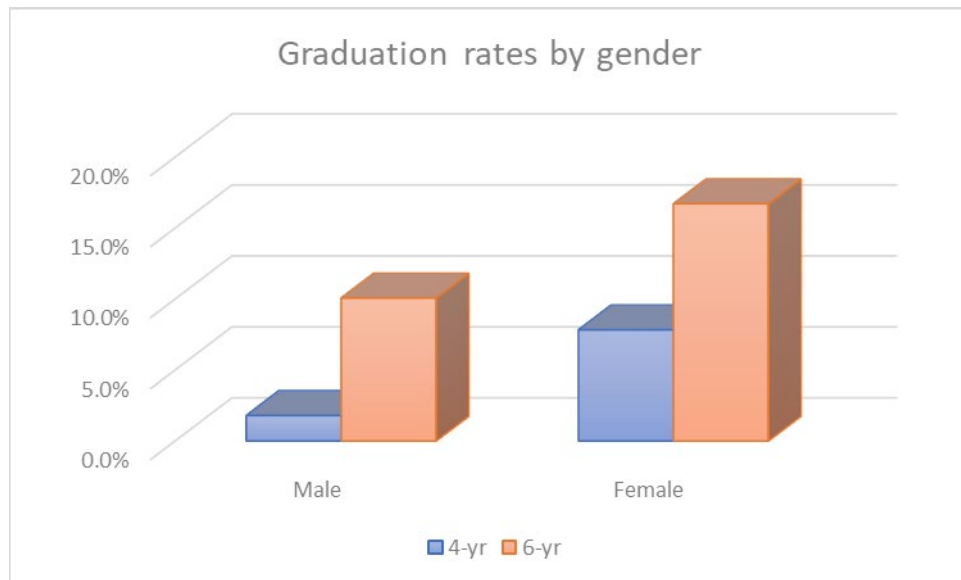
A breakdown of six-year graduation rates reveals male students of color persisted and graduated at a lower rate under the previous system.
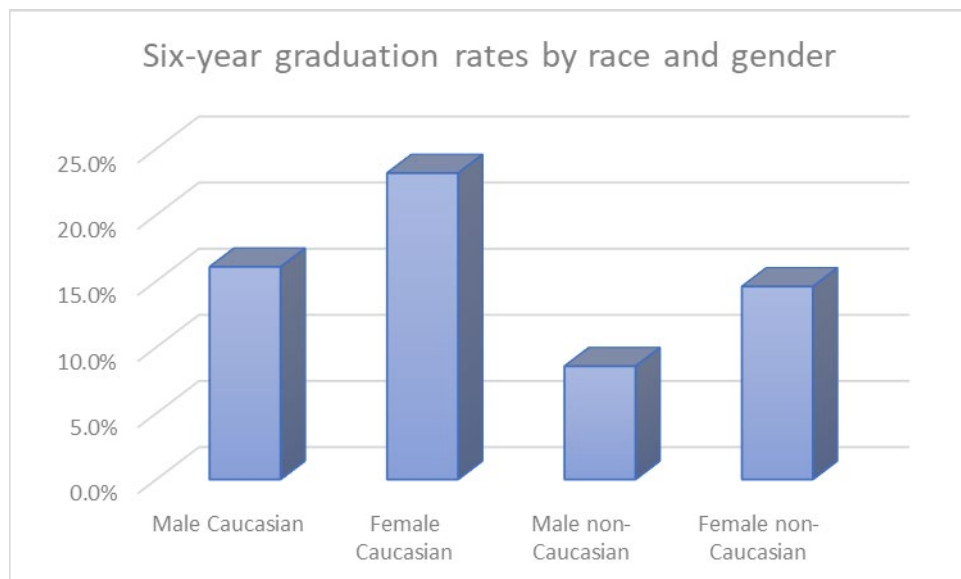
Summary Observations

- Advising students into the algebra track puts many of them into extensive remediation.
- Students succeed at low rates and many never attempt a college-level MATH course.
- Students of color are disproportionally disadvantaged.

Math to a Degree Goal

Based upon the data the Implementation Committee established the following goal for *Math to a Degree*.

Goal: Following consultations with program faculty each department chair will select a Mathematics Pathway for program majors that aligns with their chosen area of study. Non-STEM department chairs will choose a non-algebraic pathway.

Non-Algebraic Pathways:

- MATH 1332 (Contemporary Math I) and MATH 1342 (Statistics)
- MATH 1342 (Statistics) and PSYC 2317 (Introduction to Statistical Methods)

Algebraic Pathways:

- MATH 1314 (College Algebra) and MATH 1316 (Trigonometry)
- MATH 2311, 2312, 2413, 2414 (Pre-Cal to Calculus track)
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- MATH 1314 (College Algebra) and MATH 1350 (Math for Elementary School Teachers)

This effort will be supported by training for advisors, free tutoring for students in *The Math Shop*, and careful monitoring and updating of the two main non-algebraic mathematics courses, Contemporary Math and Statistics. Lamar's Director of First-Year Math Experience will keep courses aligned with the recommendations of professional societies. Finally, the QEP Implementation Committee will work to inform the campus community regarding mathematics pathways.

Steering Committee Membership:

Dr. Jeremy Alm	Director QEP/Math Department Chair
Ms. Mandy Arceneaux	Associate Director, Marketing Relations
Dr. Cristian Bahrim	Professor, Physics
Dr. Daniel Bartlett	Instructor, English and Modern Languages
Dr. Nicholas Brake	Associate Professor, Civil Engineering
Dr. Kevin Dodson	Dean, Honors Program
Dr. Bianca Easterly	Assistant Professor, Political Science
Mr. Craig Escamilla	Executive Director, Student Success

Ms. Debra Greschner	Instructor, Music
Dr. Theresa Hefner-Babb	Executive Director, Planning & Assessment
Ms. Kayla Holloway	Director, Undergraduate Advising Center
Dr. Derina Holtzhausen	Dean, Fine Arts & Communication
Ms. Rachel Hoover	Director, STAR Services
Dr. Jacqueline Jensen-Vallin	Director, First Year MATH Experience, Associate Professor, Mathematics
Dr. Ted Mahavier	Professor, Mathematics
Dr. Alberto Marquez	Associate Professor, Industrial Engineering
Ms. Rebekah Maxwell	Director of Scholarships
Ms. Diedra Mayer	Executive Director Admissions/Recruitment
Dr. Vicki McNeil	Vice President Student Affairs
Mr. Kyle Mutz	Director, Services Student w/ Disabilities
Dr. Joe Nordgren	Acting Associate Provost
Ms. Karen Nichols	Associate Professor, Library Services
Dr. Paula Nichols	Associate Provost Digital Learning
Dr. Brenda Nichols	Interim Provost and VP Academic Affairs
Dr. Peyton Richmond	Academic Director, Undergraduate Programs
Ms. Melissa Riley	Instructor, Mathematics
Mr. David Rose	Instructor, Accounting & Business Law
Mr. Jarrod Rossi	Assistant Director, Institutional Effectiveness
Dr. Bishar Sethna	Research and Accreditation Analyst Sr.
Dr. Marleen Swerdlow	Professor, Accounting & Business Law
Dr. Freddie Titus	Associate Professor, Teacher Education
Dr. Ricardo Tovar-Silos	Associate Professor, Information Systems & Analysis
Ms. Sarah Tusa	Associate Professor, Library Services
Dr. Arne Almquist	Dean of the Mary and John Gray Library
Dr. James Slaydon	Chair/Associate Professor, Economics and Finance
Dr. Robert Worley	Associate Professor, Criminal Justice
Dr. Qingjiang Yao	Associate Professor, Communication
Dr. Chunda Chen	Associate Professor, Economics and Finance
Dr. Jianjiang (Jane) Liu	Professor, Computer Science
Dr. Stacey Bumstead	Assistant Professor, Teacher Education

In March 2019 University administration accepted the newly proposed Math to a Degree as the institution's Quality Enhancement Plan. Subsequently, the QEP Director officially disbanded the Steering Committee and constituted the Implementation Committee. The charge for this Committee is as follows:

> The Implementation Committee will be constituted by faculty, staff, and students from a broad range of constituencies across campus, including Admissions, Advising, Marketing, and Planning and Assessment. This committee is tasked with overseeing all aspects of implementing the QEP by:

- Assisting the Director in writing the QEP Proposal.
- Modifying the QEP as necessary and tracking changes.
- Assisting in marketing the QEP and changing the culture and attitudes toward mathematics on campus.
- Collecting relevant data to assess the QEP.
- Assisting the Director in writing the QEP Impact Report.

Implementation Committee Membership

Ex Officio	
Jeremy Alm	Director QEP/Math Department Chair
Theresa Hefner-Babb	Exec. Dir., Planning and Assessment/SACSCOC Liaison
Brenda Nichols	Interim Provost and VP for Academic Affairs
Joe Nordgren	Acting Associate Provost
Jarrod Rossi	Assistant Director, Institutional Effectiveness
Bishar Sethna	Analyst, Institutional Research and Reporting
Mandy Arceneaux	Associate Director/Marketing
Members	
Craig Escamilla	Retention & Student Success
Natalie Tindall	Fine Arts and Communication
Mark Mengerink	Arts and Sciences
Deidra Mayer	Admissions
Kayla Holloway	Advising
Freddie Titus	Education
Jackie Jensen-Vallin	Arts and Sciences

Jamarkus Corks	Staff/Alumni
Kathy Wood	Staff
Brandy Palmer	Arts and Sciences
Katey McCall	Student
Jamie Cooper	Student

SUBCOMMITTEES	
Assessment	**Budget**
Jeremy Alm	Jamie Larson*
Jarrod Rossi	Theresa Hefner-Babb
Brenda Nichols	Joe Nordgren
Bishar Sethna	Brenda Nichols
Craig Escamilla	
Marketing	**Messaging**
Brenda Nichols	Jeremy Alm
Deidra Mayer	Natalie Tindall
Mandy Arceneaux	Mark Mengerink
Jamarkus Corks	David Short*
Katey McCall	
Advising	**Literature Review**
Kayla Holloway	Mark Mengerink
Jackie Jensen-Vallin	Brandy Palmer
Freddie Titus	David Carroll
	Nataliya Svyeshnikova*
*not a member of the implementation committee	

Review of the Literature

Introduction

Courses in algebra and geometry designed to prepare students for calculus have been the high school and early college standard for over half a century. This pathway originated with entrance requirements at institutions of higher education such as Harvard and were adopted as the norm after the launch of Sputnik incentivized the United States to reform science and engineering education to boost its technological advancements. Accordingly, one major focus in lower-division collegiate mathematics was on the "Algebra for All" initiative. In 1998, the *National Science Foundation's Report of the Senior Assessment Panel for the International Assessment of United States Mathematical Sciences* listed 11 fields of study that overlapped with mathematics including economics, manufacturing, physics, and chemistry. Released in 2013 *The Mathematical Sciences in 2025* report published by the National Research Council, expanded this number to 21 fields with the expectation of growth in the future. The new list includes ecology, entertainment, social networks, marketing, and defense, presenting an increase in jobs for "workers with mathematical science skills at all degree levels, regardless of their field of training" (National Research Council, 2013, p. 69). Technological advancements have created a need for a much more diverse set of mathematical skills in the workplace in professions other than engineering and other STEM-based fields.

Traditional First-Year Courses

Traditional college readiness first-year courses in mathematics are often barriers to student success, reducing students' chances of graduating in four years. According to the watershed national study directed with Achieving the Dream institutions, 60% of incoming students were placed in at least one college readiness math course, but only 20% ended up completing a college-level math course (Bailey, Jeong, & Cho, 2010). Additionally, 50 % of the students enrolled in college algebra failed (Saxe & Braddy, 2015).

To increase student success rates, reduce college readiness hours, and improve course and degree completion, faculty are developing pathways and improving mathematics curricula (Saxe & Braddy, 2015). National initiatives, including California Acceleration Project, Carnegie Foundation for Advancement in Teaching's Quantway and Statway, Advancing Math Pathways for Student Success, and Transforming Postsecondary Education in Mathematics, are concentrating on the development of, or support for, pathways in mathematics. Administrators and mathematics faculty are seeking to reduce the failure rate in college readiness and gateway math courses, offer courses relevant to various educational programs, and provide a selection of mathematical pathways suitable for their chosen professions.

In designing courses, faculty focus on maximizing mathematical sophistication of the student population by making a proper selection of topics and strategically ordering the way they are introduced in the classroom. The Mathematical Association of America's Committee for Curriculum Renewal Across the First Two Years (CRAFTY) is working to identify and encourage the review of the first two-years curriculum. In a panel organized by CRAFTY at the 2016 Joint Mathematics Meetings, panelists reported that curriculum changes should include using simulations in statistics courses, emphasizing quantitative reasoning, incorporating biological and social science models in calculus, and developing pathways that support underprepared students (Ganter, 2016). These pathways answer the call for mathematical application outside the realm of algebra.

Alternatives to Algebra

No stand-alone elementary statistics course is flexible enough to attend to the needs of every student population. The main goal of all introductory statistics courses is to teach students to think statistically. The focus is not necessarily on the mastery of statistical techniques, but rather on the effective collection and analysis of data. Students are required to demonstrate and apply basic ideas of statistical inference, draw conclusions from output generated by statistical software, and demonstrate an awareness of ethical issues associated with sound statistical practice (*GAISE College Report,* 2016, p. 8). Many statistics faculty are moving toward a

technology-based course using *R*, *Minitab*, or *Excel* as their focal points. Incorporating of technology into the classroom setting is necessary to make courses more relevant to students' future careers.

Liberal arts math courses like Contemporary Math, incorporate modern applications and quantitative reasoning. In these courses, students often study logic, set theory, and probability. The flexibility in the curriculum is necessary to conform to the demands of an increasing number of partner disciplines. The focus should not be in achieving mastery in algebraic-intensive manipulations but in identifying and critically analyzing the reasoning about real-life situations using logic, set theory, and discrete probability.

Current research supports the implementation of these pathways, showing that students are more likely to stay enrolled and graduate within six years when they complete a required college-level math course relevant to their field of interest within the first year (Belfield, Jenkins, & Lahr, 2016).

Many programs are showing both increases in success rates and decreases in time to completion of a first mathematics course (Charles A. Dana Center, 2019). As of 2018, more than 15 states have implemented mathematics pathways on a broad scale. In response to such developments, some faculty have raised concerns about rigor within the discipline.

Views of Rigor in Mathematics Courses

According to the literature review and interviews conducted by members of the Charles A. Dana Center with mathematicians during national conferences, there are four salient views of *rigor in mathematics* (2019). The first view emphasizes the use of deductive reasoning to prove theorems. The second view of rigor emphasizes instruction that "covers a lot of material" by teaching a long list of topics and concepts; which may undermine flexible adaptation to student needs. The third view of rigor emphasizes lectures, high-stakes summative tests, low pass rates, and low grades. Finally, the fourth view emphasizes college algebra as the gold standard of collegiate mathematics instruction in which college algebra stands as a proxy for readiness to advance to subsequent courses. Multiple understandings and

uses of rigor undermine the mathematical learning experience available to students. Consequently, a shared definition of rigor is necessary to serve all student populations. The Dana Center study proposed a view that rigor in mathematics is *a set of skills that centers on the communication and use of mathematical language*. Specifically, students must be able to communicate their ideas and reasoning with clarity and precision by using the appropriate mathematical symbols and terminology. Here, *clarity* means logical thinking, inference, and deduction. *Precision* means detailed and careful use of mathematical language. Clarity and precision are necessary so that students can demonstrate to themselves and others that their mathematical approach works and is appropriate in the context for which it has been used.

Faculty can achieve good mathematical practice in an effective pathway-appropriate course by developing classroom assignments and activities that model rigor. The emphasis on proper notation, support of students while using precise mathematical language, and feedback about the clarity of their reasoning are essential to an effective course.

The Charles A. Dana Center offers five recommendations to help move the forward a shared definition of rigor.

1. Provide faculty, administrators, and system leaders with professional development opportunities.

2. Consider revisions to curricula that embrace rigor in mathematics.

3. Consider ways to utilize technology in the integration of rigor in mathematics.

4. Encourage faculty and system leaders to engage in conversations with colleagues across the educational continuum.

5. Encourage faculty and system leaders to examine and revise their understanding of rigor as it relates to course requirements for graduation, admissions, and placement.

Learning the language of mathematics and the insights that accompany such learning may help students not only determine if they pursue mathematics beyond gateway courses but inform their citizenship and advance their careers (Charles A. Dana Center, 2019).

Recommendations from Professional Societies

Recommendations for developing an effective course in statistics (*GAISE College Report*, 2016, p. 3) include:

1. Teach statistical thinking. Teach statistics as an investigative process of problem-solving and decision-making. Give students experience with multivariable thinking.
2. Focus on conceptual understanding.
3. Integrate real data with a context and purpose.
4. Foster active learning.
5. Use technology to explore concepts and analyze data.
6. Use assessment to improve and evaluate student learning.

GAISE Recommendations for developing an effective course for Contemporary Math include:

1. Draw on the interests of the individual student.
2. Teach important mathematics.
3. Emphasize understanding, going as slowly as necessary rather than trying to cover one more topic, so the students have a sense of mastery.
4. Encourage students to use mathematics they already know and build on it.
5. Let students create a project of their own choosing and share it with everybody else (*Journal of Humanistic Mathematics*, Grabiner, 2011).
6. Emphasize mathematical thinking.
7. Keep prerequisites minimal.
8. Implement inquiry-based learning (*MAA Focus*, Nordstrom, 2017).
9. Encourage colleagues to learn from each other and utilize national policy documents and curricular guides.

10. Gather and analyze local student data.
11. Build a culture of departmental and university change through ongoing conversations.
12. Provide faculty development and support (*MAA Focus*, Ganter, 2016).

Case Studies

[Prior to Texas HB 2223: Effective Fall 2017]

This section documents the history of two students (names changed) for whom Lamar's proposed *Math to a Degree* Quality Enhancement Plan would have been helpful. First, consider the academic narrative underlining Jose's journey to degree completion.

José was admitted to LU for the Fall 2012 term. After being enrolled for 11 consecutive semesters, José graduated with a Bachelor of Science in Communication Broadcasting degree, having amassed 143 attempted credit hours in a program that requires 120 earned hours to complete. During these five-and-a-half years, Jose attempted 21 credit hours in College-Readiness pre-requisite and required Core Curriculum math courses. It is noteworthy that 21 is the number of semester credit hours required to earn a Minor in Mathematics.

Spring 2013	CRMA 0370	College Readiness Pre-Algebra	F
Fall 2013	CRMA 0370	College Readiness Pre-Algebra	C
Spring 2014	CRMA 0371	College Readiness Algebra I	F
Fall 2014	CRMA 0371	College Readiness Algebra I	F
Spring 2015	CRMA 0371	College Readiness Algebra I	F
Summer 2017	PSYC 2317	Introduction to Stat Methods	drop
Fall 2017	MATH 1332	Contemporary Mathematics I	B

At the end of Spring 2015 and after enrolling in five semesters of college readiness math courses, José was still two courses shy from being allowed to register for College Algebra. In Fall 2017, however, Contemporary Mathematics I was offered for the first time in a face-to-face format. José earned an above average "B" in the course, indicating his weakness in algebra need not have been an impediment along his track to success.

Now consider the academic narrative underlining Anna's four-and-a-half-year journey that prompted her to leave the University. Anna was admitted to Lamar for the Fall 2013 term, and from that time forward, she was required to enroll in the following CRMA courses (a grade of "U" indicates that a student earned a failing grade but did complete the course):

Spring 2014	CRMA 0370	College Readiness Pre-Algebra	U
Fall 2014	CRMA 0370	College Readiness Pre-Algebra	C
Spring 2015	CRMA 0371	College Readiness Algebra I	F
Fall 2015	CRMA 0371	College Readiness Algebra I	F
Spring 2016	CRMA 0371	College Readiness Algebra I	U
Fall 2016	CRMA 0370	College Readiness Pre-Algebra	B
Spring 2017	CRMA 0371	College Readiness Algebra I	U
Fall 2017	CRMA 0371	College Readiness Algebra I	C
Spring 2018	CRMA 0372	College Readiness Algebra II	U

After three unsuccessful attempts at CRMA 0371, Anna was sent back to CRMA 0370, a course she already passed. After 27 attempted CRMA hours, Anna was never allowed an opportunity to attempt a college-level MATH course.

Anna did not re-enroll for Fall 2018. Instead, she left the University with a 2.7 cumulative GPA that included 115 hours attempted, 82 hours earned, and no degree.

In each case the student enrolled in the University prior to the passage of Texas Law HB 2223 (2017) which mandated co-requisites and restricted students to nine credit hours of college readiness courses. Beginning in Fall 2018 students enrolled at Lamar University could no longer repeat CRMA courses multiple times.

Academic Advising

Student-centered academic advising is crucial for *Math to a Degree* to achieve its intended goal. Lamar utilizes a centralized advising model; therefore, all traditional, non-LU Online, first-year and sophomore students are assigned a dedicated full-time academic advisor employed in the Undergraduate Advising Center (UAC). Centralized advisor training, clear and consistent messaging, and professional oversight of enrollment will directly impact the success of Lamar's proposed QEP.

Create an Advising Guide

Once department chairs have selected an appropriate pathway for their majors, the QEP Implementation Committee will partner with its Marketing Subcommittee and create one-page visual handouts for each pathway and the major degree programs aligned with it. This will enable stakeholders (administrators, advisors, faculty, staff, and students) to easily determine the pathway for each major. This handout will be most helpful to advisors during their discussions with students who are in the process either of selecting a major or changing majors and will be particularly important to students contemplating a shift in direction to a different degree program.

Conduct a Change-of-Major Analysis

Because changing majors often delays graduation for students, the QEP Implementation Committee is determined to ensure that establishing mathematics pathways does not exacerbate those possible delays. Therefore, after pathways are identified for each major, the Implementation Committee, with assistance from the Undergraduate Advising Center, will analyze change-of-major patterns and determine if modifications or additions need to be made to the mathematics pathways in order to reduce the accumulation of unnecessary and unwanted credit hours.

Provide Training for Advisors

Since academic advising is designed to enhance student development and success, particularly for first year and sophomore students, the Director of Lamar's Undergraduate Advising Center will coordinate advisor training for the QEP's mathematics pathways program. Advisors need to know the content and purpose of the pathways, as well as the ramifications for students who decide to switch majors.

Enrich New Student Orientation

Most Lamar first year students complete advising and enrollment during New Student Orientation (NSO). NSO consists not only of individual sessions with each student, but also group sessions in which students learn valuable information about university services, campus life, course scheduling, and financial assistance. Lamar's NSO structure further ensures students will discover a great deal about *Math to a Degree* as a University-wide project devoted to student learning and student success by placing students in appropriate mathematics courses relevant to their plans of study. During the latter part of NSO, students have an opportunity to meet one-on-one with their advisors in order to review their upcoming course selections and to respond to any questions they may have about *Math to a Degree* and their degree plan requirements. Students who are unable to participate in NSO are invited to arrange one-on-one advising sessions with their respective advisors in order to gather detailed information about the QEP and how *Math to a Degree* might impact their academic decisions.

Given that Lamar students are required to meet with their academic advisors each semester, pathway conversations will extend beyond NSO advising. In addition to ongoing advisor-student discussions about *Math to a Degree*, the UAC employs a number of course enrollment verifications to ensure students register for courses that count toward degree progression and therefore qualify for financial aid. An additional check will be created to verify core required mathematics courses align with the selected pathway associated with each major.

Action Plan

At Lamar University, several factors influence student decision-making about course scheduling. First, all freshman, sophomore and transfer students are advised in the UAC, degree plans affect how advisors guide students. Second, some first-year students also are required to be advised in their home departments or programs, which may result in mixed messaging. Third, students often talk with one another about core curriculum and program-required classes they have enjoyed and about those courses they purposely have avoided. Fourth, scheduling conflicts also enter the equation when the course or courses for which a student planned to enroll are filled for the semester.

These and other moving parts must work in concert for students to be advised and subsequently enrolled in the appropriate degree program and math pathway that link to their career aspirations. The QEP Implementation Committee has identified the following seven critical action items:

1. Signed Declarations of Intent, confirming the selected pathway for department majors.
2. Ongoing Math Shop/Student Support.
3. Proactive Academic Advising.
4. Quality and substance of course content.
5. Bringing course content into alignment across all sections.
6. Professional development for faculty.
7. Tracking curriculum changes and assessment.

1. Declarations of Intent

Based on input from faculty, the Undergraduate Advising Center (UAC) takes its direction from departments and programs across campus in order to place students in appropriate math courses. To provide clear direction to advisors, the QEP Director will ask each department or program chair to sign a Declaration of Intent (Appendix C) wherein a pathway is chosen as the required pathway for students in that program. Once complete, a summary table will be provided to the Director of the UAC.

2. *The Math Shop* and Student Support

The Math Shop is a drop-in mathematics tutoring center where graduate student assistants engage in proactive support for students who struggle in their first-year math courses spanning from MATH 1314 College Algebra to MATH 2414 Calculus and Analytical Geometry II. Prior to Fall 2018, tutoring was offered in an outdated room without faculty or staff supervision. During

the summer of 2018, LU invested significantly in mathematics tutoring by providing $180,000 to renovate several rooms, creating *The Math Shop*, and reconfiguring a new computer classroom for use in MATH 1342. Described below:

The mission of Tutoring Services of the Department of Mathematics is to assist Lamar University's undergraduate students in developing content-appropriate study strategies and content knowledge for all first-and second-year mathematics courses, through Calculus II. Through drop-in tutoring staffed by undergraduate and graduate students who are trained in specific math-course content, we guide undergraduate students at Lamar University to become confident mathematics students who are independent, self-regulated learners.

In support of this mission, the Mathematics Department hired a Coordinator of First-Year Mathematics Experience. The Coordinator will change how graduate student tutors are trained to address the needs of Lamar students, specifically as those needs relate to *Math to a Degree* learning experiences and more generally to address those needs shared by many students who seek to improve their mathematical skills. Prior to the beginning of every semester, the Coordinator will assign each graduate tutor to serve as notetaker in a first-year mathematics course. Tutors will attend each course meeting of an assigned section of the course, take notes, and fill in gaps left by the lecture. The Coordinator will post these notes online so students may access them whenever and however often they wish.

Figure 1: "before" photo of Tutoring Lab

3. Advising

To ensure students understand how *Math to a Degree* affects them and to ensure they enroll in the correct courses, several academic advising-related actions must be implemented:

1. Aggregate all the Declarations of Intent by academic departments selecting a pathway for each major and degree plan.
2. Utilize Declarations of Intent to develop handouts that depict the six pathways and list those majors associated with each pathway.
3. Analyze change of major patterns to determine if a need exists for bridges to connect pathways.
4. Create robust pathway training for academic advisors.
5. Establish and incorporate pathway compliance checks to detect students enrolled in incorrect pathway courses and contact students for enrollment adjustments.

Figure 2: "after" photo of The Math Shop

4. Marketing of New and Revised Courses

Before Fall 2019, MATH 1342 Statistics was taught as a theoretical pencil-and-paper course that was technique-driven, not data-driven. As of Fall 2019, MATH 1342 Statistics has been updated to abide by the *Guidelines for Assessment and Instruction in Statistics Education (GAISE)*:

1. Teach statistical thinking. Teach statistics as an investigative process of problem-solving and decision-making. Give students experience with multivariable thinking.
2. Focus on conceptual understanding.
3. Integrate real data with a context and purpose.
4. Foster active learning.
5. Use technology to explore concepts and analyze data.
6. Use assessment to improve and evaluate student learning.

(See also Literature Review)

In order to promote the new version of MATH 1342, the QEP Implementation Committee will partner with the University's Office of Marketing Communications to determine how best to relay to students, advisors, staff, and faculty the new and improved MATH 1342.

In early Spring 2020, faculty and staff will receive postcards with details of the QEP. A series of short videos called *Math Myths* will be featured weekly on campus information screens. In addition, posters and signage will be placed in buildings throughout campus.

As a build up to the launch of the QEP, scavenger hunt activities will be held for students, faculty and staff. Marketing items will include buttons, notebooks and pens, t-shirts and drawstring bags with the QEP logo. These items also will be distributed during campus recruiting events such as Cardinal View and New Student Orientation when students select and register for classes.

5. Course Alignment Across Multiple Sections

The Department of Mathematics hired a Director of First-Year Mathematics Experience (DFYME) to unify student learning among all sections of all pathway courses. For each course, the DFYME will provide a common syllabus, create master templates in course homework systems, and establish common deadlines. Instructors of pathway courses (Math 1314, Math 1332, Math 1342, Math 2311, Math 2312) will meet weekly to discuss course pacing, approaches to content delivery, important topics to cover, and common student misconceptions. While no common quizzes or exams are expected, synchronizing content and pacing will preserve unity among all sections, giving similar mathematical experiences to all students in a course regardless of the instructor. Implementing these strategies will provide a level of reliability as the DFYME investigates the pacing, coverage, and support needed for student success in each of these courses. Foremost, these initiatives will create a culture of continuous improvement not only among the faculty who teach these courses but also among the students who enroll in them.

6. Faculty Professional Development

As outlined above, the Director of First-Year Mathematics Experience (DFYME) coordinates multiple sections of pathway classes from semester-to-semester. The Director will engage with faculty teaching these pathway courses during weekly coordination meetings to discuss the pacing, coverage, and content of their instructional assignments.

Further, the DFYME will host monthly Teaching Teas dedicated to enhancing and supporting the teaching of those involved in the first-year curriculum. Teaching Teas will have a topical focus based on a pre-meeting reading. The DFYME plans to structure conversations about how more effectively to use the course management system in courses, ways to support diversity and inclusion in their classrooms, and ways to incorporate a greater number of active and collaborative learning experiences for their students.

7. Tracking Changes to Degree Plans

Pertaining to the QEP implementation process, each department will review its undergraduate degree program and choose the pathway best suited for their degree plans. Based on this process, department chairs will complete and sign a Declaration of Intent form and return it to the QEP Director. Each department will be responsible for submitting program changes for approval through the required channels, which include the College Curriculum Committee, Undergraduate Curriculum Council (UCC), and Texas State University System Board of Regents. The Executive Director of Planning and Assessment, who serves as an ex-officio member of the UCC, will assist with tracking degree plan changes. Ideally, all undergraduate degree programs will select a Mathematics Pathway and update their degree plans before the end of the first year of the QEP implementation.

Timeline

Fall 2019

- Request baseline data from Management Information and Analysis.
- Rollout of redesigned GAISE-compliant MATH 1342 Statistics.
- QEP Director begins meeting with department chairs and secures signed Declarations of Intent.
- Submit MATH 1324 syllabus for approval.
- Finalize QEP name and logo.

Spring 2020

- Pilot one section of MATH 1324.
- Marketing event for students on February 25, March 4, March 23, April 4.
- Marketing Plan launched.
- Scavenger Hunt activities in February and March to familiarize students with QEP.
- QEP Director continues to meet with department chairs to secure Declarations of Intent.
- Pilot Critical-Thinking Assessment Test (CAT) assessment.

Summer 2020

- Participation in orientation events during Summer.
- Analyze data from 2019-2020 academic year.

Fall 2020

- Rollout of MATH-1324 Math for Business and Social Sciences.
- Finalize Declarations of Intent.
- Begin data collection for QEP assessment.

Spring 2021

- Degree plan changes completed.
- Continue data collection.

Summer 2021

- Analyze data from 2020-2021 academic year.

Organizational Charts

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                          Implementation
                            Committee

  Assessment      Budget        Advising      Marketing      Messaging     Literature Review
 Subcommittee   Subcommittee   Subcommittee  Subcommittee   Subcommittee    Subcommittee

 develop the overall  develop estimation  inform UAC advisors  design and        persuade non-STEM   produce a review of
 assessment plan      of necessary        of policies and      distrubute        department chairs   relevant literature
                      resources           rationales           promotional
                                                               materials

 track the assessment record and file     inform UAC advisors  provide information meet with
                      meeting minutes      of degree plan      on redesigned 1322  departments
                                           changes             & 1342

 write the assessment                      communicate                             assist with
 portion of the report                     questions and                          paperwork to change
                                           concerns from                          degree plans
                                           advisors
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President

Provost

Assistant Provost for Enrollment Management

Vice Provost Digital Learning

Acting Associate Provost

SACSCOC Liaison

Executive Director, Retention and Student Success

Director, Undergraduate Advising Center

QEP Director

Math Chair

Assistant Director, Institutional Effectiveness

Director, First-Year Math Experience

1314 Instructors

1332 Instructors

1342 Instructors

2311 Instructors

Coordinator Math Shop

Proposed Budget and Resources

Academic Year	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025
Personnel	$44,300	$44,150	$44,150	$44,150	$47,150
Faculty Development & Training	$29,700	$31,000	$31,000	$31,000	$31,000
Assessment					$10,000
Student Support Materials	$1,170	$1,000	$1,000	$1,000	$1,000
Office Equipment	$500	$500	$500	$500	$500
Public Relations	$5,000	$2,000	$2,000	$2,000	$2,000
Total	$80,670	$78,650	$78,650	$78,650	$91,650

The proposed budget for *Math to a Degree* will be reviewed during the annual budget building process and adjusted as needed. The QEP Director will work each year with the AVP of Financial Services and the Manager of Budget to ensure financial resources are available to augment the Quality Enhancement Plan and any needed alterations.

The proposed budget is based on a student achievement-centered quality enhancement plan however, years two through five include funding for consultants. Including additional funds for consultants and the Assistant Director, Institutional Effectiveness will allow for flexibility in the assessment of the QEP.

The *Math to a Degree* five-year budget plan is divided into two sections: one for Personnel and another for Maintenance and Operations.

Personnel-related expenses include salaries and stipends for faculty/staff who are assigned to the QEP.

- **QEP Director** – oversees all aspects of the QEP implementation and receives a monthly stipend throughout the academic year. Initially this half-time .5 FTE assignment will extend for one year and will reduce to .25 FTE for each the remaining four years.
- **Director First-Year Math Experience** – oversees courses in the six pathways for *Math to a Degree*. In this role the director coordinates

faculty teaching, approves course syllabi, monitors assignments and testing, and administers *The Math Shop* tutoring lab. The monitoring and success of the QEP relies on data gathered by the director so two-thirds of the stipend will be provided by the QEP budget.

- **Assistant Director Institutional Effectiveness** – compiles core curriculum reports and assists the Director First Year Math Experience with reporting Math Pathway assessment data. During years four and five the Director will co-author the final report and assess the program.
- **Math Shop Tutors** – provide support for students enrolled in Math courses. The budget includes $15,000 to pay hourly wages to graduate assistants employed in *The Math Shop*. Tutors will also participate in three inter-rater reliability sessions during the academic year.
- **Adjunct Faculty** – teach Pathway courses. Funding for additional faculty will allow the Department of Mathematics to maintain low faculty-to-student ratios.
- **Student Assistant** – helps the QEP Director with web page maintenance and the Assistant Director Institutional Effectiveness with collecting data for the 2025 QEP Impact Report.

The Maintenance and Operations (M&O) budget includes available funding for costs apart from personnel. Funds in this section can be moved from one account to another with approval of the Manager of Budget in Finance and Operations.

- **Faculty Development and Training** - encompasses travel to SACSCOC conferences, professional development training for math faculty teaching Pathway courses, and funding for three departmental meetings each year for graduate assistants to conduct inter-rater reliability sessions. Beginning in year two this area also includes funding for consultants to advise on any modifications to the QEP.
- **Student Support Materials** - designates funding for common scientific calculators for use in math course assessments. In years three through five the funding allocation will include educational resources and materials for use in classrooms and *The Math Shop*.
- **Office Supplies** – provides QEP Director with funds for technology replacements and standard office supplies. During year one, technology-related expenses can be allocated through Higher Education Funds.
- **Public Relations** - includes allocations for marketing the QEP. First year funding will be greater than in years two through five. Promotional items will be needed to market *Math to a Degree* to

prospective students at high school college nights, Cardinal Views, campus visits, and New Student Orientations.

Members of the QEP Budget Committee include: Executive Director Office of Planning & Assessment/SACSCOC Liaison, Interim Provost and Vice President for Academic Affairs, Coordinator - Academic Affairs, Acting Associate Provost, and Associate Vice President for Financial Services.

QEP Budget Summary Table

Year	2020-21	2021-22	2022-23	2023-24	2024-25
Personnel	$44,300	$44,150	$44,150	$44,150	$47,150
M & O	$36,370	$34,500	$34,500	$34,500	$44,500
Total	$80,670	$78,650	$78,650	$78,650	$91,650

QEP Budget by Academic Year		
Academic Year 2020-2021 (Year 1)		
QEP Impact Report due March 2025		
Item name	**Item Cost**	**Notes**
Personnel		
QEP Director	$6,300	$700 Month / 9 Months
Director - First-Year Math Experience	$6,000	$500 stipend per month/12 months
Math Shop Tutors	$15,000	Graduate Assistants/hourly
Student Assistant	$5,000	19.50 hours/week at $10 per hour
Adjuncts for Fall Semester	$12,000	Adjunct faculty 3/$4,000
Total Personnel Budget	**$44,300**	
Maintenance and Operations		
Faculty Development & Training	**$29,700**	
Travel to SACSCOC or QEP Related professional conferences for QEP Director	$8,700	SACSCOC meetings in Nashville (Winter 2020) and New Orleans (Summer 2021)
Math faculty professional development funds	$15,000	Funding allows Pathways faculty to attend professional conferences and for the Math Department to invite guest speakers to campus.
Funds for *The Math Shop* tutor training sessions	$6,000	Inter-rater reliability. Fall pre-test, Fall post-test, spring post-test. Tutor evaluations of student work.

Student Support Materials	**$1,170**	
90 scientific calculators	$1,170	$13.00 x 90=$1,170
Office Equipment	**$500**	
Computer and office supplies for QEP Director	$500	Computer from HEF funds
Public Relations	**$5,000**	
Marketing	$5,000	Initial funding for posters and promotional items for students.
Total Operations Budget	**$36,370**	
Total: 2020-2021	**$80,670**	

Academic Year 2021-2022 (Year 2)		
QEP Impact Report due March 2025		
Item Name	**Item Cost**	**Notes**
Personnel		
QEP Director	$3,150	$350 Month/9 Months
Assistant Director - Institutional Effectiveness	$3,000	Stipend for assessment data report for core curriculum.
Director - First Year Math Experience	$6,000	$500 stipend per month/12 months
Math Shop Tutors	$15,000	Graduate Assistants / hourly
Student Assistant	$5,000	19.50 hours/week at $10 per hour
Adjuncts for Fall Semester	$12,000	Adjunct faculty 3 / $4,000
Total Personnel Budget	**$44,150**	
Maintenance and Operations		
Faculty Development and Training	**$31,000**	
Travel to SACSCOC or QEP Related professional conferences	$10,000	SACSCOC Meetings in Dallas, TX (Winter 2021) and Orlando (Summer 2022)
Math faculty professional development funds	$10,000	Funding allows Pathways faculty to attend professional conferences and for the Math Department to invite guest speakers to campus.
Funds for *The Math Shop* tutor training sessions	$6,000	Confidence interval sessions. Fall Pre-test, Fall post-test, spring post-test. Tutor evaluations of student work.
Consultants	$5,000	Consultants for reviewing QEP progress and implementing modifications.

Student Support Materials	**$1,000**	
75 scientific calculators	$1000.00	$13.00 x 75 = $975
Office Equipment	**$500**	
Office supplies QEP Director	$500	
Public Relations	**$2,000**	
Marketing/Publications	$2,000	Funding for posters, promotional items for students.
Total Operations Budget	**$34,500**	
Total: 2021-2022	**$78,650**	

Academic Year 2022-2023 (Year 3)		
QEP Impact Report due March 2025		
Item Name	**Item Cost**	**Notes**
Personnel		
QEP Director	$3,150	$350 monthly / 9 Months
Assistant Director - Institutional Effectiveness	$3,000	Stipend for assessment data report for core curriculum.
Director - First Year Math Experience	$6,000	$500 monthly/12 months
Math Shop Tutors	$15,000	Graduate assistants/hourly
Student Assistant	$5,000	19.50 hours/week
Adjuncts for Fall Semester	$12,000	Adjunct Faculty 3/ $4,000
Total Personnel Budget	**$44,150**	
Maintenance and Operations		
Faculty Development and Training	**$31,000**	
Travel to SACSCOC or QEP Related professional conferences	$10,000	SACSCOC Meetings in Atlanta (Winter 2022) and TBD
Math faculty professional development funds	$10,000	Funding allows Pathways faculty to attend professional conferences and for the Math Department to invite guest speakers to campus.
Funds for *The Math Shop* tutor training sessions	$6,000	Confidence interval sessions. Fall Pre-test, Fall post-test, spring post-test. Tutor evaluations of student work.

Consultants	$5,000	Consultants for reviewing QEP progress and implementing modifications.
Student Support Materials	**$1,000**	
Resources and materials for use in classroom and Math Shop tutoring lab	$1,000	
Office Equipment	**$500**	
Office supplies QEP Director	$500	
Public Relations	**$2,000**	
Marketing/Publications	$2,000	Initial funding for posters, promotional items for students.
Total Operations Budget	**$34,500**	
Total: 2022-2023	**$78,650**	

Academic Year 2023-2024 (Year 4)		
QEP Impact Report due March 2025		
Item Name	**Item Cost**	**Notes**
Personnel		
QEP Director	$3,150	$350 monthly / 9 months
Asst. Director - Institutional Effectiveness	$3,000	Stipend for work on QEP Report due March 2025
Director - First Year Math Experience	$6,000	$500 month/12 months
Math Shop Tutors	$15,000	Graduate Assistants / hourly
Student Assistant	$5,000	19.50 hours/week / $10 hour
Adjuncts for Fall Semester	$12,000	3 adjuncts/ $4,000
Total Personnel Budget	**$44,150**	
Maintenance and Operations		
Faculty Development and Training	**$31,000**	
Travel to SACSCOC or QEP Related professional conferences	$10,000	SACSCOC meetings TBD
Math faculty professional development funds	$10,000	Funding allows Pathways faculty to attend professional conferences and for the Math Department to invite guest speakers to campus.
Funds for *The Math Shop* tutor training sessions	$6,000	Confidence interval sessions. Fall Pre-test, Fall post-test, spring post-test. Tutor evaluations of student work.

Consultant	$5,000	Consultants for reviewing QEP progress and implementing modifications.
Student Support Materials	**$1,000**	
Educational resources and materials for use in classroom and *The Math Shop* tutoring lab	$1,000	
Office Equipment	**$500**	
Office supplies for QEP Director	$500	
Public Relations	**$2000**	
Marketing/Publications	$2,000	Funding for posters, promotional items for students.
Total Operations Budget	**$34,500**	
Total: 2023-2024	**$78,650**	

Academic Year 2024-2025 (Year 5)		
QEP Impact Report due March 2025		
Item Name	**Item Cost**	**Notes**
Personnel		
QEP Director	$3,150	$350 monthly / 9 months
Assistant Director – Institutional Effectiveness	$6,000	$500 monthly / 12 months
Director - First Year Math Experience	$6,000	$500 monthly/12 months
The Math Shop Tutors	$15,000	Graduate assistants/hourly
Student Assistant	$5,000	19.50 hours/week
Adjuncts for Fall Semester	$12,000	3 adjuncts/ $4,000
Total Personnel Budget	**$47,150**	
Maintenance and Operations		
Faculty Development and Training	**$31,000**	
Travel to SACSCOC or QEP Related professional conferences	$10,000	SACSCOC meetings TBD
Math faculty professional development funds	$10,000	Funding allows Pathways faculty to attend professional conferences and for the Math Department to invite guest speakers to campus.
Funds for *The Math Shop* tutor training sessions	$6,000	Confidence interval sessions. Fall Pre-test, Fall post-test, spring post-test. Tutor evaluations of student work.

Consultants	$5,000	Consultants for reviewing QEP progress and implementing modifications.
Assessment Costs	**$10,000**	
Comprehensive Assessment Review of QEP	$10,000	Report assessing faculty and students, completion rates and faculty satisfaction.
Student Support Materials	**$1,000**	
Educational resources and materials for classroom use and *The Math Shop* tutoring lab	$1,000	
Office Equipment	**$500**	
Office supplies QEP Director	$500	
Public Relations	**$500**	
Marketing/Publications	$2,000	Funding for posters, promotional items for students.
Total Operations Budget	**$44,500**	
Total: 2024-2025	**$91,650**	

Assessment Plan

Goal: Following consultations with program faculty, each department chair will select a Mathematics Pathway for program majors that aligns with their chosen area of study. Non-STEM department chairs will choose a non-algebraic pathway.

Objective One

By December 2020, department chairs will sign a Declaration of Intent identifying the Mathematics Pathway.

Outcomes

1. QEP Director will initiate campus-wide discussions with department chairs and deans regarding *Math to a Degree*.
2. QEP Director will consult with each department about the Mathematics Pathway recommended for program majors.
3. All department chairs will sign a Declaration of Intent, choosing a Mathematics Pathway for their students.
   a. Most STEM-departments will continue with the calculus-based track.
   b. Non-STEM disciplines will move away from college algebra.

Objective Two

Fall-to-fall retention will improve from a five-year baseline of 61%.

- As of Fall 2019, Lamar's current retention rate is 66%.

Outcomes

1. The QEP will target a two percent annual growth for each of the 5 years of the QEP.
2. Total retention target of 75% by 2025.

Objective Three

Percentage of FTIC students who complete their first credit-bearing college-level mathematics course within the first two semesters will increase from a five-year baseline of 58%.

Outcomes

1. The QEP will target an annual growth of two percent for each of the five years of the QEP.
2. Total FTIC completion of first credit-bearing college-level mathematics course of 70%.

Objective Four

Percentage of FTIC students who are core complete in math within the first two full academic years will increase.

Outcome

1. The QEP Assessment Committee will establish a baseline for this objective.
2. Based on these findings the committee will establish a future target.

Objective Five

Number of college readiness mathematics hours taken by FTIC students will decrease.

Outcome

1. The QEP Assessment Committee will establish a baseline for this objective.
2. Based on these findings the committee will establish a future target.

QEP Assessment Committee

Members of the QEP Assessment Committee will monitor and track the QEP outcomes.

- QEP Assessment Committee Membership:
  - Jarrod Rossi, Assistant Director, Institutional Effectiveness, Chair
  - Craig Escamilla, Executive Director, Retention and Student Success
  - Bishar Sethna, Analyst, Institutional Research and Reporting

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Appendix A: Student Data by Term

Appendix A contains performance data of all mathematics TSI restricted students entering Fall 2012 through Fall 2014. Data are separated by term. All students were advised into the "algebra track" since it was the only track available at the time.

Fall 2012 Full-time FTIC Cohort		%		
Number full-time FTIC	**1674**	100.0%		
Math TSI-restricted number	**407**	24.3%		
TSI-restricted first course attempted				
0370	**233**	73.0%		
0371	**75**	23.5%		
0372	**11**	3.4%		
Total	**319**	100.0%		
Grades earned				
A	**43**	13.5%		
B	**64**	20.1%		
C	**70**	21.9%		
U	**33**	10.3%		
F	**98**	30.7%		
Total	**308**	96.6%	of	319
Percent who eventually attempted CRMA course				
Starting in…				
0370	**74**	31.8%	of	233
0371	**30**	40.0%	of	75
0372	**4**	36.4%	of	11
Total	**108**	33.9%	of	319
Percent who eventually passed CRMA course				
Starting in…				
0370	**57**	24.5%	of	233
0371	**25**	33.3%	of	75
0372	**3**	27.3%	of	11
Total	**85**	26.6%	of	319

Percent who graduated in four years				
Starting in…				
0370	**5**	2.1%	of	233
0371	**4**	5.3%	of	75
0372	**1**	9.1%	of	11
Total	**10**	3.1%	of	319
Percent who graduated in five years				
Starting in…				
0370	**22**	9.4%	of	233
0371	**9**	12.0%	of	75
0372	**3**	27.3%	of	11
Total	**34**	10.7%	of	319
Percent who graduated in six years				
Starting in…				
0370	**30**	12.9%	of	233
0371	**12**	16.0%	of	75
0372	**3**	27.3%	of	11
Total	**45**	14.1%	of	319
Percent who graduated in six years after unsuccessful first attempt in…				
0370	**4**	3.8%	of	105
0371	**4**	6.3%	of	64
0372	**13**	8.7%	of	149
Total	**21**	6.6%	of	318

Fall 2013 Full-time FTIC Cohort		%		
		%		
Number full-time FTIC	1402	100.0%		
TSI-restricted	174	12.4%		
TSI-restricted first course attempted				
0370	97	66.0%		
0371	36	24.5%		
0372	14	9.5%		
Total	147	100.0%		
Grades earned				
A	18	12.2%		
B	39	26.5%		
C	27	18.4%		
U	13	8.8%		
F	46	31.3%		
Total	143	97.3%	of	147
Percent who eventually attempted CRMA course				
Starting in…				
0370	32	33.0%	of	97
0371	16	44.4%	of	36
0372	8	57.1%	of	14
Total	56	38.1%	of	147
Percent who eventually passed CRMA course				
Starting in…				
0370	23	23.7%	of	97
0371	14	38.9%	of	36
0372	7	50.0%	of	14
Total	44	29.9%	of	147

Percent who graduated in four years				
Starting in…				
0370	**3**	3.1%	of	97
0371	**4**	11.1%	of	36
0372	**1**	7.1%	of	14
Total	**8**	5.4%	of	147
Percent who graduated in five years				
Starting in…				
0370	**6**	6.2%	of	97
0371	**5**	13.9%	of	36
0372	**1**	7.1%	of	14
Total	**12**	8.2%	of	147
Percent who graduated in six years				
Starting in…				
0370	**10**	10.3%	of	97
0371	**6**	16.7%	of	36
0372	**1**	7.1%	of	14
Total	**17**	11.6%	of	147
Percent who graduated in six years after unsuccessful first attempt in…				
0370	**1**	2.4%	of	42
0371	**3**	12.0%	of	25
0372	**8**	5.9%	of	136
Total	**12**	5.9%	of	203

Fall 2014 Full-time FTIC Cohort				
		%		
Number full-time FTIC	**1286**	100.0%		
TSI-restricted	**224**	17.4%		
TSI-restricted first course attempted				
0370	**58**	29.7%		
0371	**82**	42.1%		
0372	**55**	28.2%		
Total	**195**	100.0%		
Grades earned				
A	**19**	9.7%		
B	**38**	19.5%		
C	**46**	23.6%		
U	**30**	15.4%		
F	**57**	29.2%		
Total	**190**	97.4%	of	195
Percent who eventually attempted CRMA course				
Starting in…				
0370	**18**	31.0%	of	58
0371	**30**	36.6%	of	82
0372	**19**	34.5%	of	55
Total	**67**	34.4%	of	195
Percent who eventually passed CRMA course				
Starting in…				
0370	**14**	24.1%	of	58
0371	**23**	28.0%	of	82
0372	**15**	27.3%	of	55
Total	**52**	26.7%	of	195

Percent who graduated in four years				
Starting in…				
0370	**4**	6.9%	of	58
0371	**6**	7.3%	of	82
0372	**7**	12.7%	of	55
Total	**17**	8.7%	of	195
Percent who graduated in five years				
Starting in…				
0370	**6**	10.3%	of	58
0371	**12**	14.6%	of	82
0372	**12**	21.8%	of	55
Total	**30**	15.4%	of	195
Percent who graduated in six years				
Starting in…				
0370	**6**	10.3%	of	58
0371	**12**	14.6%	of	82
0372	**12**	21.8%	of	55
Total	**30**	15.4%	of	195
Percent who graduated in six years after unsuccessful first attempt in…				
0370	**0**	0.0%	of	16
0371	**3**	7.1%	of	42
0372	**3**	5.0%	of	60
Total	**6**	5.1%	of	118

Appendix B: Bootstrap Resampling Intervals

Aggregating data by ethnicity results in a small population sample. It is useful to consider some measure of the variation inherent in the data. Bootstrap resampling intervals at the 95% confidence level, with 100,000 resamples, were used rather than applying conventional confidence intervals, which can exceed the range of the actual data.

The following resampling intervals are for persistence rates for students who started in some CRMA courses and eventually passed college algebra.

Race	Population size	Lower endpoint	Actual	Upper endpoint
Black, Non-Hispanic	382	20.9%	25.1%	29.6%
American Indian/Alaskan	9	0.0%	11.1%	33.3%
Asian Pacific Islander	6	0.0%	33.3%	66.7%
Caucasian	151	28.5%	35.8%	43.7%
Hispanic-Other	18	0.0%	11.1%	27.8%
International Non-resident	63	11.1%	20.6%	31.7%
Mexican	12	0.0%	25.0%	50.0%
Puerto Rican	1	0.0%	0.0%	0.0%
Race Unknown/Not Reported	13	23.1%	46.2%	69.2%

The following resampling intervals indicate six-year graduation rates for students who started in a CRMA course and eventually passed college algebra.

Race	Population size	Lower endpoint	Actual	Upper endpoint
Black, Non-Hispanic	382	9.4%	12.6%	16.0%
American Indian/Alaskan	9	0.0%	0.0%	0.0%
Asian Pacific Islander	6	0.0%	16.7%	50.0%
Caucasian	151	14.6%	20.5%	27.2%
Hispanic-Other	18	0.0%	11.1%	27.8%
International Non-resident	63	1.6%	7.9%	15.9%
Mexican	12	0.0%	25.0%	50.0%
Puerto Rican	1	0.0%	0.0%	0.0%
Race Unknown/Not Reported	13	0.0%	15.4%	38.5%

Appendix C: Declaration of Intent

Math to a Degree

Lamar University Quality Enhancement Plan

DECLARATION OF INTENT

The Quality Enhancement Plan at Lamar University focuses on improving student achievement in mathematics courses by removing barriers to success. After consulting with faculty each department chair will select a Mathematics Pathway for program majors that aligns with their chosen area of study. Non-STEM department chairs will choose a non-algebraic pathway.

The pathways are:

     A. MATH 1332 (Contemporary Math) and MATH 1342 (Statistics)

     B. MATH 1342 (Statistics) and PSYC 2317 (Introduction to Statistical Methods)

     C. MATH 1314 (College Algebra) and MATH 1316 (Trigonometry)

     D. MATH 2311, 2312, 2413, 2414 (Pre-Cal to Calculus track)

     E. MATH 1324 (Mathematics for Business and Social Sciences) and BUAL 2310 (Business Analysis I)

     F. MATH 1314 (College Algebra) and MATH 1350 (Math for Elementary School Teachers)

Department _____

College of _____declares

its intent to direct its students through formal advising to enroll in the two-course Mathematics

Pathway

Circle <u>One</u> of the following:

     A.   B.   C.   D.   E.   F.

Department Chair _____   College Dean_____

_____
  QEP Director   Date

Appendix D

Learning Outcomes

College Algebra

Learning Outcomes

Upon successful completion of MATH 1314 College Algebra, students will be able to:

- Demonstrate and apply knowledge of properties of functions, including domain and range, operations, compositions, and inverses.
- Recognize and apply polynomial, rational, radical, exponential and logarithmic functions and solve related equations.
- Apply graphing techniques.
- Evaluate all roots of higher degree polynomial and rational functions.
- Recognize, solve and apply systems of linear equations using matrices.

Mathematics for Business & Social Sciences

Learning Outcomes

Upon successful completion of MATH 1324 Mathematics for Business & Social Sciences, students will be able to:

- Apply elementary functions, including linear, quadratic, polynomial, rational, logarithmic, and exponential functions to solving real-world problems.
- Solve mathematics of finance problems, including the computation of interest, annuities, and amortization of loans.
- Apply basic matrix operations, including linear programming methods, to solve application problems.
- Demonstrate fundamental probability techniques and application of those techniques, including expected value, to solve problems.
- Apply matrix skills and probability analyses to model applications to solve real-world problems.
- Apply appropriate differentiation techniques to obtain derivatives of polynomial functions.
- Solve optimization problems with emphasis on business and social sciences applications.
- Apply the derivative as the rate of change.

Contemporary Mathematics

Learning Outcomes

Upon successful completion of MATH 1332 Contemporary Mathematics, students will be able to:

- Apply the language and notation of sets.
- Determine the validity of an argument or statement and provide mathematical evidence.
- Solve problems in mathematics of finance.
- Demonstrate fundamental probability/counting techniques and apply those techniques to solve problems.
- Interpret and analyze various representations of data.
- Demonstrate the ability to choose and analyze mathematical models to solve problems from real-world settings, including, but not limited to, personal finance, health literacy, and civic engagement.
- Examine the mathematics of art, dance, music, or other topics.

Statistics

Learning Outcomes

Upon successful completion of MATH 1342 Statistics, students will be able to:
- Explain the use of data collection and statistics as tools to reach reasonable conclusions.
- Recognize, examine and interpret the basic principles of describing and presenting data.
- Compute and interpret empirical and theoretical probabilities using the rules of probabilities and combinatorics.
- Explain the role of probability in statistics.
- Examine, analyze and compare various sampling distributions for both discrete and continuous random variables.
- Describe and compute confidence intervals.
- Solve linear regression and correlation problems.
- Perform hypothesis testing using statistical methods.

Precalculus

Learning Outcomes

Upon successful completion of MATH 2311 Precalculus, students will be able to:

- Define and use properties of functions, which include domain and range, operations, compositions, and inverses;
- Delineate and apply polynomial, rational, radical, exponential, and logarithmic functions and solve related equations and application problems;
- Apply graphing techniques;
- Evaluate all roots of higher degree polynomials and rational functions;
- Describe and solve systems of equations and solve application problems;
- Demonstrate facility with algebraic manipulations.

Appendix E

GAISE Executive Summary

From the *GAISE College Report 2016* (page 3)

In 2005 the American Statistical Association (ASA) endorsed the *Guidelines for Assessment and Instruction in Statistics Education (GAISE) College Report*. This report has had a profound impact on the teaching of introductory statistics in two- and four-year institutions, and the six recommendations put forward in the report have stood the test of time. Much has happened within the statistics education community and beyond in the intervening 10 years, making it critical to re-evaluate and update this important report.

For readers who are unfamiliar with the original *GAISE College Report* or who are new to the statistics education community, the full version of the 2005 report can be found at
http://www.amstat.org/education/gaise/GaiseCollege_full.pdf

and a brief history of statistics education can be found in Appendix A of this new report.

The revised GAISE College Report takes into account the many changes in the world of statistics education and statistical practice since 2005 and suggests a direction for the future of introductory statistics courses. Our work has been informed by outreach to the statistics education community and by reference to the statistics education literature.

We continue to endorse the six recommendations outlined in the original GAISE College Report. We have simplified the language within some of these recommendations and re-ordered other recommendations so as to focus first on what to teach in introductory courses and then on how to teach those courses. We have also added two new emphases to the first recommendation. The revised recommendations are:

1. Teach statistical thinking.

   - Teach statistics as an investigative process of problem-solving and decision-making.
   - Give students experience with multivariable thinking.

2. Focus on conceptual understanding.

3. Integrate real data with a context and purpose.

4. Foster active learning.

5. Use technology to explore concepts and analyze data.

6. Use assessments to improve and evaluate student learning.

This report includes an updated list of learning objectives for students in introductory courses, along with suggested topics that might be omitted from or de-emphasized in an introductory course. In response to feedback from statistics educators, we have substantially expanded and updated some appendices. We also created some new appendices to provide details about the evolution of introductory statistics courses; examples involving multivariable thinking; and ideas for implementing the GAISE recommendations in a variety of different learning environments.

Appendix F: Similar QEPs

Institution	Type	Goals of the QEP	Link
Auburn University at Montgomery	4-year university	• Increase pass rates in remedial and core math courses • Decrease enrollment in remedial math courses • Improve retention rates for remedial math students	http://www.aum.edu/QEP
Trenholm State Community College	2-year community college	• Decrease enrollment in remedial math courses • Of students who place into remedial math courses, increase the number enrolled in remedial math during their first semester • Increase pass rates in remedial math courses • Improve retention rates for remedial math students • Of the students who complete the capstone course, increase the number of students who complete remedial mathematics within one year	https://www.trenholmstate.edu/college-information/qep-quality-enhancement-plan/
West Georgia Technical College	2-year technical school	• Increase the number of students who successfully complete the remedial capstone course • Increase the number of students who successfully complete college algebra as a result of completing the remedial support course • Improve students' problem-solving abilities • Improve students' learning through increased faculty development opportunities	https://www.westgatech.edu/discover-wgtc/quality-enhancement-plan-qep/
Wallace Community College	2-year community college	• Increase pass rates and student success in remedial math courses • Redesign remedial courses to ensure content learned prepares students for success in gateway math courses	https://www.wallace.edu/programs_of_study/academics/disciplines/developmental_math/quality_enhancement_plan_qep.aspx
Indian River State College	4-year college	• Enhance student learning by redesigning remedial courses • Increase student success rates in remedial courses	https://www.irsc.edu/programs/math-instructional-support.html
Jefferson Davis Community College	2-year community college	• Increase student performance and success rates in remedial and core courses • Increase the student success rates in subsequent math courses	http://www.sacscoc.org/pdf/2009%20track%20a%20qeps/Jefferson%20Davis%20CC%20QEP%20Summary.pdf

Appendix G: List of Acronyms

CRAFTY		Curriculum Renewal Across the First Two Years
CRMA		College-Readiness Math course abbreviation
GAISE		Guidelines for Assessment and Instruction in Statistics Education
MATH		Math course abbreviation
NSO		New Student Orientation
QEP		Quality Enhancement Plan
TSI		Texas Success Initiative Assessment
UAC		Undergraduate Advising Center
WINGS		Not actually an acronym; the original name for the QEP