

LTC QEP Impact Report

Initial Goals and Intended Outcomes

Two goals were specified for Lanier Technical College's Quality Enhancement Plan:

1. Improve student learning in LTC's math Learning Support courses
2. Improve students' ability to apply mathematical skills in occupational courses

The college's QEP Design Team established the following intended outcomes for each goal:

1. A 10% improvement in student success for math Learning Support courses over baseline data established in pilot courses through the five-year life of the Plan. While linear progression is not necessarily expected, this overall degree of improvement would translate to a "run rate" of 2% improvement per year.
2. A 10% improvement in students' ability to apply mathematical concepts in their occupational coursework over the five-year life of the plan, to be assessed via math-specific student learning outcomes for each occupational program. Again, this would translate of a "run rate" of 2% improvement per year.

Major strategies used to reach these goals were 1) redesign of instructional delivery for learning support courses, 2) enhanced tutoring services, 3) targeted professional development activities.

Changes Made to the QEP

Changes for Diploma-Level Students (Goal 1):

Year 1 (AY2017)

Year 1 represents the rollout of the QEP model to all students. During Year 1, success rates for the diploma-level co-requisite learning support math class (MATH 0090A) became 97%.

No changes were to the plan were made in Year 1.

Year 1 targeted professional development activities (diploma- and degree-level) for instructors included workshop sessions on sample lessons, activities, teaching strategies, math study skills, and creating a comfortable learning environment. Tutors received training assistance techniques. These sessions were provided by a third-party subject matter expert contracted by the college.

Year 2 (AY2018)

The three-hour requirement for MATH 0090A created scheduling difficulties for students in some LTC programs. It was hypothesized that the full three hours of instruction were not needed, and that students could make better progress toward graduation if MATH 0090A were redesigned as a one-hour course.

Also, new, lower Accuplacer "cut scores" were put in place.

Finally, due to liability and reporting concerns, LTC stopped enforcing its attendance policy.

These three factors had a negative effect on student success, which dropped by 20% for the diploma-level students.

Professional development sessions (diploma- and degree-level) for instructors provided in Year 2 dealt with use of electronic texts and online homework, and additional instruction on use of manipulatives. Workshops for tutors covered use of manipulatives and understanding the course instructional materials.

The calendar of available tutoring sessions was expanded to include Fridays in Year 2.

Year 3 (AY2019)

No changes were made to the QEP for diploma-level students in Year 3. The success rate remained essentially unchanged (a 1% improvement).

Year 3 professional development topics (diploma- and degree-level) included creating manipulatives, using guided notes, learning styles, and classroom "Do's and Don'ts". LTC was one of only four colleges in the southeastern region to receive a grant from American Mathematical Association of Two-Year Colleges (AMATYC) to host one of AMATYC's "Traveling Workshops."

Andrea Hendricks from Georgia Perimeter College provided a workshop on strategies for increasing self-efficacy, reducing math anxiety, and integrating study skills into the classroom, with emphasis on how instruction is received from the perspective of the student.

LTC's strategy of developing enhanced tutoring services made major progress in Year 3 with the creation of a dedicated, permanent tutoring center at the Hall campus.

Year 4 (AY2020)

Changes to instruction for diploma-level students included 1) simplifying the application project by delivering it in a manner that allows students to approach the problem in smaller, more discrete steps, and 2) development of an additional manipulative exercise on visualizing measurements using the American Standard and the Metric System units.

It should be noted that Year 4 of the QEP coincided with the first year of the COVID-19 pandemic. State-mandated lockdowns required that LTC migrate as much instruction as possible to a distance education format.

Professional development sessions for instructors in Year 4 provided continued coverage on using manipulatives and guided notes, and on developing and teaching application problems. The tutors received expanded training on the definition and role of the tutor, a tutor code of ethics, tutoring tips and techniques, characteristics of successful tutors, and the 10 steps of tutoring. Because of the COVID-19 pandemic, these training sessions were delivered in a virtual format, and both instructors and tutors were given training on teaching strategies adapted for a virtual environment.

In Year 4, Lanier Tech began providing tutors at the off-campus instructional sites where QEP courses were being delivered. In the middle of second term, Year 4, tutoring services were migrated to online delivery in response to the COVID-19 pandemic. Online tutoring was offered during weekends, which had not been feasible before processes for online tutoring were put in place.

Year 5 (AY2021)

As discussed for Year 2, the diploma-level co-requisite support course was changed from the original three contact hours to one contact hour of instruction. This change seems to have had a negative and significant impact on student success in both the support course and the college-level math course it was paired with. In Year 5, the QEP was changed to return to a three-hour support course (MATH 0912A). Success rates following this

change returned to and in fact exceeded the rates for Year 1 (100% for both MATH 1012A and MATH 0912A). The success rate for diploma-level was 100% in Year 5.

Professional development sessions for Year 5 covered the recurring elements (use of manipulatives/explorations, teaching math study skills, dealing with math anxiety, etc.) and helping students become independent learners. Tutors were given training on how to use WCONLINE®, a platform that allows students to use the internet to schedule both online and on-campus, face-to-face tutoring sessions. The platform lets tutors create virtual rooms for private instruction, record notes about the session, and make the notes available to the student, instructor, or other tutors as needed. The platform also provides robust reporting features.

Tutoring services were enhanced in Year 5 with the launch of WCONLINE®. And in Year 5, LTC was again able to provide face-to-face instruction in the tutoring centers.

Changes for Degree-Level Students (Goal 1):

Year 1 (AY2017)

No changes were to the plan were made in Year 1.

Year 2 (AY2018)

Changes to instruction for degree-level students included 1) redesign of course delivery involving a new textbook, guided notes, and online homework, 2) increased use of manipulatives to teach graphing and factoring, and 3) development of a new manipulative-based exercise for improving skills in graphing quadratic equations.

It should be noted that in AY2018, colleges in the Technical College System of Georgia changed the placement test being used from Compass to Accuplacer. Following this change, a lower percentage of entering students were placed in learning support courses.

Year 3 (AY2019)

Changes to instruction for degree-level students included 1) revision of manipulative assignments on graphing and factoring, and 2) simplification of instruction on factoring, with more advanced skills to be taught in the college-level algebra class. Course sequencing was revised to cover study

skills in the first two weeks of the semester, rather than spread across the semester.

Year 4 (AY2020)

Tracking the success of degree-level learning support students in their college-level math course (MATH 1111), the QEP team noted that these students had an 63% pass rate for the college-level course. The QEP Implementation Team believed this could be improved by adopting a co-requisite model such as what was in place for the diploma-level students. The degree-level co-requisite model would retain instruction on study skills, use of manipulatives (now called "Explorations"), and dealing with math anxiety. The QEP Implementation Team developed the co-requisite model in Year 4, and offered the first co-requisite degree-level courses in the final semester of Year 4. This model was continued through Year 5, during which the success rate for the redesigned college-level course (MATH 1111B) improved to 79%.

It should be noted that Year 4 of the QEP coincided with the first year of the COVID-19 pandemic. State-mandated lockdowns required that LTC migrate as much instruction as possible to a distance education format. In addition, the college developed a robust online tutoring system.

Year 5 (AY2021)

To improve both the success and withdrawal rates for MATH 1111B students, the QEP Team began delivery of a math "boot camp" in Year 5. The boot camp is a four-day learning opportunity that gives students instruction on basic algebra and study skills. The students are also introduced to the tutoring centers. The boot camp takes place during the week before start of term. Learning support students are given first opportunity to enroll in the boot camp. If space is still available in the week before boot camp, enrollment is opened for all degree-level students. The goal of the boot camp was to improve student success and withdrawal rates in MATH 1111B by helping students begin the course with better preparation and less anxiety.

LTC also began offering "Workshop Wednesdays." In one-and-half-hour online sessions, a full-time math instructor reviews materials from the unit currently being taught and answers student questions in preparation for the unit test. Workshop Wednesdays are offered throughout the semester.

At the end of Year 5, as impacts of the COVID-19 pandemic lessened, LTC was again able to offer face-to-face tutoring in the tutoring centers. The

online tutoring option — which had proved to be successful and was well-received by the students — was continued.

Changes Made in Occupational Instruction (Goal 2)

The structure and scope of the student learning outcomes assessment reports used to evaluate progress toward Goal 2 ("Improve students' ability to apply mathematical skills in occupational courses") are discussed below under Impact of the QEP on Student Learning. Examples of changes made for Goal 2 are shown here, using the Physical Therapist Assistant (PTA) program as a sample.

To assess students' ability to apply math skills in the context of occupational therapy, the PTA Program Director added the following outcome to the annual assessment report: "Students will perform calculations and conversions used in the physical therapy field." Students were scored on their ability to calculate range of motion, percentage of intensity, and heart rates.

Year 1 (AY2017)

Faculty provided additional and revised instruction on calculating percentage of intensity. AY2017 scores improved dramatically over those of AY2016: from 17% to 79%.

Year 2 (AY2018)

The AY2017 students were most challenged by calculating range of motion (31% success). As a strategy to improve this, faculty incorporated case studies showing patients with reduced range of motion and required students to record and interpret this data correctly in their Subjective, Objective, Assessment and Plan (SOAP) notes. The AY2018 results were much higher: 73%.

Year 3 (AY2019)

Calculating range of motion remained the lowest scoring topic. Faculty adjusted instructional delivery to provide more practice with exercises involving range of motion.

Year 4 (AY2020)

For AY2020, the faculty had planned to develop a new rubric for scoring students' work with SOAP notes and give them more practice with exercises

involving range of motion. However, the impact of the COVID-19 pandemic was felt especially acutely in programs such as PTA, which relies heavily on hands-on, in-person instruction and practice, as well as clinical instruction. For much of AY2020, in-class and clinical instruction were simply not available options. The faculty did collect assessment results, but did not believe the quality of the data was such that it could be used to plan improvement strategies.

Year 5 (AY2021)

By Year 5, students' ability to calculate range of motion had improved dramatically. In fact, the AY2021 cohort of students scored 100% on this topic. However, their scores for calculating percentage of intensity had dropped significantly. For AY2022, the faculty developed additional lab activities that focus on calculating percentage of intensity in a variety of scenarios. The faculty also added a question on percentage of intensity to the final exam, to be used to assess students' progress between first assessment and the end of the course.

Impact of the QEP on Student Learning

Goal 1 of the plan was to improve student learning in LTC's math Learning Support courses.

Four learning outcomes were established for both diploma- and degree-level students:

- Students will solve quantitative and spatial mathematical relationships
- Students will transfer math learning across content areas and real-life situations
- Students will apply estimation and mental computation strategies
- Students will identify relevant and irrelevant data

Success rates (the percentage of students completing the course with a grade of A, B, or C) and assessment results for the student learning outcomes are summarized in Tables 1 and 2.

<p>Table 1: Student Learning Outcomes, Enrollment, & Success Rate, Diploma Level (MATH 1012A)</p>
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Course	2016 (Year 0) (Baseline) (Students/ Success%)	20 17 (Year 1)	20 18 (Year 2)	20 19 (Year 3)	20 20 (Year 4)	20 21 (Year 5)
SLOs	72%	74%	64%	61%	65%	86%
Enrollment/Success Rate	7 / 100%*	78 / 94%	66 / 74%	87 / 72%	31 / 67%	13 / 100%

* Results from spring and summer semesters only.

Table 2: Student Learning Outcomes, Enrollment, & Success Rate, Degree Level (MATH 0090B/0911B)						
Course	2016 (Year 0) (Baseline) (Students/ Success%)	20 17 (Year 1)	20 18 (Year 2)	20 19 (Year 3)	2020 (Year 4)	20 21 (Year 5)
SLOs	69%	60%	60%	67%	73%	74%
Enrollment/Success Rate	138 / 55%*	526 / 72%	317 / 63%	433 / 67%	363 / 79% & 86%**	263 / 82%

* Results from spring and summer semesters only

** Results from summer semesters only (pilot "co-requisite" course)

As shown above, student learning outcomes assessment results improved for both diploma- and degree-level students over the life of the plan, by 14% and 5% respectively. The student success rate in diploma-level math learning support was 100% at the end of the plan, and 82% for degree-level students, a 27% improvement over the baseline.

Table 3: Degree-Level Algebra LS Success Rates, Pre-Corequisite vs. Corequisite		
	Year 1 - Year 4	Year 5
Enrollment	913	525

Success Rate	63%	79%
Withdrawal Rate	24%	34%

While success in the college-level algebra courses for math learning support students was not explicitly included in the QEP, the QEP Team naturally wished to see an improvement here. Development of a co-requisite degree-level algebra course — modeled on the successful diploma-level course — was implemented in Year 5. Although the withdrawal rate in the first year of the co-requisite model increased, the student success rate improved significantly (16%).

Goal 2 of the QEP was to improve student’s ability to apply mathematical skills in occupational courses.

To assess progress toward this goal, the QEP Implementation Team and Lanier Technical College’s Institutional Effectiveness staff worked with faculty in each of LTC’s academic programs to develop at least one student learning outcome that measured student’s ability to apply mathematical skills in the context of their chosen occupational program.

Examples of such student learning outcomes are shown below:

- Allied Health — Dental Hygiene: Students will accurately calculate values necessary to determine correct radiographic exposure parameters.
- Business, Professional Services, & Public Safety (BPSPS) — Accounting: The students will be able to compute depreciation of plant (fixed) assets using a variety of depreciation methods.
- Applied Technology — Automotive Technology: Students will use Ohm's law to diagnose faults in electrical circuits.
- Advanced Technology & Engineering — Drafting: Students will calculate dimensions on a mechanical blueprint using direct, indirect, transferred, and calculated dimensions.

A sample of the number of students, learning outcome, topics within the outcome, and results used to calculate the values shown above is provided in Table 4.

Table 4: Sample Student Learning Outcome Results

FY2021 Program SLOs Assessment

Division/Dept./Prog. Health Information Management Technology
 Person/Title Completing Form: Annette Baker

Outcome	Awards	Assessment Means or Measures	Summary of Assessment Results	Use of Assessment Results																				
<p>7. Students will correctly calculate pharmaceutical dosage calculations.</p>	<ul style="list-style-type: none"> HIMT Degree 	<p>Criterion - referenced objective exam</p>	<p>Sample size: 29 Population size: 29</p> <table border="1" data-bbox="852 716 1235 1308"> <tr> <td></td> <td>20 19</td> <td>20 19</td> <td>20 19</td> </tr> <tr> <td>Theory</td> <td>95 %</td> <td>96 %</td> <td>97 %</td> </tr> <tr> <td>Equation set up</td> <td>97 %</td> <td>95 %</td> <td>96 %</td> </tr> <tr> <td>Adult Calculations</td> <td>95 %</td> <td>71 %</td> <td>73 %</td> </tr> <tr> <td>Child Calculations</td> <td>94 %</td> <td>60 %</td> <td>59 %</td> </tr> </table> <p><u>Example Results</u></p>		20 19	20 19	20 19	Theory	95 %	96 %	97 %	Equation set up	97 %	95 %	96 %	Adult Calculations	95 %	71 %	73 %	Child Calculations	94 %	60 %	59 %	<p>In AY2021, faculty delivered a supplemental lecture on balancing equations.</p> <p><u>Documentation</u></p> <p>Overall results are very good, but there is still room for improvement with adult calculations and child calculations.</p> <p>In AY2022, the</p>
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				faculty will collaborate with Lanier Tech's QEP director to identify strategies for teaching ratios and proportions to students with visual or tactile learning styles.
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The desired outcome for Goal 2 was a 10% improvement in students' ability to apply mathematical concepts in their occupational coursework over the five-year life of the plan, as assessed via math-specific student learning outcomes for each occupational program. This would translate of a "run rate" of 2% improvement per year.

Results are summarized in Table 5.

Table 5: Success Rates for Math-Related Student Learning Outcomes by Division						
	2016 (Baseline)	2017 (Year 1)	2018 (Year 2)	2019 (Year 3)	2020 (Year 4)	2021 (Year 5)
Allied Health	77%	80%	83%	91%	90%	88%
Business, Professional Services,	69%	77%	87%	90%	85%	88%

& Public Safety						
Advanced Technology & Engineering	69%	83%	73%	81%	81%	86%
Applied Technology	86%	66%	70%	67%	67%	77%
Overall Average	75%	77%	79%	83%	83%	85%
Total Number of Students	625	606	626	558	636	578

While there was naturally a certain amount of variance from year to year (that is, the college did not maintain a steady rate of a 2% improvement each year), the overall trend was upward, and LTC did achieve its goal of a 10% improvement, from 75% in the baseline year, to 85% in the final year of the plan.

Reflections and Lessons Learned

Redesign of Instructional Delivery: The clearest lesson learned from Lanier Technical College's Quality Enhancement Plan is that face-to-face instruction with intentional efforts to provide robust tutoring services and targeted training for instructors and tutors is a dramatic improvement over the delivery method LTC had in place before the QEP. Prior to the change, only a minority (38%) of learning support students were able to complete their required developmental course work and thus be eligible to graduate. By the end of the QEP, 100% of diploma-level students and 82% of degree-level students were able to successfully complete their required developmental course work.

Student learning outcomes assessment results are the most direct measure of student learning, and success rates provide a useful supplementary

measure. During the five years of the QEP, the QEP Team realized that changes to how instruction is delivered can have a positive impact on success rates while also having a negative impact on withdrawal rates. Lanier Technical College wants its students to be successful. Strategies for improvement should be implemented not simply to improve specific metrics, but to — as much as possible — improve students' chances for successful completion of college and entry into a rewarding career.

Overall, the boot camp initiative seemed to be successful. Throughout AY2022 (which followed Year 5 of the QEP), 82% of the students who participated in the boot camp and completed a college-level algebra course finished the class with a grade of A, B, or C. The QEP Team remains concerned, though, about the level of "follow-through" by the boot camp participants: of the 20 students in the AY2022 boot camp cohort, nine students either withdrew from or did not enroll in college algebra.

Enhanced Tutoring Services: The QEP Team believes the increase in student participation in tutoring at Lanier Technical College was one of the most successful aspects of the plan. Lanier Technical Students value the tutoring services provide: in satisfaction surveys on tutoring services, 97.25% of students rated their tutoring sessions as "excellent" or "very good." Qualitative responses were also overwhelming positive: typical responses to the open-ended response option include comments such as "Awesome resource. Thanks!", "A wonderful session and cannot wait for the next time!", and "Could not do it without the support center!".

Table 6: Tutoring Center Usage Statistics					
Course	2017	2018	2019	2020	2021
	(Year 1)	(Year 2)	(Year 3)	(Year 4)	(Year 5)
Math Only	3,286	3,743	3,840	4,860	2,863*

* Face-to-face tutoring in the tutoring center was unavailable for the majority of Year 5 due to the COVID-19 pandemic.

Based on the positive impact of tutoring services in math, tutoring offerings were extended to other subjects, including writing, psychology, chemistry, physics, biology, economics, Microsoft Office, and use of the library. By AY2022 (the first full academic year following the COVID-19 pandemic), usage levels for the tutoring centers had increased by 139% over Year 1.

Targeted Professional Development: Providing targeted professional development for both instructors and tutors prior to the start of each term proved to have benefits beyond instruction in pedagogical techniques. Program coordination improved, with classes being delivered more consistently and instructors having a clearer understanding of their roles. There was a positive impact on morale as well, with the instructors and tutors consistently reporting that they valued the opportunity to ask questions and share ideas.

In relation to Goal 2, a primary lesson learned was that the tutoring centers have value beyond serving QEP learning support students. Years 4 and 5 saw an uptick in visits to the tutoring center by students in occupational programs seeking help with math and writing.