Lanier Technical College

Quality Enhancement Plan

Math Multiplies Opportunities

Dates of on-site review: November 10 – 12, 2015

President: Dr. Ray Perren

Accreditation Liaison: Dr. Joanne Tolleson

CONTENTS

EXECUTIVE SUMMARY

Identification of Need

Colleges across the country have identified low success rates for students needing remedial instruction as a powerful barrier to student success, and Lanier Technical College sees the same pattern in its own student body.

A detailed analysis of the courses and delivery modes which students have the most difficulty passing showed that Learning Support and General Education courses account for the greatest number of "stops," and that within this group, mathematics courses are the largest group. Of students who enrolled in Learning Support mathematics courses in fall 2014, only 17% were able to complete their math Learning Support course in one term, and only 38% completed their math Learning Support requirement regardless of number of attempts. Tragically, the students who cannot fulfill this requirement will never be able to graduate.

Numerous focus groups with both student and faculty participants were used to explore the challenges students face in LTC's math classes. Among the emerging themes, frustration and dissatisfaction with Lanier Tech's computer-based emporium-model delivery method for its math Learning Support class (MATH 0090) – essentially online learning held in a classroom environment – were the most frequently and emphatically cited. Students expressed a desperate desire for more frequent and higher quality interaction with teachers, and teachers lamented the slow pace and wasted effort of students' self-directed progress through the modules.

A review of literature revealed that despite widespread enthusiasm for and momentum of computer-based instruction, traditional face-to-face instruction offers many benefits to the students. In addition, the literature shows that truly addressing the needs of Learning Support mathematics students requires a curriculum and an educational philosophy that gives as much weight to factors in the affective domain as it does to those in the cognitive domain: addressing math anxiety, self-efficacy, and self-concept are – for these students – as important as addressing gaps in their knowledge of fractions and formulas. Finally, tutoring can be an important intervention for these students, provided that the tutors regularly work with students in the classroom alongside the math faculty.

Student Learning

There is a clear need for Lanier Tech to do more to help students complete their mathematics Learning Support requirement in a way that lets them succeed in their required mathematics courses and progress to graduation.

The **purpose** of Lanier Tech's QEP is to increase student learning in the mathematics Learning Support program such that students emerge with the skills and attitudes necessary for success in college-level mathematics courses. The **goals** of the plan are to:

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

Lanier Technical College's Quality Enhancement Plan includes three major **strategies** to enhance student learning: 1) redesign of instructional delivery for Learning Support courses, 2) enhanced tutoring services, 3) targeted professional development activities.

The Plan

Lanier Technical College commits to improve student learning in its Learning Support mathematics program through "Math Multiplies Opportunities," a Quality Enhancement Plan that deploys a curriculum with balanced emphasis on the cognitive and affective domains, delivered via face-to-face, on-ground instruction, and supported by a robust tutoring program. To ensure success of the plan, LTC will provide the financial resources and administrative oversight necessary to deliver improved student advisement training and sustained professional development for faculty.

Relationship of QEP to College Mission

Providing "career-technical education programs, offered through traditional and distance delivery methods, leading to associate degrees, diplomas, and technical certificates of credit" is central to Lanier Technical College's mission.

Mathematics skills are essential for virtually all career-technical education programs. Lanier Tech's career-technical education programs will only lead to degrees, diplomas and technical certificates of credit if all its students – including those who enter college needing remediation – can succeed in their required math courses and apply the skills learned in those courses in their program of study.

A comprehensive redesign of LTC's Learning Support mathematics program that addresses student learning in the affective as well as the cognitive domain, delivered through face-to-face, teacher-paced instruction and supported by a robust tutoring program, is detailed in this plan.

INSTITUTIONAL DESCRIPTION

Mission Statement

Lanier Technical College, a unit of the Technical College System of Georgia, serves as the foremost workforce development resource for Banks, Barrow, Dawson, Forsyth, Hall, Jackson, and Lumpkin counties by providing

- career-technical education programs, offered through traditional and distance delivery methods, leading to associate degrees, diplomas, and technical certificates of credit;
- customized business and industry training and economic development services;
- continuing education for technical and professional development; and
- adult education services.

Profile

Lanier Technical College offers 155 programs of study including 31 associate degree programs, 38 diploma programs, and 86 technical certificate of credit programs. Programs are available in Allied Health, Business and Computer Technology, Industrial and Technical studies, and Public and Personal Services.

The College's Economic Development Services provide industry-specific continuing education courses in a range of fields including ammonia refrigeration, robotics, programmable logic controllers, rapid 3D prototyping, and many other industry specific areas. Lanier Tech also houses Georgia's Advanced Manufacturing Technology Center which provides industry with training using state-of-the-art equipment.

Lanier Technical College, working with area Certified Literate Community Programs (CLCP), offers adult education courses for individuals wishing to obtain their high school equivalency diploma.

Courses are offered using a variety of instructional delivery models such as on-line, traditional classroom, and hybrid formats. LTC faculty members have excellent educational credentials and are practitioners with years of real-world experience in the field in which they teach.

LTC delivers academic programs at five campuses in Oakwood, Cumming, Barrow, Dawsonville, and Commerce Georgia.

Sites

Oakwood Campus
2990 Landrum Education Drive
Oakwood, GA, 30566
Phone: 770-533-7000
Fax: 770-531-6328

Dawson Campus
408 Highway 9 North
Dawsonville, GA, 30534
Phone: 706-216-5461
Fax: 678-513-5220

Forsyth Campus
3410 Ronald Reagan Blvd
Cumming, GA, 30041
Phone: 678-341-6600
Fax: 770-781-6951

Jackson Campus
631 South Elm Street
Commerce, GA, 30529
Phone: 706-335-1931
Fax: 706-538-0437

Barrow Campus
965 Austin Road
Barrow, GA, 30680
Phone: 770-297-4500
Fax: 770-868-4082

Demographics

According to 2013 U.S. Census estimates, Lanier Technical College's service area has 567,415 residents. 34.9% of residents over age 25 have an associate degree or higher. Unemployment in the area is 6.0%. The population is 60.6% white, 30.7% African American, 8.9% Hispanic, and 3.4% Asian. Median income is $29,205 and 18.2% live below the poverty level. (See Appendix A, Service Area Demographics.)

During FY2015, the College served 1,408 full-time and 3,749 part-time students, totaling 5,157 students. 60.8% of the student body is female; 39.2% is male. By age, the students are quite diverse (16 – 20 years, 33.7%; 21 – 25, 26.4%; 26 – 30, 12.9%; 31 – 35, 8.3%; 36 – 40, 6%; over 40, 12.7%).

GOVERNANCE AND ADMINISTRATION

Lanier Technical College is a member institution of the Technical College System of Georgia (TCSG), with the President reporting directly to the TCSG Commissioner. Vice Presidents for each of the following divisions report to the President: Academic Affairs, Student Affairs, Administrative Services, Institutional Effectiveness & Operations, Technology, Economic Development, and Adult Education. (See Appendix B, Organizational Chart.)

PROGRAMS OF STUDY

Lanier Technical College's programs follow a curriculum that is standardized among all colleges within the system in accordance with a code of General Program Standards established by the SBTCSG. Per TCSG Procedure IV.H.1, Structure of Associate Degree, Diploma, and Technical Certificate of Credit Programs, the range of semester credit hours required for graduation with an Associate Degree is 60-73.

All degree programs require a minimum of 15 hours of general education credit, with at least three credit hours in mathematics. All degree-level programs require either MATH 1100, Quantitative Skills/Reasoning; MATH 1101, Mathematical Modeling; MATH 1111, College Algebra; or MATH 1113, Precalculus.

LTC offers the following degree programs:

- Accounting
- Applied Technical Management
- Automotive Technology
- Building Automation Systems
- Business Administrative Technology
- Business Management
- Computer Support Specialist
- Criminal Justice Technology
- Dental Hygiene
- Design and Media Production
- Drafting Technology Degree
- Early Childhood Care and Education
- Electrical Utility Technology
- Emergency Management
- Engineering Technology
- Fire Science Technology
- Health Information Technology
- Healthcare Management Technology
- Horticulture
- Industrial Systems Technology
- Interiors
- Internet Specialist – Web Site Design
- Machine Tool Technology
- Marketing Management
- Medical Assisting
- Motorsports Vehicle Technology
- Networking Specialist
- Paramedicine
- Physical Therapist Assistant
- Radiologic Technology
- Surgical Technology

Lanier Technical College also offers a number of diploma programs. These are academic programs designed for students who intend to move straight into the workforce and do not plan to continue their post-secondary education past Lanier Technical College. Per TCSG Procedure IV.H.1, Structure of Associate Degree, Diploma, and Technical Certificate of Credit Programs, the range of semester credit hours required for graduation from a diploma program is 37-59. Typically, these programs have nine or fewer hours of General Education coursework delivered through non-transferrable courses.

The majority of diploma-level programs require students to complete MATH 1012, Foundations of Mathematics. A small number of programs require students to complete MATH 1013, Algebraic Concepts, and/or MATH 1015, Geometry & Trigonometry.

LTC offers the following diploma programs:

- Accounting
- Air Conditioning Technology
- Automotive Collision Repair
- Automotive Technology
- Building Automation Technology
- Business Administrative Technology
- Business Management
- CNC and Machine Tool Technology
- Computer Support Specialist
- Cosmetology
- Criminal Justice Technology
- Dental Assisting
- Design and Media Production Technology
- Drafting Technology
- Early Childhood Care and Education
- Electrical Control Systems
- Electrical Systems Technology
- EMS Professions Diploma
- Fire Science Technology
- Firefighter/EMSP
- Horticulture
- Industrial Mechanical Systems
- Industrial Systems Technology
- Interiors
- Internet Specialist – Web Site Design
- Machine Tool Technology
- Marketing Management
- Medical Assisting
- Motorsports Vehicle Technology
- Networking Specialist
- Paramedicine
- Pharmacy Technology
- Practical Nursing
- Residential Care Technician

Electrical Utility Technology	Surgical Technology
Emergency Management	Welding and Joining Technology

Lanier Technical College offers 86 technical certificate of credit (TCC) programs. These are narrowly focused programs intended to build students' skills in a particular aspect of a profession or trade. Per TCSG Procedure IV.H.1, Structure of Associate Degree, Diploma, and Technical Certificate of Credit Programs, the range of semester credit hours required for graduation from a certificate program is 9-36.

Some TCC programs have a math component, either MATH 1012, Foundations of Mathematics, or MATH 1111, College Algebra. A significant number of TCC programs have no math component.

LTC offers the following technical certificate of credit programs:

- Advanced CAD Technician
- Advanced Emergency Medical Technician
- Advanced Fire Administration
- Advanced Shielded Metal Arc Welder
- Advertising Layout Specialist
- Architectural Systems Drafter
- Automotive Chassis Technician Specialist
- Automotive Climate Control Technician
- Auto. Electrical/Electronic Systems Technician
- Automotive Engine Performance Technician
- Automotive Engine Repair Technician
- Automotive Refinishing Assistant I
- Automotive Refinishing Assistant II
- Auto. Transmission/Transaxle Technician Specialist
- Basic Fire Company Officer
- Basic Metal Fabricator
- Basic Residential Air Conditioning System Design
- Basic Residential Gas Heat Design
- Basic Shielded Metal Arc Welder
- Bilingual Customer Service Specialist
- CAD Operator
- CDA Preparation
- Child Development Specialist
- CISCO CCNP Specialist
- CISCO Network Specialist
- CNC Specialist
- Criminal Justice Specialist
- Design and Media Production Specialist
- Digital Illustration Specialist
- Drafter's Assistant
- Early Childhood Care and Education Basics
- Early Childhood Program Administration
- Electrical Utility Technician
- Emergency Medical Technician
- Entrepreneurship
- Esthetician
- Fire Fighter I
- Fire Fighter II
- Fire Officer I
- Fire Officer II
- Garden Center Technician
- Gas Metal Arc Welder
- Gas Tungsten Arc Welder
- Geriatric Care Assistant
- Graphic Design and Prepress
- Healthcare Assistant
- Healthcare Marketing
- Healthcare Science
- Industrial Electrician
- Industrial Fluid Power Technician
- Industrial Motor Control Technician
- Infant and Toddler Child Care Specialist
- Interior Design Assistant
- Interior Window Treatments
- Internet Specialist Website Developer
- Landscape Design Technician
- Landscape Specialist
- Lathe Operator
- Linux/UNIX Systems Administrator
- Marketing Specialist
- Medical Coding Specialist
- Medical Front Office Assistant
- Microsoft Excel Application Professional
- Microsoft Office Application Professional
- Mill Operator
- Motorsports Chassis Technician
- Motorsports Engine Builder
- Motorsports Fabrication Technician
- Nurse Aide
- Office Accounting Specialist
- Ornamental Iron Fabricator
- Patient Navigator
- PC Repair and Network Technician
- Pharmacy Assistant
- Phlebotomy Technician
- Programmable Control Technician I
- Residential Wiring Technician
- Robotic Technician
- Sales Professional
- Shampoo Technician
- Small Business Marketing Manager
- Social Media Marketing
- Supervisor/Management Specialist
- Sustainable Urban Agriculture Technician
- Technical Specialist
- Visual Merchandising Associate

INSTITUTIONAL PROCESS

As part of Lanier Technical College's reaffirmation effort, the College's Leadership Team, consisting of the President, Vice Presidents, Assistant Vice President of Academic Affairs, Executive Director of College Foundation, the Academic Deans, and other key administrators, determined to appoint three successive teams of faculty and staff to oversee the Quality Enhancement Plan: a QEP Topic Selection Team, a QEP Design Team, and a QEP Implementation Team. For each team, faculty and staff were chosen on the basis of their firsthand knowledge of student needs, development of college-wide student learning outcomes, and skills and knowledge of academic development and assessment processes.

The QEP Topic Selection Team was appointed in February 2014. To ensure a wide range of constituents, the roster was developed to include representatives from each of the academic divisions and each campus, as well as the Student Affairs department, and the student body. (See Appendix C, QEP Team Rosters.)

At their QEP Topic Selection Kick-off Meeting on March 12, 2014, the Topic Selection Team was charged with developing a forward-looking Quality Enhancement Plan that focuses on student learning in support of the College's mission. They were directed to develop a plan with the following characteristics:

1. Improves student learning
2. Meets SACSCOC Principles of Accreditation
3. Addresses the needs of society and students
4. Is mission-appropriate to higher education and workforce development
5. Is within the institutional capabilities of Lanier Tech
6. Has clearly specified educational objectives, focuses on achieving LTC's mission and meeting the needs of the students.

INSTITUTIONAL DATA

On April 21, 2014, the Topic Selection Team conducted an analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) facing the College. The Topic Selection Team itself were the participants in the analysis. Facilitated discussion led to lists of items within each category, which were then used to develop potential areas of focus for a QEP topic. Participants were each given several colored stickers which they used in casino-style voting to indicate the topics and SWOT areas they believed deserved greatest consideration. That is, participants were asked to vote for the QEP topic they believed was most important, but could also use their votes to emphasize their belief that particular items in the SWOT analysis itself were deserving of sustained attention.

Items receiving the highest number of votes were:

- Topic: Math Skills (27 votes)
- Topic: First-Year Experience (9 votes)
- Topic: Distance Education (8 votes)

- Opportunity: Opportunity to Impact Students (8 votes)
- Topic: Study Skills (5 votes)
- Topic: Writing Skills (4 votes)
- Topic: Technology in the Classroom (4 votes)
- Strength: Job placement (4 votes)
- Strength: Small class size (4 votes)
- Weakness: Lack of screening for online success (4 votes)
- Opportunity: Opportunity to be proactive with 1st-year students (4 votes)
- Weakness: Space (3 votes)
- Opportunity: Promote small college experience (cost/value, transfer) (3 votes)

The process resulted in the following set of topics:

Target	Description
Communication Skills	Presentation skills, public speaking, professional presence
Writing Skills	Academic writing, business writing
Distance Education	Increased success in online learning environments
First-Year Experience	High school-to-college transition, career choice, academic expectations, college services,
Math Skills	Improving math success in occupational courses
Reading Skills	Improving college-level comprehension
Study Skills	Effective study habits and techniques
Technology in the Classroom	Using technology to improve the learning environment

Beginning May 6, 2014, the QEP Topic Selection Team members then researched successful QEPs related to these topics completed by other institutions. They also constructed a questionnaire to be given to a broad range of LTC stakeholders. The questionnaire was then distributed to students, program advisory committee members, the College's local board and foundation board, and faculty and staff, asking them to rank these potential topics in order of preference and importance. (See Appendix D – QEP Topic Selection Questionnaire.)

The questionnaire results were then tabulated and ranked.

Lanier Technical College: QEP Topic Selection Survey Results, 2014

Order by Groups' Rankings		Advisory Boards	Rank	Local Board	Rank	Foundation	Rank	Faculty & Staff	Rank	Students	Rank	Total*
1	**Communication Skills**	71	1	6	2	14	1	108	1	340	4	9
2	**Reading Skills**	38	5	5	4	5	3	69	3	539	1	16
3	**First-Year Experience**	41	4	3	5	6	5	94	2	370	2	18
4	**Math Skills**	60	2	8	1	2	8	68	4	162	6	21
5	**Technology in the Classroom**	37	6	6	2	8	2	51	7	221	5	22
6	**Writing Skills**	44	3	3	5	5	3	65	5	159	7	23
7	**Study Skills**	31	7	2	8	4	6	63	6	366	3	30
8	**Distance Education**	20	8	3	5	4	6	39	8	144	8	35

* *Total: This is a total of rankings, with 1 being best and 8 being worst. So, a lower value in the "Rank" column indicates greater preference.*

The Topic Selection Team met on June 17 to discuss these results, which resulted in a shorter list of four key issues meriting more detailed analysis:

- Communication Skills
- Reading Skills
- First-Year Experience
- Math Skills

On June 24, subcommittees drawn from the Topic Selection Team were assigned to research each of these topics and to locate and present on successful related QEPs. The subcommittees reported out to the Topic Selection Team on July 8.

From May to June of 2014, the Topic Selection Team shifted focus to analyzing a range of institutional data to identify patterns, trends, and priorities within this set of topic. Data reviewed included:

- Lanier Tech's annual Student Learning Outcomes Assessment Reports
- SWOT Analysis
- Topic Preference Questionnaire results, which included input from:
  - Program Advisory Boards
  - LTC Local Board
  - LTC Foundation
  - Faculty & Staff

    - Students
- Technical College System of Georgia (TCSG) Data Center reports showing Lanier Technical College's progress on the Complete College Georgia (CCG) metrics
    - DC249: Progress Metric 1: Enroll in Remedial
    - DC252: Progress Metric 2A: Success in Remedial
    - DC254: Progress Metric 2B: Success in Remedial
- A locally developed "Killer Course Report" identifying the courses and delivery modes that present the greatest obstacles to student success

Student Learning Outcomes Assessment reports are a central element of Lanier Technical College's institutional planning efforts. These reports, completed annually, provide detailed direct assessment of student learning across the curriculum. The Topic Selection Team reviewed the Student Learning Outcomes Assessment Reports seeking to identify recurring issues that affect student learning across disciplines. One issue noted was students' consistent problems with reading and following directions. Another was students' work ethic: often faculty had difficulty accurately assessing student learning simply because many students did not complete key assessments. Most strongly, the review showed math skills — particularly applied math skills within occupational courses — to be a recurring weakness. Typical statements made by faculty when analyzing assessment data include:

- Students still seem to be struggling with the actual analysis of... ratios, which is the entire purpose of this outcome. (Accounting #3, 2012)
- Finding the discounts using ordinary and exact interest decreased from 83% to 77%. Applying these concepts to promissory notes went from 85% to 70%. (Math #1, 2012)
- The students had the most difficulty in performing calculations... "Calculated (reconciled) the account correctly" went from 95% to 63%... The calculation errors were simple math errors. (Healthcare Management #5, 2012)
- The area of Children's Calculations only had a small improvement of 49% to 57%... In AY2013, faculty will continue to require weekly calculations/conversion practice prior to exam. Students will continue to be encouraged to attend weekly tutoring sessions and the Math faculty will continue to incorporate the MA faculty's needs in the classroom (Medical Assisting #3, 2012)
- Power calculations are 78%. More class time will be devoted to in-class calculations to improve results (Electrical Utilities #3, 2012)
- Students had the most difficulty with space planning and were somewhat challenged in calculating significant dimension. (Interiors #1, 2012)
- Identifying geometric tolerance is 76% and reference dimensions is 65%. Students need more exposure to reference and geometric tolerances than they get in the blueprint reading course. (Machine Tools #6, 2012)
- Students appear to have mastered concepts in simple calculations such as range, mode, and mean. Students were more challenged with mathematical calculations involving more complex calculations. (Clinical Laboratory Technology, Outcome #1, 2013)

- Elements of the skill requiring mathematical calculations gave students the most difficulty. They performed well on manual aspects of the skill. (Clinical Laboratory Technology, Outcome #3, 2013)
- The continuing problem in the classroom is lack of background in basic geometry and trigonometry…..e.g. the Pythagorean theorem. (Electrical Utility, Outcome #2, 2013)
- Students continue to struggle with power calculations. (Electrical Utility Technology, Outcome #3, 2013)
- The target scores for all labs is a 90% average. The problem areas for PLC build, test, and troubleshoot are... Math Instructions (80%) – This may be attributed to weak math skills from the beginning. Difficulty with formula manipulation and basic algebra concepts may stem from several semesters of non-usage. (Industrial Systems Technology, Outcome #3, 2013)
- The math is taken in the first or second semester. The PLC course is taught in the fifth or sixth semester. These math skills translate to the programming labs. A review of formulas and basic algebra will be beneficial. (Industrial Systems Technology, Outcome #3, 2013)
- However the lack of understanding proper programming techniques from math, subroutines, and data handling could be the key to this very low score. (Industrial Systems Technology, Outcome #3, 2013)
- Even though Industrial Systems Technology is set on students being able to achieve a minimum score of 80% on all wiring, programming, and adjusting performances, improvement is needed for math operations. (Industrial Systems Technology, Outcome #4, 2013)
- Motor load calculations is related to the wiring/conductor tables. Both require basic math to perform the tasks. This was the second lowest score and reviewing some basic math at the beginning of the course may help. Math pre-test can be developed to determine these weaknesses for students. (Industrial Systems Technology, Outcome #5, 2013)
- For the upcoming fiscal year, we will continue to track online students separately from hybrid students and will work to improve on some of the lower scoring areas by adding addition exercises and more tutorials for online students. (Accounting, Outcome #2, 2013)
- All students still seem to struggle with properly completing the Schedule C, which includes depreciation calculations and self-employment tax calculations. (Accounting, Outcome #3, 2013)
- When looking at the 2013 data, faculty noted that this year they had made students use rulers and other tools with defined widths for the first two topics while learning the technique, rather than simply estimating lengths. This simple change seemed to make a noticeable difference for some students. (Cosmetology, Outcome #3, 2013)
- A supplemental exercise on angular calculations will be assigned in 2014 to give students more practice with this topic. (Drafting, Outcome #2, 2013)

- The faculty believe that students' difficulties with this and other topics stem from weakness in their mathematical skills. In 2014, the Electronics faculty will meet with the Math faculty to discuss adding modules and exercises that will better prepare students for specific math skills needed for success in electronics courses. (Electronics Technology, Outcome #2, 2013)
- The difference between students' performance on "Transistors" and the next two topics — "Field Effect Transistors" and "Bipolar Junction Transistors" — reinforces the perception discussed above, that students need stronger math skills to succeed in these courses: they scored relatively well on questions dealing with general concepts (92%) but the scores dropped significantly when the questions required them to solve equations (68% and 67%). In 2014, the Electronics faculty will meet with the Math faculty to discuss adding modules and exercises that will better prepare students for specific math skills needed for success in electronics courses. (Electronics Technology, Outcome #3, 2013)
- Students had the most difficulty with presentation and calculating pricing... Faculty will provide additional online practice activities to accompany the price calculation worksheet to increase success in this area. (Interiors, Outcome #3)
- The assessment results show a weakness in understanding Z-axis heights and documentation on how much material to leave out of the vise. (Machine Tool Technology, Outcome #3, 2013)
- [Calculating] income tax withholding and social security taxes.. are relatively complex and we are not surprised to find they challenge students. (Accounting #4, 2014)
- Student understanding of sub-netting and the subsequent need to verify network configurations is still an issue due to the students entering the course with poor math skills (Computer Information Systems #9, 2014)
- Faculty noted the two topics students scored lowest on... are both more math and accounting intensive than the other topics. (Marketing #2, 2014)
- The students did have difficulty with determining the dosage for prescriptions (Pharmacy #2, 2014)
- Students still struggle with accuracy in completion of the multi-step pricing process. (Interiors #2, 2014)
- Results of assessments show serious deficiency in understanding that proportional mixing means that for a specific volume of paint or other material a specific amount of another material must be added. (Auto Collision Repair #5, 2014)
- Most of the deductions were math- or measurement-related issues (Motor Vehicle Sports #2, 2014)

In summary, review of SLOs revealed multiple topics for consideration with math skills being the most frequently cited topic.

- Reading Skills
- First-Year Experience
- Math Skills

The Topic Selection Team then analyzed a set of reports that provided different perspectives on challenges facing LTC students.

The Topic Selection Team studied reports showing the College's progress on the Complete College Georgia (CCG) initiative. Demographic information from these reports gave the Selection Team detailed information on the make-up of LTC's student body. The majority of student's in the fall 2014 cohort were female (56%); 70% were nontraditional students aged 25 or older. CCG Progress Metric 1 (report DC249), Enrollment in Remedial Education, showed that historically, 33% to 38% of LTC's entering student population need remedial education. Of these, more students need Math developmental courses than need English or Reading courses. Review of Progress Metrics 2A and 2B on Success in Remedial Education showed that the College has been inconsistent in requiring students to enroll in their remedial courses and college-level Math and English courses in a timely way.

In a subsequent meeting, the Topic Selection Team was presented with the results of LTC's locally developed "Killer Course Report", which analyzes which courses and which delivery modes present the students with the greatest obstacles to success. The report identifies the number and percentage of "stops" (i.e. final grades of D, F, W, or I, and the number of these that were because of withdrawals).

"Killer Course Report" by Pass Rate, 2013-2014

	Course	Enrollment	(A,B,C) Successes	(D,F,W,I) Failures	Withdrew	Pass Rate
1	MATH 1101 Online	12	2	10	9	17%
2	MATH 98 Hybrid >=50% Online	8	2	6	2	25%
3	READ 97 Web Enhanced	12	3	9	0	25%
4	MATH 1113 Web Enhanced	10	4	6	5	40%
5	MATH 99 Web Enhanced	88	36	52	21	41%
6	DMPT 1015 Lecture	14	6	8	2	43%
7	MATH 1015 Lecture	7	3	4	0	43%
8	MATH 1111 Online	84	37	47	29	44%
9	FRSC 1141 Lecture/Lab	11	5	6	3	45%
10	MATH 1011 Online	28	13	15	2	46%
11	DMPT 1000 Lecture	10	5	5	2	50%
12	READ 97 Hybrid <50% Online	8	4	4	4	50%
13	WELD 1010 Lecture/Lab	6	3	3	3	50%
14	PSYC 1101 Online	108	55	53	26	51%
15	BIOL 2113 Hybrid >=50% Online	35	18	17	7	51%

16	MATH 98 Web Enhanced	129	68	61	30	53%
17	ENGL 1101 Online	156	83	73	42	53%
18	MATH 99 Lecture	41	22	19	9	54%
19	ENGL 2130 Online	66	36	30	24	55%
20	MCHT 1011 Web Enhanced	11	6	5	3	55%
21	PHAR 1040 Online	22	12	10	6	55%
22	WELD 1110 Lecture/Lab	11	6	5	3	55%
23	ENGL 98 Hybrid >=50% Online	34	19	15	8	56%
24	CIST 1305 Hybrid <50% Online	16	9	7	2	56%
25	MGMT 1115 Hybrid >=50% Online	16	9	7	5	56%

"Killer Courses", sorted by Number of Stops, 2013 - 2014

				(A,B,C)	(DFWI)	
	Course	**Enrollment**	**Successes**	**Stops**	**Withdrew**	**Pass Rate**
1	COMP 1000 Online	536	408	127	113	76%
2	COMP 1000 Hybrid <50% Online	489	390	99	72	80%
3	ENGL 1101 Hybrid >=50% Online	208	122	86	48	59%
4	ENGL 1101 Online	156	83	73	42	53%
5	MATH 098 Web Enhanced	129	68	61	30	53%
6	PSYC 1101 Online	108	55	53	26	51%
7	MATH 099 Web Enhanced	88	36	52	21	41%
8	MATH 098 Lecture	100	59	41	11	59%
9	ENGL 1010 Online	88	51	37	29	58%
10	MATH 112 Online	114	81	33	12	71%
11	MATH 1111 Online	62	30	32	17	48%
12	ENGL 1101 Online	91	59	32	22	65%
13	ENGL 2130 Online	66	36	30	24	55%
14	MATH 1100 Online	49	21	28	16	43%
15	ALHS 1090 Online	114	87	27	16	76%
16	ENGL 1101 Hybrid >=50% Online	97	71	26	7	73%
17	MATH 1111 Lecture	63	39	24	15	62%
18	MATH 1111 Web Enhanced	69	45	24	18	65%
19	EMPL 1000 Online	80	56	24	14	70%
20	BUSN 1440 Online	120	97	23	19	81%
21	ALHS 1090 Web Enhanced	121	99	22	14	82%
22	BIOL 2113 Online	45	24	21	8	53%
23	COMP 1000 Hybrid >=50% Online	102	81	21	15	79%
24	ALHS 1010 Web Enhanced	107	86	21	12	80%
25	READ 90 Hybrid <50% Online	56	36	20	6	64%

The most striking findings within the “Killer Course” reports was the disproportionate number of stops caused by general education and Learning Support – especially math – courses. When ranked by pass-rate percentage, 15 of the 25 courses with the lowest pass rate were general education or learning support classes. Of these, nine were math courses. Design & Media Production Technology and Reading learning support each accounted for two of the remaining courses; other programs/subjects only had one course in the 25 courses with the lowest pass rate.

When ranked by raw number of stops, 16 of the 25 courses with the highest number of stops were general education and learning support courses. Of these, seven were math courses. Six were English courses. Allied Health Courses also appeared six times.

In the review of Student Learning Outcomes assessment results, math skills had previously been identified as a potential focus for the QEP. The "Killer Course Report" showed that distance education should also be considered.

The Topic Selection Team met a final time on July 29, 2014 to review and discuss all data. The Team then conducted an electronic vote on which topic to recommend to the LTC Leadership Team. Math Skills and First-Year Experience each received six votes; Communication Skills received four votes; Reading Skills received one vote.

On August 12, 2014, the Chair of the Topic Selection Team presented the top three topics to the Leadership Team.

- Communication Skills
- First-Year Experience
- Math Skills

The presentation included a summary of the processes followed and data gathered by the Topic Selection Team. After substantive discussion, the Leadership Team selected Math Skills as the focus for Lanier Technical College's Quality Enhancement Plan.

DEVELOPMENT OF PLAN

In September 2014, a QEP Design Team was selected to identify the specific focus of the Plan. For this team as well, members were selected from each of the academic divisions and each campus, as well as administrative divisions such as Student Affairs and Administrative Services. (See Appendix C, QEP Team Rosters.)

The Design Team met biweekly to refine the subject of "Math Skills" and identify a specific QEP focus for the "Math Skills" topic.

The QEP Design Team's first major effort was to organize a set of 22 focus group sessions involving students and five focus groups with faculty from each LTC academic division (Business & Computers, Technical & Industrial, Allied Health, Public & Personal Services, and General Education). In October and November, the Team developed questions for the focus groups (see Appendix E – Focus Group Questions). In order to solicit honest and uninhibited input from the participants, the College hired an experienced facilitator from outside Lanier Tech to lead the sessions. The faculty and staff focus groups sessions were held in November and December of 2014; the student focus groups were held in January 2015.

Institutional data reviewed by Topic Selection Team earlier in process (see p. 11) seemed to indicate that applied math skills within occupational courses would be the most likely focus for improvement, but the Design Team's review of the focus group results quickly showed that the College's developmental Math program is a source of widespread frustration. As the focus groups' facilitator summarized:

> "Across the board, [in] every class, no matter what program, there were students who had taken a learning support math, or something very similar to it at another institution. Overall, it is the class that received the greatest number of negative comments. These comments ranged from horrible teachers, how can you have students in this type of program doing it on computers, unnecessary for the rest of my program, and hardest to get through, classes to big, and beyond. It seems to overall, [to] leave a bad taste in students mouths, and potentially has a very negative impact on how they view the remainder of their required math courses at Lanier Tech."

Of course, in the wide-ranging discussion of focus groups, numerous other topics were raised, but dissatisfaction with the developmental Math program continuously resurfaced. Typical comments by students included:

- No, did not feel like you were learning anything. Did not like the online component.
- Computer usage, sometimes is harder to understand and follow concepts.
- Math 0090 was horrible. It was on computer and that does not help you if you do not know how to do something
- Some of it is helpful, but it would be even more helpful if they had had an actual instructor for the 0090 course
- More interaction with professors.
- MyMathLab was horrible.
- More instructional, less computer.
- MUST have a helpful teacher. You need someone to help you understand the concepts. Looking at it on a computer screen is not helpful.
- Offer math 0090 with a teacher. Should not be on a computer.
- This is very frustrating, especially for students who have come back and are not familiar with this type of format.
- It should not take 2-3 semesters to get a basic math class finished. This happens because you don't have professors who actually teach the class.
- Too much on computer.
- Everyone else is very frustrated with this model.
- If you are in a learning support class, why not have support?

Faculty teaching math courses had similarly negative views regarding the MATH 0090 course:

- It was something we were forced into doing, against wishes.

- It has been implemented over 1 year. It is not effective.
- Very time consuming, because students are not exiting out when they should.
- Have tripled number of students enrolled, but not tripled number of students finishing it.
- There is no motivation, can be very frustrating and defeating for students.

Some faculty were even more blunt:

- It sucks royally.

Additionally, students who expressed frustration with MATH 0090 frequently expressed high levels of math anxiety, saying things such as:

- Stigma that math has; math anxiety overwhelming.
- Overwhelming.*
- Overwhelmed.*
- Math anxiety.*
- Anxiety.*
- Math anxiety on tests.

* *These short statements about what causes students to not succeed at math appeared multiple times.*

One student said specifically that the computer delivery platform, MyMathLab, caused or at least aggravated her sense of math anxiety.

The students' anxiety about math may well be a function of their feeling underprepared and lacking a solid understanding of fundamental concepts. Faculty said that students are "missing basic fundamentals that you learn in elementary, middle, etc." and they have a "lack of foundation." Students were asked what leads to a sense of anxiety or stress in their math classes:

- Lack of basic foundation.
- [Need] understanding the basics.
- Not understanding the basics.
- Over analyzed... forget to explain the basics.
- When someone throws an advanced concept at you and you don't have the foundation.
- Not having a good foundation.
- Don't have strong fundamentals.
- Did not get fundamentals.

When students were asked what they would change about LTC's math classes, the desire for multiple delivery modes and pacing was often expressed:

- More options, different ways to take math, serve different ways of learning.

- Have different levels, for accelerated vs. need more time.
- My math lab needs more options how to solve problems, not everyone may understand the way an example is given.
- Every student learns differently, how do you apply that to teaching?

Finally, it must be admitted that there is also a pattern of students finding math teachers inaccessible and unapproachable, a situation which is perhaps aggravated by LTC's heavy reliance on computer-based instruction:

- They don't feel that they can approach professors
- Teachers who can't teach and are very impatient
- Professors make you feel dumb, they know the material very well, but are not good teachers
- Online courses- lack of communication leads to horrible grades. Students can't get ahold of teachers, then can't get caught up.
- Some faculty is very impatient, do not help students. Creates a level of discomfort and fear by students.
- Have never had a teacher that makes math fun.
- Lack of instruction.
- More teacher support, try and have TA's that actually help and don't just babysit.
- Bad experience with professors.
- I like the self-learning format, but when you get to something you do not understand, it would be nice to have a teacher explain to you.
- Not having a teacher present.
- Not having any help.
- Too nervous to ask instructor for help.
- Not receiving attention or direction from teacher.

These comments indicate that while the Teams' initial impression had been that a QEP relating to "Math Skills" would be focused on successfully using math skills in occupational courses, the underlying cause of difficulties students face may actually lie with the foundational instruction they receive in math Learning Support (i.e. developmental) coursework.

With this in mind, the team reviewed quantitative data on Lanier Tech's Math Learning Support program. A review of all students enrolled in MATH 0090 in Fall 2014 revealed a disturbing lack of progress through the Learning Support program.

Fall 2014 MATH 0090 Students Summary

	A	B	C	D	E	F	G	H
	Students Needing MATH 1111	Students Needing MATH 1100	Students Needing MATH 1111 or 1100	Students Needing MATH 1012	Students Needing Math 1013	Other	Total A (Columns A, B, D, E, F)	Total B (Columns C, D, E, F)
Total	211	133	344	92	5	6	447	447
Reached Exit Point	46	50	65	67	1	6	170	139
Reached Exit Point in One Term	12	11	16	52	0	2	77	70
Average # Tries	2.9	2.5	2.3	1.7	2	1.8	2.1	2.1
% Reaching Exit Point	22%	38%	19%	73%	20%	100%	38%	31%
% Reaching Exit Point in One Term	6%	8%	5%	57%	0%	33%	17%	16%

These data indicate that very few students complete their Learning Support requirement in a single term. More alarmingly, even after multiple attempts, only a minority of students outside of those who will take MATH 1012, complete their Learning Support requirement: success rate for these classes is 19% to 38%. This is disturbing because these students simply cannot graduate until they do so. Lanier Technical College's mission is to provide students with an education that lets them succeed in their careers. If they do not graduate, LTC has failed.

Students who do complete their Learning Support requirement face another barrier to graduation when they enter their college-level math course.

LTC Math Pass Rates by Delivery Mode, Fall 2014

	Course	Enrollment	Successes (A, B, C)	Stops (D, F, W, I)	Withdrew	Incompletes	Pass Rate
1	MATH 1111 COLLEGE ALGEBRA Online	60	19	41	28	0	32%
2	MATH 1011 BUSINESS MATH Online	15	5	10	6	0	33%
3	MATH 1100 QUANTITATIVE SKILLS/ Online	21	8	13	4	0	38%
4	MATH 1100 QUANTITATIVE SKILLS/ Web Enhanced	12	6	6	6	0	50%
5	MATH 1111 COLLEGE ALGEBRA Hybrid <50% Online	225	122	102	60	1	54%
6	MATH 1131 CALCULUS I Hybrid <50% Online	5	3	2	1	0	60%
7	MATH 1101 MATH MODELING Hybrid <50% Online	8	5	3	2	0	63%
8	MATH 1012 FOUND. MATHMATICS Online	57	43	14	10	0	75%
9	MATH 1012 FOUND. MATHMATICS Hybrid <50% Online	173	134	38	22	1	77%

Except for the diploma-level MATH 1012 classes and one small class of degree-level students (MATH 1101), 40% or fewer students were able to complete these required courses.

These data raise a number of questions for the Design Team. What causes LTC students to fail to move through the math program? How can we help them complete the program? What role does delivery mode play? How can we design the curriculum to best meet the learning needs of this population of students?

REVIEW OF LITERATURE

Members of the QEP Design Team worked with the College's reference librarian through the summer and fall of 2015 to collect and review literature in the field pertaining to Learning Support math. Particular areas of inquiry included delivery modes, affective factors, enhanced tutoring, alternative teaching methods, placement testing, and professional development.

DELIVERY MODE

Currently, Lanier Tech delivers its math Learning Support instruction via a computer-based, emporium-model class (MATH 0090), in which students must demonstrate mastery of topics by scoring 80% or higher on a computer module for each topic. In this course, students work independently to complete a series of modules within a software platform (MyMathLab) that both explains math concepts and tests students' ability with them. While the design of LTC's current delivery method assumed that students would have significant interaction with their instructors and would use computer-based instruction primarily for practice and reinforcement, in practice there is less student-teacher interaction than ideal. Students resist asking for instruction and many instructors find it difficult to engage them when they are used to working on their own on a computer. The effect is that LTC's emporium-model math Learning Support classes are essentially a distance education format delivered on campus: as the focus group results showed, students worked through instructional models on a computer with relatively little interaction with their teachers.

Also, anecdotal evidence in the classroom strongly suggest that relying primarily on computer-based instruction for math courses is not effective. Student comments elicited in focus groups, presented above, emphatically echoed this belief. Comments such as the following are typical and representative:

- No, did not feel like you were learning anything. Did not like the online component.
- Computer usage, sometimes is harder to understand and follow concepts.
- Math 0090 was horrible. It was on computer and that does not help you if you do not know how to do something.

The emerging sense from focus group results and quantitative data that primarily computer-based instruction just does not work for developmental math classes is supported by research literature in the field. A study conducted by Zavarella & Ignash examined "the effectiveness of computer-based instruction with different types of learners, especially with those enrolled in developmental education courses" (p. 2). Their results indicate that "students enrolled in the hybrid or distance learning format had a higher withdrawal rate" (Zavarella & Ignash, 2009, p.

6). Strikingly, they also found that this holds true regardless of students' scores on placement tests:

> Students who enrolled in either the hybrid or distance learning formats had greater odds of withdrawing from the course compared to students enrolled in a lecture-based format regardless of their placement scores. CPT scores appeared to have no relationship with completion status of the course while controlling for delivery method. (Zavarella & Ignash, 2009, p.8)

The same study also found that students' beliefs and ideas about why they should opt for computer-based instruction are unreliable, and many drop out when faced with unexpected challenges. And, the study found that students who opted for computer-based instruction seldom take advantage of available tutoring services. A major finding of the study was that "students enrolled in developmental mathematics courses taught in a computer-based format had a higher dropout rate than students enrolled in a traditional lecture-based course." (Zavarella & Ignash, 2009, p.8)

A number of other researchers have had similar findings. Helms (2014), for example, found that "online students had significantly lower grade point averages, missed significantly more grade opportunities, and were significantly more likely to fail the course compared to their F2F counterparts" (Abstract, para. 1).

While Helms's results are based on student performance, other researchers such as Young and Duncan focus on student perceptions. They found that:

> Student Effort was rated significantly higher for online courses than for F2F courses, also with a small effect size. A second analysis, using 11 pairs of the same course and same instructor, yielded similar findings. Students rated on campus courses significantly higher than online courses in Communication, Faculty/Student Interaction, Grading, Course Outcomes, and Overall Evaluation; effect sizes were large. Overall, both analyses indicated that students are more satisfied with traditional, F2F courses compared to online courses. (Young & Duncan, 2014, p. 70)

Di & Jaggars' work on performance gaps between students in face-to-face vs. online, computer-based instruction is particularly relevant for Lanier Technical College. In academic year 2015, the two largest racial demographic groups in the student body are white non-Hispanic (73.1%) and Hispanic (12.6%). A study by Kaupp found that "both white and Hispanic students performed more poorly in online courses than they did in face-to-face courses, with the effect being stronger among Hispanic students" (as cited in Di & Jaggars, 2014, p. 636), while another study by Figlio, Rush, & Yin states that "Hispanic students, males, and those with lower prior GPAs performed more poorly in the online than in the face-to-face course section" (as cited in Di & Jaggars, 2014, p. 636). These groups seem to be particularly at risk, but the negative correlation between online, computer-based instruction and student persistence and GPAs is seen across demographic groups: "Overall, the online format had a significantly negative relationship with both course persistence and standardized course grade, indicating that the typical student had more difficulty succeeding in online courses than in face-to-face courses" (Di & Jaggars, 2014, p. 651).

AFFECTIVE FACTORS

In focus groups, a large number of LTC students reported an "overwhelming" sense of math anxiety, and faculty voiced similar concerns. When asked "What do you think prevents students from doing well in math courses?", students responses included factors such as:

- Stigma that math has; math anxiety overwhelming
- Overwhelming
- Overwhelmed
- Math anxiety
- Anxiety
- Math anxiety on tests

The Design Team concluded that the review of the literature also indicates that a successful redesign of Lanier Tech's Learning Support mathematics program must address factors in the affective domain including math anxiety. Groundbreaking work by Benjamin Bloom in the 1950s delineated the roles played by IQ and cognitive entry skills, quality of instruction, and student affective considerations. Bloom weighted cognitive factors quite heavily, at 50%, with quality of instruction and student affective considerations being responsible for only 25% of student learning. Recent work by Zientek, Yetkiner Ozel, Fong, & Griffin (2013), however challenges this long-held assumption, and indicates that affective variables contribute as much as 41% of developmental math grade variance (p. 1002).

For the purposes of this review, LTC is investigating math anxiety as defined by Hopko et al. (2003): "feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in ordinary life and academic situations" (p. 648). Math anxiety is an obvious affective variable to consider as an aspect of the Learning Support redesign, but research literature discussed below suggests that math anxiety is most constructively considered as one element within a constellation of affective variables which also includes the student's level of self-efficacy and math self-concept.

Encouragingly, many researchers, such as Andrews & Brown (2015), find strong evidence that math anxiety and its impact on student learning do respond to pedagogic interventions:

> While math anxiety is a result of math-skill related fears, it can have as much to do with the experience of anxiety itself and a student wanting to avoid repeated anxious feelings, especially in public. If educators can help students get through the road block of mathematical inferiority and anxiety and gain confidence in their ability to apply math skills successfully, students can begin to face the challenges associated with math and move forward rather than avoid such challenges. (p. 369)

The literature also indicates that math anxiety is only one of a related cluster of affective factors effecting student learning and student performance. In addition to math anxiety, self-efficacy and self-concept in mathematics should also be considered.

A 2014 study by Jameson & Fusco finds that there is a statistically significant relationship between anxiety, self-efficacy, and self-concept.

Jameson & Fusco (2014) point out that "a plethora of studies have established the negative relationship between self-efficacy and anxiety" (p. 314) but their study shows that this relationship figures differently for different populations of students. In particular, older, non-traditional students exhibit a stronger negative correlation between anxiety and self-efficacy, or the belief that a person can successfully execute a desired behavior to result in a desired outcome. The correlation is clear and symmetrical among older students, but not necessarily so among traditional students: "adult learners had significantly lower levels of math self-efficacy, but not differing levels of anxiety or concept, than traditional students" (Jameson & Fusco, 2014, p. 313). Furthermore, they found that "as age increased, math anxiety increased and math self-efficacy decreased" (Jameson & Fusco, 2014, p. 314).

These findings are of particular relevance for Lanier Tech's QEP, as a plurality (40%) of LTC's current students are age twenty-five or higher.

In addition to anxiety and self-efficacy, the literature explores the role of math self-concept in students' success or failure in mathematics. Jameson & Fusco follow Marsh & Shelvelson's definition of self-concept: "a multifaceted and hierarchical construct that includes both general and specific perceptions an individual holds about him- or herself" (as cited in Jameson & Fusco, 2014, p. 309). Jameson & Fusco (2014) accept the currently held view, established by a number of researchers, that "self-concept contains a self-efficacy component, particularly in mathematics (Jameson, 2013b; Pajares & Miller, 1994; Pietsch, Walker, & Chapman, 2003; Usher & Pajares, 2008)" (p. 309).

In Jameson & Fusco's (2014) view, significant improvements to adult learner retention and completion require a synthetic approach to math anxiety, self-efficacy, and self-concept:

> Taken together, the results of this study suggest that adult learners are experiencing negative self-perceptions and affect that may hinder their learning. Previous research has indicated that these negative self-perceptions and affective reactions may be of particular import in adult learner retention and degree completion (Kazis et al., 2007; Lim, 2001). Therefore, all systems within colleges and universities should be knowledgeable about and aware of the diverse needs, skills, attitudes, and experiences of adult learners to aid in their degree completion. (p. 314)

Jameson & Fusco (2014) stress the "*diverse* needs, skills, attitudes, and experiences of adult learners" (p. 314). Li et al. (2013) echoes this, recommending a model in which "each new student is assessed from both academic and behavioral risk perspectives and subsequently referred to resources for academic and behavioral skill development" (p. 20). Just as important, Li et al. (2013) recommends that institutions avoid using "one-size-fits-all" approaches to developmental courses. Instead, institutions should "take a multifaceted approach to assessing and identifying student academic and behavioral skill gaps, and, in turn, provide resources designed to address these gaps" (p. 22).

Wernersbach, Crowley, Bates, & Rosenthal (2014) found encouraging evidence that incorporating a study skills component in math classes improves both students' self-efficacy and their math course success. They cite ~~a~~ Polansky, Horan, & Hanish's 1993 study that showed 100% of students enrolled in one particular college's study skills course came back the next semester, and that only 33% of at-risk students who did not enroll in the study skills course were enrolled at the school after the following two semesters (p. 15). Their own study and others they cite similarly find that embedded study-skills components in math classes can have a significant impact on student success.

ENHANCED TUTORING SERVICES

The literature on developmental mathematics students indicates that tutoring services can be an important intervention, but only if the tutoring program is intentionally designed and provides trained tutors. A simple "put them in tutoring" approach does not work. While tutors who have only a certain level of subject matter expertise may be helpful for higher level students, developmental students need a richer, more nuanced, and more tailored form of tutoring. Nolting, a nationally recognized expert on assessing institutional variables that affect math success, says that:

> Developmental students need a multimodality instructional approach which means integrating the lecture with manipulatives, math study skills, and group work; learning math vocabulary words; using web-based support; tutoring students based on their learning style; giving frequent quizzes and practice tests; and inviting counselors into the class to discuss anxiety issues and provide a referral for personal problems. (Boylan & Nolting, 2011, p. 22)

In a 2001 background research study, the U.S. Department of Education identified characteristics of successful tutoring efforts. Their study showed that tutoring works best if:

1. There are trained people under careful supervision.
2. There is careful monitoring and reinforcement of tutee progress.
3. There are frequent and regular tutoring sessions, with each session between 10-60 minutes daily (regular tutoring sessions generate the most consistent positive gains).
4. Tutoring sessions are well-structured and content and delivery of instruction is carefully scripted (The term "strategies" is a more fitting term for "scripts." The general idea is that effective tutors must know their material and have instructional routines).
5. There is close coordination with the classroom or teacher.
6. There is intensive and ongoing training for tutors.

Gutierrez examines the effectiveness of tutoring at the K-12 level in a range of subjects. His findings indicate that those tutoring programs having the qualities listed above are indeed effective. While Gutierrez's work focuses on K-12 students, it is reasonable to proceed on the belief that similar qualities will define a successful tutoring program for college students. As Gutierrez says, “We no longer have to assume that tutoring works, as its success is backed up by decades of research, which have established that well-planned tutoring programs can improve individual student achievement, self-esteem as well as overall school climate” (p. 15). In other words, an institution working to improve student success should not be asking whether to provide robust tutoring, but rather what forms of tutoring work best.

A robust tutoring program with trained personnel is a significant expense, but a study by Gallard, Albritton, & Morgan (2010) indicates that such services can be recouped over the long term:

> Efforts to increase success of students who need developmental education can be costly. However, expenditures for achieving advancements for developmental education students are recouped in financial benefits to institutions and ultimately to society at large. (p. 10)

The model Gallard, Albritton, & Morgan (2010) examine is an Academic Success Center that provides tutors with experience and advanced degrees, a computerized mentoring and tutoring system to monitor student success rates and provide detailed reporting. Their findings show that:

> students receiving tutoring from the Academic Success Center one or more times had both higher pass rates (C or better) in their developmental education courses and higher re-enrollment rates (percent fall term students who enrolled spring term) than developmental education students in the same courses who did not receive tutoring from the Academic Success Center. (Gallard, Albritton, & Morgan, 2010, p. 12)

Based on an observed 15.5% overall improvement in developmental course completion rates, the research team calculated the economic benefits of student advancement (Gallard, Albritton, & Morgan, 2010, pp. 12-14). In monetary terms, their results show a “272% return on investment ($79/$29)” (Gallard, Albritton, & Morgan, 2010, p. 16). The authors also consider the societal benefits, pointing out the impact of improved student success on the competitive of the U.S. workforce. Given Lanier Tech’s mission of workforce development, their findings are particularly relevant.

> With half of the students entering community colleges not ready for college-level classes (McClenney, 2004), the future competitiveness of the U.S. workforce is at risk. Consider that a developing country such as India produced almost 50 million college graduates in 2004 (Jain, 2005). This compares to only 2.5 million U.S. college graduates for the same year (U.S. Census Bureau, 2004). To improve the competitiveness of the U.S. workforce, the number of college graduates must increase. One way to accomplish this is to help students advance through their degree sequence and increase the number of students at each milestone toward degree completion. (Gallard, Albritton, & Morgan, 2010, p. 16)

ALTERNATIVE TEACHING METHODS

As discussed above, traditional face-to-face instruction has been shown to have multiple benefits. Before implementation of the current computer-based emporium-model math Learning Support course, Lanier Tech did use traditional instruction, with marginal success. The QEP Design Team determined that in moving to traditional delivery, it would be important to not simply turn back the clock to what was being done before. Instead, a redesign of LTC's math Learning Support program must incorporate teaching methods most suited to developmental students.

One approach is the use of manipulatives in the classroom. Most research on manipulatives has focused on K-12 students, however the very few instances of research that has been done on teaching college students using manipulatives are promising.

Manipulatives are perhaps best conceived as a special case of something teachers do consistently: use external representations to complement verbal instruction. As Marley & Carbonneau (2014) say in their review of relevant scholarly literature,

> External representations are a core component of everyday instruction. For example, classroom teachers commonly draw graphs on chalkboards and select textbooks with pictures that illustrate target information. A particular form of external representations is instructional manipulatives, which are often suggested as being effective at facilitating classroom learning. Manipulative-based instructional strategies allow learners to physically interact with concrete representations to learn target information (Carbonneau and Marley 2012). The primary assumption of instructional manipulatives, and other external representations, is that they provide a bridge from the concrete to the abstract, which, in turn, promotes greater conceptual understandings (Bruner 1964; Piaget and Inhelder 1969). (p. 1)

A 2009 study by Belenky and Nokes shows that manipulatives are an effective tool for teaching college students provided that assignments are presented with appropriate prompts. Belenky & Nokes (2009) define "manipulatives" as "physical objects that are supposed to help the student concretize his or her knowledge by expressing concepts and performing problem-solving steps with them" (p. 103). Their findings underscore the importance of presenting assignments using manipulatives with metacognitive prompts, or "questions that ask students to reflect on various aspects of the learning materials and problem-solving process and have been hypothesized to facilitate abstraction and learning" (Belenky & Nokes, 2009, p. 103). The authors examine how "different pairings of learning materials (concrete versus abstract) and prompt-based activities (metacognitive versus problem-focused) impact the learning and coordinating of conceptual and procedural skills" (Belenky & Nokes, 2009, p. 104). Contrary to their expectations, the findings show that the only pairing that produces effective results is using concrete learning materials (i.e. manipulatives) with metacognitive prompts (Belenky & Nokes, 2009).

At the time of this writing, the QEP Design Team was unable to find a significant amount of additional directly relevant research on math manipulatives dealing with students at the College level. The team determined, however, that incorporating manipulatives as an alternative teaching method in the redesigned math Learning Support program is a worthwhile intervention to explore.

PROFESSIONAL DEVELOPMENT

A final "leg of the stool" for a successful redesign of a Learning Support math program is ensuring that faculty are appropriately trained in methodologies and delivery methods appropriate for developmental students. Leading researchers in the field have found that many current math faculty teaching developmental courses – despite having excellent credentials in mathematics – lack training in the special needs of developmental students: "Many educators teaching developmental mathematics are highly qualified in the discipline of mathematics. However, they may have limited coursework or formal training in developmental education, college teaching, student learning, or the application of varied teaching strategies" (Bonham & Boylan, 2012, p. 18).

Such training, naturally, has sustained benefit only when faculty see its value and are motivated to apply the content of the training to make genuine changes in their teaching methods. A body of research investigates how institutions can best incentivize faculty approach and use professional development opportunities most constructively. One consistent finding is that while monetary incentives have a positive effect, the most effective incentives are those which build faculty members' professional value. Hardré (2012) finds that "community college faculty members are more intrinsically than extrinsically motivated for all of the outcomes of interest: teaching, basic or applied research, action or teaching research, and professional development" (p. 556). Another important factor in sustaining engagement and improvement is ensuring that faculty can see the benefit of their professional development efforts:

> An inherent value of any professional development program is improvement in student learning when faculty members implement new techniques (Doyle & Marcinkiewicz, 2001). Thus, it is important to show faculty results for their effort in increasing student learning. Since observers met with faculty weekly, faculty saw how their changes in teaching were improving their students' learning" (Perez, McShannon, & Hynes, 2012, pp. 384-385).

Research shows that professional development has similar value for part-time faculty, and that part-time faculty are similarly motivated by internal factors. Lanier Tech's full-time math faculty have been fully engaged in development of the plan and are committed to its success. Perforce, adjunct faculty have not been able to participate in the process as fully and consistently. Research by Gerhard and Burn (2014) finds that "The success of efforts to improve student outcomes in precollege mathematics at community colleges hinges on engaging and supporting non-tenure-track faculty [NTTF]" (p. 208). Encouragingly, their research also finds that a number of mechanisms can be successful in initiating and sustaining engagement by NTTF. While compensation proved to be successful in *initiating* engagement, successful strategies for sustaining engagement involved other means: "sustained engagement resulted when NTTF were offered value-added opportunities linked to their professional growth" (Gerhard & Burn, 2014, p. 214). Specifically, NTTF responded positively to "opportunities to learn about new curricular ideas and teaching strategies, connect with their peers, build professional relationships, and deepen their commitment to student learning" (Gerhard & Burn, 2014, p. 214).

PLACEMENT TESTING

As discussed below, in "Implementation of the Plan," Lanier Technical College – like all institutions in the Technical College System of Georgia – is in transition from its current placement test, COMPASS, to Accuplacer, developed and administered by the College Board. COMPASS will no longer be available after 2016, and the Technical College System of Georgia has selected Accuplacer as its system-wide replacement. This choice was made by an ad-hoc committee of selected TCSG College Presidents and TCSG academic staff; Lanier Technical College's President, Dr. Ray Perren, was a member of this committee. Currently available literature indicates that Accuplacer is a solid choice with strong predictive value for mathematics courses: "The results indicate that *ACCUPLACER™ OnLine Arithmetic* and *Elementary Algebra* scores appear to be good predictors of student success in developmental mathematics courses" (James, 2006, p. 7).

Conclusions

Taken as a whole, the review of literature conducted by the Design Team brings into focus a number of points and ideas that can be used to refine the focus, goals, interventions, and assessments of LTC's QEP:

- Students in online courses, which are structurally very similar to LTC's Learning Support math courses, have significantly lower grade point averages and are significantly more likely to fail the course.
- Developmental students withdraw from computer-based courses at a higher rate than traditional courses.
- These patterns – lower GPAs, higher failures, higher withdrawals – hold true regardless of a student's score on placement tests.
- Students tend to be poor judges of whether an online or computer-based course will be effective for them, and they tend to underestimate the level of effort required to succeed in these courses.
- Some research shows that white and Hispanic students – Lanier Technical College's two largest racial demographic groups – tend to have the largest performance gap between online/computer-based instruction versus traditional face-to-face instruction.
- The affective component of successful instruction for developmental math students is likely to be more important than has traditionally been realized.
- Affective factors such as math anxiety are best understood and addressed as one of a related group of factors which also includes mathematics self-efficacy and self-concept.
- The relationship between math anxiety, self-efficacy, and self-concept is different for adult learners and traditional age students.
- Curricula and educational philosophies that consciously address affective factors for developmental math students have been shown to be effective at reducing math anxiety.

- Tutoring services have also been shown to be effective, with the proviso that the tutoring must be delivered by trained tutors who work closely with faculty.
- Enhanced tutoring services are expensive to deliver, but this expense can be completely or largely recouped by higher retention rates and the resulting income from tuition and fees.
- Use of manipulatives in developmental math classroom instruction is a promising supplemental intervention.
- An institutional commitment to on-going professional development has consistently been shown to be a key variable in successful change management for large scale projects such as a QEP.
- The most successful incentives to ensure faculty value and apply material learned through professional development opportunities appeal to intrinsic motivations, specifically those that enhance their value as professionals.

FOCUS OF THE PLAN: PURPOSE, GOALS, AND STRATEGIES

Lanier Technical College commits to improve student learning in its Learning Support mathematics program through “Math Multiplies Opportunities,” a Quality Enhancement Plan that deploys a curriculum with balanced emphasis on the cognitive and affective domains, delivered via face-to-face, on-ground instruction and supported by a robust tutoring program. To ensure success of the plan, LTC will provide the financial resources and administrative oversight necessary to deliver improved student advisement training and sustained professional development for faculty.

The **purpose** of Lanier Tech’s QEP is to increase student learning in the mathematics Learning Support program such that students emerge with the skills and attitudes necessary for success in college-level mathematics courses. The **goals** of the plan are to:

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

Lanier Technical College’s Quality Enhancement Plan uses three major **strategies** to enhance student learning: 1) redesign of instructional delivery for Learning Support courses, 2) enhanced tutoring services, 3) targeted professional development activities.

QUALITY ENHANCEMENT PLAN STRATEGIES

The QEP Design Team met over 25 times between May and September of 2015 to analyze the institutional data discussed above and findings in the review of literature to determine the elements of the Quality Enhancement Plan.

A key element of the Plan and implementing its strategies is to hire a qualified professional to serve as Lanier Tech’s QEP Director (see Appendix G, QEP Director Job Description).

The QEP Director will have primary administrative oversight of all aspects of the QEP through its lifespan. The Director will coordinate as needed with academic division Deans, Program Coordinators, and administrators at each campus and instructional site. In addition, the Director will teach two math courses each term. This will ensure that he or she is fully cognizant of issues and challenges facing the teachers and students.

COURSE REDESIGN

Instead of a single multi-semester math Learning Support course, MATH 0090, delivered in an emporium model using computer-based instruction, Lanier Tech will offer three three-hour 0090-level courses: MATH 0090A, MATH 0090B, and MATH 0090Q, all to be delivered in a face-to-face, on-ground (i.e. traditional) format. The first course in this sequence, MATH 0090A, will be delivered as a co-requisite with MATH 1012, a diploma-level course which has very similar course objectives as the first portion of the current MATH 0090 class. That is, students whose program requires MATH 1012 and whose placement scores indicate a need for remediation will be “mainstreamed” into sections of MATH 1012; sections of MATH 0090A will be scheduled in the same classroom immediately following MATH 1012. These co-requisite sections of MATH 1012 will be designated as MATH 1012A. The students with a Learning Support requirement will register for both sections, and will remain in the classroom after delivery of MATH 1012A to attend MATH 0090A. Details of the relationships between these classes and how they will be delivered are discussed below.

MATH 1012A has the following course competencies (see Appendix J, MATH 1012A Syllabus):

- Fractions
- Decimals
- Ratios and Proportions
- Percentages
- Measurement and Conversion
- Geometric Concepts
- Technical Applications
- Basic Statistics

MATH 0090A has related competencies, with the addition of topics within the affective domain (see Appendix I, MATH 0090A Syllabus):

- Whole Numbers
- Fractions
- Decimals
- Percent and Ratio/Proportion
- Measurement
- Geometry
- Math Study Skills
- Overcoming Math Anxiety

An additional planned improvement is to involve occupational program faculty teaching in diploma-level programs in the planning and delivery of the Technical Application component of MATH 1012/1012A. These faculty members will meet with the math faculty in fall 2015 to develop “real world” application problems and scenarios drawn from their programs to be included in the MATH 1012/1012A lesson plans. The course schedule included in MATH 1012A syllabi will also include times when occupational program faculty may guest lecture to the class to discuss how math will be used on the job and how they as working professionals approach and solve math-related tasks.

Course content of MATH 0090B will include math concepts from the cognitive domain (see Appendix K, MATH 0090B Syllabus):

- Introduction to Real Numbers and Algebraic Expressions
- Linear Equations and Inequalities
- Graphs of Linear Equations and Linear Inequalities
- Systems of Linear Equations

- Polynomial Operations
- Factoring Polynomials
- Rational Expressions and Equations
- Radical Expressions and Equations
- Quadratic Equations

The course content of MATH 0090B will be delivered as a co-requisite to MATH 0090Q, which will reinforce algebra skills and address math anxiety, developing strategies for self-efficacy in solving math problems, and math study skills. In addition to review of the cognitive content of MATH 0090B, the course content of MATH 0090Q includes affective topics. (See Appendix L, MATH 0090Q Syllabus):

- Introduction to Real Numbers and Algebraic Expressions
- Linear Equations and Inequalities
- Graphs of Linear Equations and Linear Inequalities
- Systems of Linear Equations
- Polynomial Operations
- Factoring Polynomials
- Rational Expressions and Equations
- Radical Expressions and Equations
- Quadratic Equations
- Math Study Skills
- Overcoming Math Anxiety

The full-time math faculty will develop detailed lesson plans for each of the courses listed above (see Appendix N, sample lesson plans).

MATH 0090A, MATH 0090B, and MATH 0090Q will be delivered in a face-to-face, on-ground, traditional format. In addition, the sections of MATH 1012A scheduled as co-requisite classes to sections of MATH 0090A will only be offered in the traditional format (i.e., students with a Learning Support requirement may not take MATH 1012A in a distance education format). In focus group sessions, both faculty and students expressed a strong sense that this delivery method is more effective. Institutional data and the review of literature suggests this one change is likely to significantly impact the success of LTC's math Learning Support sequence.

Institutional data shows that the greatest challenge for Lanier Tech math Learning Support students comes when they reach the material for pre-algebra and basic algebra concepts (i.e., the course content of MATH 0090B; see results for students needing MATH 1100 and MATH 1111, p. 21). Therefore, the most comprehensive redesign strategies will be put in place for these students: face-to-face sections of MATH 0090B will be scheduled in conjunction with sections of MATH 0090Q, which will give these students help managing math anxiety, developing math study skills, etc., as well as providing opportunities for the teachers to give the students individualized instruction and "real world" math exercises provided by the students' occupational teachers. This course will also introduce mathematical concepts by means of varied and alternative teaching methods such as use of manipulatives and collaborative activities. Students who complete MATH 0090B with a course grade of 70% or higher and whose program of study requires MATH 1013 will receive exemption credit for MATH 1013.

ENHANCED TUTORING SERVICE

As indicated by the relevant literature, a strong tutoring program with trained tutors can be a key component of a successful math program. Lanier Technical College has committed the greater part of its budget for the Quality Enhancement Plan to hiring tutoring personnel devoted student success and success of the QEP.

The College has discussed the need for a dedicated tutoring center with architects currently designing the College's new campus in Gainesville, and a Math Success Center is being included in the facility design. Design sketches will be available for review by the On-site Reaffirmation Committee in November 2015. The Center is envisioned as a facility with space for tutors to work with students either individually or in small groups, or for students to work together, using both computer-based and traditional instructional materials. Office space is provided for a Center Supervisor. In the interim, the Math Success Center at the Oakwood campus will be located in building 100.

At the Forsyth Campus, a large classroom space previously used for the Drafting program will be repurposed as a Math Success Center. Appropriate smaller spaces have been designated for tutoring services at the Dawson and Barrow campuses.

The budget developed for the tutoring program is based on the assumption that the Centers will be open six to eight hours a day, Monday through Thursday, on a schedule that maximizes accessibility for morning and evening students.

To further improve accessibility of the tutors, and to increase the chances of students building a rapport with tutors such that they are inclined to take advantage of the resources provided by the Success Centers, tutors will also work alongside the Math faculty in the classrooms in a support or paraprofessional role. The QEP Director will construct the Success Center schedules in such a manner that tutors are available to serve in the classroom during portions Math Learning Support classes focusing affective domain content and practice sessions (MATH 0090A and MATH 0090Q). Attendance records at the two Success Centers compiled during the spring 2016 pilot semester indicate that such "embedded tutoring" does indeed lead to an increase in students' willingness to use the Success Center. Embedded tutors were used at the Forsyth campus, and that campus's Success Center saw a high level of student participation. However, because of scheduling issues, the College was not able to provide embedded tutors for students enrolled in the pilot Math Learning Support courses on the Oakwood Campus, and students at this campus did not visit that campus's Success Center at nearly the same rate as was the case on the Forsyth Campus.

The literature unequivocally indicates that tutoring is effective only if the tutors have received quality training. Training tutors will be an on-going need if Lanier Tech's QEP is to be sustainable over the long term. The QEP Director will be responsible for training tutors (See Appendix G, QEP Director Job Description).

The QEP Director will be responsible for managing tutors' work schedules, coordinating training for new tutors, assessing the effectiveness of tutor training, collecting and reporting data on the Centers' usage and efficacy, and ordering supplies and materials.

Tutors will tutor math students in the two Math Success Centers and in designated locations at the Barrow and Dawson Campuses (see Appendix H, Math Tutor Job Description).

Beginning in fall 2016, faculty, the QEP Director and tutors will use TCSG's TEAMS (TCSG Early Alert Management System) student retention software to communicate about students' tutoring needs and activities (TEAMS is currently partially deployed; full deployment is scheduled for completion in fall 2016). For example, an instructor who believes a student needs to work in the Success center will notify the student and then use TEAMS to inform the Director that the student has been directed to schedule a session in the Success Center. The Director can then use TEAMS to notify both the student and the tutor an appointment has been scheduled, and the tutor and Director can record notes about whether the tutoring session was completed and what was accomplished, which the instructor can review as needed. This process will not only help ensure that students do not "fall through the cracks" but also provide data to enhance reporting on and assessment of the Centers' and tutors' effectiveness in improving student learning.

TARGETED TRAINING AND PROFESSIONAL DEVELOPMENT ACTIVITIES

LTC will provide training to mathematics instructors on how to teach the content of MATH 0090A and 0090Q, which address affective elements of successful student learning in math. All Lanier Technical College's math faculty have extensive formal training in mathematics, but none have a formal academic background in this area. Since all math instructors delivering MATH 0090A and 0090Q will now be responsible for delivering lesson plans that cover multiple topics within the affective learning domain, Lanier Technical College will employ a team of recognized experts in this field to train a first cohort of instructors and Math Success Center staff (Dr. Paul Nolting, author of *Winning of Mathematics*, and Kim Nolting). The faculty and staff in this cohort will not only be given instruction in the MATH 0090A and 0090Q material but will also be prepared to serve in a "train-the-trainer" role to ensure Lanier Technical College can sustain quality delivery of MATH 0090A and 0090Q in the future as new instructors and tutors are hired. This training will be delivered October 26 – 27 and will cover:

- Teaching course content on material in the affective domain
- Using manipulative and other alternative teaching methods in the classroom
- Tutoring math students

The Technical College System of Georgia is currently in the process rolling out the TCSG Early Alert Management System (TEAMS), a student-retention software platform. TEAMS creates faculty-initiated and (beginning in fall 2016) automatically triggered alerts for students who may be at heightened risk of attrition. The system also manages a "ticket" system to track activities relating to each alert. Faculty and staff can use this "ticket" system to ensure that each student's issues have been appropriately addressed. The system also incorporates reporting features to track and analyze the College's activities to promote student retention. TEAMS also provides an excellent mechanism for communication between faculty and tutors. In addition to the college-wide TEAMS training that will be provided to all faculty and staff, math faculty and Math Success Center staff will be given additional training on how to use TEAMS as an integral component of their job in fall 2015. This supplemental TEAMS training will be delivered on November 5, 2015.

In addition, on October 27, 2015, all faculty and staff who advise students will receive advisement training covering the redesigned math program and how to read and apply placement cut scores.

Regular participation by the math faculty at professional conferences is also integral to the plan: faculty will attend the conferences of relevant professional organizations including the American Mathematics Association of Two-Year Colleges (AMATYC), the Georgia Mathematics Association of Two-Year Colleges (GMATYC), the National Association for Developmental Education (NADE), and the Georgia Association for Developmental Education (GADE). In addition, selected faculty will attend the Kellogg Institute, an intensive two-week seminar on research and best practices in developmental education. Upon returning from the conferences and seminars, faculty will present best practices and lessons learned to the QEP Implementation Team and to other faculty.

DEVELOPMENT TIMELINE

Timeframe	QEP Activities	Coordinating Personnel
QEP Topic Selection Team Activities Begin		
February 24, 2014	Nomination of QEP Topic Selection Team Members	IE/Deans/President/VPAA
March 12, 2014	QEP Topic Selection Kick-Off Meeting: Reviewed expectations and processes of QEP. Received information on topic selection, record keeping, and data collection.	Mark Smith/IE
April 1, 2014	Presented SLO Data; Elected Committee Chair; Discussed timeline for Topic Selection; "Best Practices" research assignments	Topic Selection Team/Theresa Lindsey (chair)/IE
April 21, 2014	Reviewed "Best Practices" QEPs; Discussed Selection & Design process; Reviewed SLO data; SWOT Analysis followed by casino voting by committee members based LTC trends	Topic Selection Team/ Theresa Lindsey/IE
April 29, 2014	Conference call with Dr. Smith: Progress Report; Reviewed feasibility of topics identified by Team; Set up calendar for Topic Selection	Theresa Lindsey/IE/Nancy Beaver, VP of Student Affairs
April 30, 2014	Distributed casino voting results on SWOT analysis and QEP topics to Topic Selection Team via email; Distributed QEP presentation and questionnaire to Team for feedback	Topic Selection Team/Theresa Lindsey/IE
May 6, 2014	Distributed QEP Topic presentation and questionnaire for faculty to present face-to-face to Advisory Committee members	Theresa Lindsey/IE
May 8, 2014	Gathered and assessed input from Advisory Committees	Theresa Lindsey/IE

May 22, 2014	Teleconferenced with Dr. Smith; Discussed and reviewed Killer Course Reports and HOBET testing scores; Reviewed data from Advisory Committees; Discussed presentation to Faculty members on Institution Day	Topic Selection Team/Theresa Lindsey/IE
June 3, 2014	Discussed entire QEP Process; Selected Team members for Institution Day presentation; Assigned research topics to each Team member	Topic Selection Team/Theresa Lindsey/IE/Nancy Beaver
June 4, 2014	Presented QEP information and questionnaire to Lanier Tech Foundation; Discussed; Gathered input	Theresa Lindsey
June 10, 2014	Presented QEP information and questionnaire to Lanier Tech Local Board; Discussed; Gathered input	Theresa Lindsey
June 12, 2014	Institution Day: Topic Selection Team Presentation; Q&A; Distributed Questionnaire to Faculty and Staff; Collected Questionnaires	Theresa Lindsey/Team Members Beth Hefner, Howard Ledford, Johnna Connell, Susan Baker, Christian Tetzlaff
June 17, 2014	Identified top four topics based on input from Advisory Committees, students, Foundation, Faculty & Staff; Assigned subcommittees to research each targeted topic	Topic Selection Team/Theresa Lindsey/IE
June 24, 2014	Progress Report; Reviewed subcommittee research criteria	Topic Selection Team/Theresa Lindsey/IE
July 8, 2014	Subcommittees reported on top four topics; Identified topic recommendations for Leadership Team	Topic Selection Team/Theresa Lindsey/IE
July 22, 2014	Reviewed and compiled topic research	Topic Selection Team/Theresa Lindsey/IE
August 4, 2014	Committee voted on top four topics via email	Theresa Lindsey
August 12, 2014	Presentation to Lanier Tech Leadership Team: Topic Selection process, research, constituent feedback; feasibility. Final topic selected by Leadership Team.	Theresa Lindsey
August 13, 2014	Reported to Topic Selection Team of Leadership Team's discussion and vote. Topic was determined to be math.	Theresa Lindsey
August 18, 2014	Nomination of QEP Design Team Members	IE/Deans/President/VPAA
QEP Design Team Activities Begin		
September 23, 2014	QEP Design Team Kick-Off Meeting, Review of QEP Guidelines, Assessment of the QEP, Topic Selection Process, and Math QEP Research, Election of Committee Chair	Design Team/Dr. Perren/IE/Theresa Lindsey (chair of Topic Selection Committee)
October 7, 2014	Presentation of QEP Research, Focus Group Questions, Focus Group Delivery of Questions	Susan Baker (chair)/IE/Amy O'Dell/ Kathryn Thompson/ Theresa Lindsey
October 21, 2014	Review of Focus Questions (Faculty and Advisory Boards), Focus Groups and Survey Logistics, Planning Calendar	Design Team/Susan Baker (chair)/IE
November 4, 2014	Statement of Purpose was developed, Focus Group Questions were finalized, Advisory Committees Questions were changed to a survey form, Team Members volunteered to collect gift cards from local restaurants	Design Team/Susan Baker (chair)/IE/Theresa Lindsey/Johnna Connell/Christian Tetzlaff/Troy Lindsey/Joanne Tolleson/

		Howard Ledford
November 18, 2014	Allyson Martin hired to lead Focus Groups, Public & Personal Focus Groups met 11/12/14, Advisory Committee Surveys collected, Calendar updated, Research/Review of Literature sub-committee met by phone	Design Team/Susan Baker/IE/Theresa Lindsey/Kathryn Thompson /Cheree Madison
December 10, 2014	Technical & Industrial Faculty Focus Group met 12/3/14, Allied Health Science Faculty Focus Group met 12/3/14, Business & Computers Faculty Focus Group met 12/4/14, Advisory Committee Survey results in Sharepoint, Logistics sub-committee met 12/4/14 chose Student Focus Groups, Marketing sub-committee met 12/8/14, Research/Review of Literature sub-committee researched developmental math and occupational QEPs	Design Team/Susan Baker/IE/Mari Lynn Burdeshaw/Christian Tetzlaff/Amy O'Dell/Kathryn Thompson/Cheree Madison
January 13, 2015	Student Focus Groups began meeting today, Motion to include Gen Ed in Focus Group passed unanimously	Design Team/Susan Baker/IE
January 27, 2015	Preliminary results from Focus Groups were discussed, a new list of questions for the Gen Ed Focus Group was reviewed and approved by members, it was decided to invite all math faculty to future meetings	Design Team/Susan Baker/IE
February 23, 2015	Reviewed focus group data and identified emerging themes and issues. Amy reported an estimate from the marketing sub-committee.	Design Team/Susan Baker/IE/Amy O'Dell/Kathryn Thompson
February 23, 2015	Began review of literature. Kathryn reported on bibliographies put in SharePoint.	Design Team/Katheryn Thompson
March 2, 2015	Discussed QEP ideas and recurring themes from focus group results. The team members voted that the QEP would involve the redesign of MATH 0090.	Design Team/Susan Baker/IE
March 9, 2015	Amy presented flyers for the slogan and logo contests. Three QEP goals were identified and discussed. The review of literature continued.	Design Team/Susan Baker/IE/Amy O'Dell
March16, 2015	Reviewed the literature and QEP's from other colleges this past week. The goals were revised based on their findings and narrowed to two goals. The QEP web page was presented to the team and approved. A paper on Learning Support classes leading to college-level classes was presented and discussed.	Design Team/Susan Baker/IE/Amy O'Dell/Janice Alves/Amy McGehee/Jeff Shrader
March 23, 2015	"Math Multiplies Opportunities!" selected as slogan/title. Amy reported on the QEP web page, should be up soon. Reviewed the literature and other colleges' QEPs.	Design Team/Susan Baker/IE/Amy O'Dell
March 30, 2015	Amy reported that SGA has agreed to provide funding for the iPad Mini to be used as a prize for the logo contest. Dr. Paul Nolting was chosen unanimously to be consultant for the QEP.	Design Team/Susan Baker/IE/Amy O'Dell
April 13, 2015	Planning for QEP FAQ on website. Dr. Perren approved the budget for Dr. Nolting's fees and	Design Team/Susan Baker/IE/Amy O'Dell

	expenses prior to the meeting. An email was sent to all students regarding the logo contest.	
May 4, 2015	The logo winner was announced today. Dave Parrish, LTC marketing director, liked the logo. The math instructors met April 20th and discussed possible strategies to improve MATH 0090.	Design Team/Susan Baker/IE/Amy O'Dell
May 7 – 8, 2015	The math faculty met with Dr. Nolting and Kim Nolting. A plan was developed to change the delivery of the MATH 0090 class.	Dr. Nolting/Kim Nolting/ Janice Alves/Susan Baker/ Amy McGehee/Jeff Shrader
May 26, 2015	Amy reported on the QEP Logo contest winner, Ilse Hayakawa. Focus Group data and student history data was reviewed.	Design Team/Susan Baker/IE/Amy O'Dell
May 27, 2015	Meeting with Dr. Sheeley focused on what a successful Lanier Tech math student should "know, do, and be".	Dr. Sheeley/Dr. Perren/Dr. Tavarez Holston/Dr. Joanne Tolleson/Brad Gadberry/ Donna Brinson/Kevin Jarvis/ Nancy Beaver/ Johnna Connell/ Christian Tetzlaff/ Kathryn Thompson/ Susan Baker
June 3, 2015	Discussed how to redesign MATH 0090, training for advisors, and how to measure success.	Design Team/Susan Baker/IE
June 4, 2015	Presentation to Foundation Board of Trustees	Theresa Lindsey
June 10, 2015	Presentation to LTC Local Board	Theresa Lindsey
June 10, 2015	Dr. Cheree Madison provided a set of characteristics that described a "highly able mathematics student". The team edited this list for a LTC student in a math class and discussed characteristics of an LTC student at a program level. Objectives of our QEP were also discussed.	Design Team/Dr. Cheree Madison/ Susan Baker/IE
June 17, 2015	Amy O'Dell provided an update on the QEP website. All links have content and there is info on the student who won the logo design contest. Amy also shared ideas for marketing the QEP. Kevin volunteered to deliver advisement training to instructors. The team continued to discuss outcomes and teaching strategies.	Design Team/Amy O'Dell/ Susan Baker/ IE
June 24, 2015	The team discussed student assessment and placement and how the new design would be different from the Emporium model and just a lecture class. The team voted to begin advisement training in the fall semester.	Design Team/Susan Baker/IE
July 13, 2015	QEP Math Sub-Committee Team met and discussed "ideal LTC math student". Joanne suggested combining MATH 0090 with MATH 1013; the math instructors loved the idea.	IE/ Amy McGehee/Jeff Shrader/ Susan Baker
July 15, 2015	Susan gave a review of the Learning Support conference she attended. Jeff reported on the math sub-committee's revision of the QEP design. The math faculty created two co-requisite models: MATH 90/1012 and a Math 90/1013 that would include study skills, tutoring, and group work. The team discussed exemption testing, scores, financial aid concerns, etc. Christian	Design Team/Jeff Shrader/Christian Tetzlaff/Donna Brinson/ Susan Baker/IE

	suggested we contact deans and request info on what math skills are needed in each program. Donna volunteered to spearhead this task.	
July 22, 2015	Dr. Collins and Donna Brinson reported on the information gathered from their divisions. The design and cutoff scores were discussed. A vote was taken and passed to not change the scores. The assessments, goals, and objectives were revised. The idea of templates for program instructors was introduced by Amy O'Dell. Dr. Madison suggested ten minute videos of program instructors teaching math for their programs.	Design Team/Dr. Deanne Collins/ Donna Brinson/ Amy O'Dell/ Dr. Cheree Madison/ Susan Baker/ IE
August 5, 2015	Learning Assistance Training – Phone Conference with Kim Nolting and Dr. Paul Nolting	Kim Nolting/Dr. Nolting/IE/ Amy McGehee/Janice Alves/Susan Baker
August 12, 2015	Amy O'Dell distributed a marketing flyer she created and other marketing ideas were discussed. Kathryn suggested a QEP day, perhaps on "pi day", March 14th.	Design Team/Susan Baker/IE/Amy O'Dell
August 24, 2015	QEP Math Sub-Committee Team discussed how the modules would be divided into the 0090A, 0090B, and 0090C classes. It was decided to use the textbook Winning At Math for the 0090C class.	Janice Alves/Amy McGehee/Susan Baker/IE/Amy O'Dell/Chearra Hines
August 24, 2015	Susan explained the math team's redesign of the 0090/1012 classes and Janice explained the redesign of the 0090B and 0090C classes. The team discussed the pros and cons of the design. It was decided that more time would be needed in the 0090C class.	Design Team/Susan Baker/Janice Alves/IE
August 25, 2015	Joanne updated the team on her conversation with Dr. Benita Moore about the number of hours in a 0090 class. MATH 0090B and 0090C could each have 3 hours. Janice had put together a QEP Redesign Proposal that was shared and discussed.	Design Team/Dr. Joanne Tolleson/Janice Alves/Susan Baker/IE
September 1, 2015	Discussed the redesign draft 2, Susan provided drafts of 0090A/1012 and 0090B content material which was also discussed. COMPASS scores were discussed for each class. It was decided to have pilot classes in Spring semester and to use Institutional Day to train advisors. Donna suggested doing advisement training during faculty meetings also. Amy O'Dell updated the team on the marketing plan.	Design Team/Susan Baker/IE
September 8, 2015	Discussed marketing plan. The design was discussed and formalized by changing 0090C to 0090Q.	Design Team/Amy O'Dell/Susan Baker/IE
September 10, 2015	Amy O'Dell provided a handout of the marketing plan from September 2015 – November 2015. The team discussed the plan and offered suggestions. The design was discussed. Donna Brinson volunteered to work on an advisement document to be used for advisor training.	Design Team/Amy O'Dell/Susan Baker/IE
September 15, 2015	Dr. Nichols attended the meeting to explain	Design Team/Dr. Dana

	different options of the accelerated learning program. The QEP design was finalized and reviewed.	Nichols/Susan Baker/IE
September 17. 2015	Worked with VP Administrative Services to develop QEP budget.	Joanne Tolleson, Brad Gadberry, Laura Elder
September 21, 2015	The math faculty met via WebEx with Dr. Tolleson and Brad to review the budget.	Dr. Joanne Tolleson/Brad Gadberry/Amy McGehee/Janice Alves/ Susan Baker
September 22, 2015	The math faculty reviewed and revised the syllabi for 0090A, 1012A, 0090B, and 0090Q.	Janice Alves/Amy McGehee/ Susan Baker
September 24, 2015	Reviewed the QEP design and the syllabi. The marketing plans were discussed.	Design Team/Amy O'Dell/Susan Baker/IE
September 29, 2015	The math faculty met via WebEx with Dr. Tolleson and Brad to review and revise the Learning Support SLO's	Dr. Joanne Tolleson/Brad Gadberry/Amy McGehee/Janice Alves/ Susan Baker
September 29, 2015	Goals and objectives added to web page.	Amy O'Dell

I. IMPLEMENTATION OF THE PLAN – PROCESS, COMMUNICATION, BUDGET

LTC's community is actively involved in the QEP process. These groups were integral in the research and development phase and will continue to be involved in the implementation process.

Faculty and Staff

- Topic Selection Team
- Design Team
- Implementation Team
- Faculty Focus Groups
- Faculty Surveys
- Newsletters
- Logo Contest
- Updates at Faculty & Campus Meetings
- Direct Emails
- Faculty Training
- QEP Website

Students

- Student Focus Groups
- Student Representative on Topic Selection Team
- Topic Selection Survey
- Logo Contest
- Student Government Association (SGA) Meetings
- SGA Provided IPad Logo Contest Inventive
- Newsletters
- Campus posters with QR Code to QEP Website
- Varied Promotional Items / Gifts
- Trivia & Raffles at Campus Picnics

Boards of Directors and Trustees

- Special Presentations to both Boards by Topic Selection Committee Chair
- Dialogue introduced to promote the QEP
- Reviewed Focus Group Results
- Topic Selection Vote
- Updates from President
- QEP Website
- Social Media Updates via Twitter and Facebook

Alumni, Advisory Committee and Community

- Social Media Updates via Twitter and Facebook
- Topic Selection Survey at Advisory Committee Meetings
- Alumni Representation in QEP Meetings and Discussions
- Newsletter Updates
- QEP Website
- Updates at Advisory Committee Meetings

LTC's implementation of the QEP will begin with a first round of training sessions delivered in fall 2015. This training will cover how to deliver content for the pilot courses, tutor math students, and interpret placement scores. The pilot courses and Math Success Center operations both began in spring 2016.

TRAINING

LTC's full-time math faculty delivered the first iteration (spring 2016) of the redesigned math Learning Support classes, since they were fully involved in design of the QEP and are most familiar with the purpose and goals of the QEP and the strategies that will be used to achieve them. Lanier Technical College employed an expert in the field (Dr. Paul Noting) to provide the full-time math faculty and a number of adjunct faculty with training in the MATH 0090Q content and the affective domain components of MATH 0090A, which is new material for most or all of these teachers. This training took place October 26 – 27, 2015. The goal of the training was to ensure not only that the faculty are competent to teach affective course objectives such as managing math anxiety and improving self-efficacy but also be able to serve in a "train-the-trainer" role for additional and new faculty as Lanier Tech builds and sustains the new teaching model. Additional training on the use of manipulatives in the classroom by Dr. Paul Nolting and Dr. Marnie Phipps was provided on October 27, 2015. During the October 26 – 27 sessions, Dr. Nolting provided training on tutoring math students.

In early October, Dean Donna Brinson trained faculty advisors on interpreting placement scores and using them to correctly place students in the redesigned math Learning Support courses.

In November 2015, LTC's Student Navigator provided training to math faculty and Math Success Center Staff on using the TEAMS software platform to communicate with each other and keep records on tutoring delivered.

PILOT COURSES

Students for the initial offering of the redesigned math courses in spring 2016 were drawn from a pool of first-time math students (i.e. new or returning students who have not previously taken any math courses at LTC). For the spring roll-out, eight sections of the redesigned courses, with MATH 0090A and MATH 1012A offered at the Oakwood Campus, and six sections of MATH 0090B and MATH 0090Q were offered at the Oakwood and Forsyth Campuses. Students who have partially completed their work in the emporium-model MATH 0090 class were not be encouraged to enroll in the redesigned course, but some returning students did enroll in these sections. In subsequent terms, additional sections of math in the new format will be offered with the goal of completely phasing out emporium-model MATH 0090 classes by fall of 2016.

In fall 2016, any enrolling students who have partially completed work in one or more emporium-model MATH 0090 classes will be tracked into sections of the redesigned math course: students who have completed zero to five modules will be placed in MATH 0090A; degree-seeking students who have completed at least module six will be placed in MATH 0090B and MATH 0090Q.

ENHANCED TUTORING SERVICES

Math Student Success Centers will be hosted at the Oakwood and Forsyth campuses. Each center provides space for one-on-one and small-group tutoring sessions and space for students to use computers for practice or exercises assigned by the tutors. Design of the new main campus in Gainesville, scheduled for completion in 2018, includes purpose-built space for the Math Success Center. In the interim, the Oakwood Center is hosted in Building 300 of the Oakwood Campus. On the Forsyth Campus, the lab for the Drafting Technology program, now closed on this campus, has been repurposed as a Math Success Center. Space has also been designated at the Dawson and Barrow campuses for tutors use when they travel to those campuses.

Tutors will be hired to staff both Student Success Centers and to travel to the Dawson, Barrow, and Jackson campuses. Job requirements and minimum qualifications for this position are shown in Appendix H.

Math Success Center staff will use the TEAMS software platform to communicate with students, faculty, and each other, and to record statistics on tutoring delivered.

The College began offering math tutoring services through the Centers in January 2016.

IMPROVED STUDENT PLACEMENT SERVICES

Under Lanier Tech's current Learning Support model, all students whose placement scores do not place them in college-level courses are required to take the complete sequence of MATH 0090 modules. This means that students who may be close to being prepared to enter College Algebra must complete the entirety of a quite labor intensive sequence of coursework, most of which they already know. Under the revised model, students will be more precisely placed in a sequence that does not require relatively advanced students to spend time on basic material. The following COMPASS scores, based on research conducted by the Technical College System of Georgia in 2011, will be used for placing students in the pilot offerings of the redesigned math Learning Support program.

COMPASS Placement Cut Scores

	COM3	COM4
Diploma Students:		
MATH 0090A	19 – 25	
MATH 1011, MATH 1012	26+	
MATH 1013	26+	28+
Degree Students:		
MATH 0090B/Q for MATH 1100	26+	1 – 27
MATH 1100	26+	28 +
MATH 0090B/Q for MATH 1101, MATH 1111	26+	1 – 36
MATH 1101, MATH 1111	26+	37+

A detailed guide of how these scores can be used to correctly place students has been made available to faculty advisors, and was made available for review by the On-Site Reaffirmation Committee.

This placement scheme is an interim measure, as Lanier Tech – along with other TCSG colleges – will be moving to a different placement test, the College Board Accuplacer test, in fall 2016. We believe that this test will provide more detailed and accurate placement data.

> High school, colleges and CTE providers use ACCUPLACER placement tests to help determine students' readiness to participate successfully in college-level course work. ACCUPLACER results provide data that identify specific areas of proficiency and pinpoint knowledge and skills gaps, making it easier for counselors and advisers to make decisions about students' needs for developmental or transitional courses prior to enrollment in college-level classes.
>
> ACCUPLACER supports accurate placement decisions through:
>
> - The ability to input GPA and other variables and allow for placement using test scores as one of multiple factors
> - A multiple weight measuring tool that allows institutions to apply values on a student's background and experience
> - Customized and modularized placement tests that provide both diagnostic and placement scores that can align with local, state, and national standards
>
> (https://accuplacer.collegeboard.org/professionals/about-accuplacer/how-it-works)

Because LTC will not be using COMPASS after pilot terms of the QEP implementation plan, and because the College has not used Accuplacer before and therefore has no historical data on student success for students placed with the test, the College has not done an analysis on the efficacy of LTC's previous placement schemes. On-going analysis of math Learning Support students placed using Accuplacer will be an integral component of LTC's assessment of the QEP: each term, the relative success of students who score in various brackets will be analyzed and placement cut-scores will be adjusted as needed.

COMMUNICATION PLAN

INITIAL PUBLICATION

A QEP communications plan was developed to, initially, create interest and excitement for the plan, and then ensure that the full range of stakeholders are kept informed of progress on the Plan in a timely and accurate way. An additional benefit of the communication plan is it will create a documentation base to support creation of Impact Reports and the Fifth-Year Interim Report.

When the topic of increasing student success in math learning support classes was selected, the QEP Design Team's focus immediately moved to creating an identity or brand for the project. The team first developed a list of potential titles and slogans:

Math has SERIOUS problems… let's solve them!
Do the Math!
Math… the subject that counts!
Math 911… Learning Support Emergency
Math… the missing piece of the puzzle
Math Pathways – leading to a great career
Connect to Your Future with Math
Your Career Begins with Math
Connect with Math
Math Leads to a Great Career
Sail into the Future with Math
Sail into a Great Career with Math
All Hands on Math
Math 4 You
Count on Math
The Path to Success Begins with Math
Choose Your Math Path
Choose Your Math Pathway
Control Your Future with Math
Think Math!
Math with a twist
Math world
Divide and conquer with math
Multiplying opportunities with math
Why math?
Math Success. It's a Mind Game.
Math Works
Bringing Math to Life
Math Multiplies Opportunities
Math Makes Sense
Math Opens Doors

The Design Team selected "Math Multiplies Opportunities" as a title that best captures the intent of the Plan. A college-wide contest was then held to both generate awareness and interest and to tap into LTC students' creativity to develop a QEP logo. A number of creative entries were submitted.

1. MATH x Opportunities	10. Math Multiplies Opportunities!
2. Math Multipies Opportunities	11. QEP MATH MULTIPLIES OPPORTUNITIES
3. MATH MULTIPLIES OPPORTUNITIES	12. Math Multiplies Opportunities
4. Math Multiplies Opportunities	13. Math Multiplies Opportunities
5. Math Multiplies Opportunities	14. Math Multiplies Opportunities
6. Math Multiplies Opportunities!	15. QEP MATH MULTIPLIES OPPORTUNITIES!
7. LTC+ mxO Success!	16.
8. Math Multiplies Opportunities	17.
9. The key to "calculating" a better future! MATH MULTIPLIES OPPORTUNITIES	

Then all students, faculty, and staff were invited to vote on the submissions. Nearly 600 stakeholders voted, and the logo below was selected as best capturing the purpose of promoting student success in LTC's math program:

Math Multiplies Opportunities

The QEP Design Team then began communicating the QEP's goal of improving student success in learning support math to stakeholders across the LTC community through a variety of activities including posters, flyers, newsletters, social media posts, email blasts, banners, window clings, table tents for desktops and counters. The team will also distribute promotional items including branded T-shirts, pens, notepads. In addition, trivia contests and raffles will be held at each campus fall picnic to help generate awareness and enthusiasm about the QEP.

Another key communication tool – not only for building initial awareness and enthusiasm for the QEP but also for providing continuing long-term communication to stakeholders about LTC's progress on the Plan – is a dedicated page on LTC's web site: http://www.laniertech.edu/QEP/qep_main.aspx. This page explains the QEP's goals and outcomes and how it was developed. It is also used to publicize events such as the logo contest and picnic events. It provides a "Frequently Asked Questions (FAQ)" page to give stakeholders quick and easily understood information about that the Plan and its goals and outcomes. The page will be continuously updated as the QEP moves forward. This web page was launched in June 2015.

ON-GOING COMMUNICATION AND INVOLVEMENT

The QEP Implementation Team will be charged with maintaining awareness of and focus on the QEP as the plan moves through successive years of implementation. The Team will be responsible for developing these activities and modifying or adding to them as needed, but initial planned activities include:

- Continuing the monthly QEP Newsletter and social media updates (Began October 2015)
- Posting QEP logo as default desktop background on all campus lab and library computers (October 2015)
- Featuring QEP success stories on social media and website
- Semi-annual updates from President to Local Board and Foundation Trustees
- Annual presentations by President at Institutional & Campus Meetings

- Annual updates by Program Coordinators to Program Advisory Committees
- On-going updates to QEP Website
- Semesterly communications from President to faculty and staff in the “Five Things” email
- Semesterly updates by QEP Director to faculty in Faculty Meetings
- QEP booth and activities at semi-annual student picnics at each campus

INSTITUTIONAL CAPABLITY & IMPLEMENTATION BUDGET

Lanier Tech is committed to embedding the quality enhancements generated by “Math Multiplies Opportunities” into the fabric of the College. To that end, a detailed budget sourced from local funds has been developed, giving QEP staff and facilities a permanent presence within LTC as an independent planning unit.

No grant money or other temporary funding sources are used to finance the QEP. The QEP has been assigned a planning unit code, and this unit’s expenses are now a line item on the College’s budget. Each planning unit code maps to a speed chart in PeopleSoft which the Administrative Services division uses to manage the College budget.

Funds for the budget will be obtained from 1) increased tuition revenue and 2) student activity fees. Delivering the redesigned math Learning Support will require students to take six credit hours of learning support courses each semester they are enrolled in math Learning Support. This is an increase over the three credit hours math Learning Support students currently enroll for. At $89 per credit hour, this will generate $534 per student per semester, an increase of $267. These tuition funds will first be used to pay the instructors delivering the class, but the College expects there to be a surplus beyond this which can be applied to other QEP expenses such as salaries for the QEP staff (QEP Director and Math Tutors). Lanier Tech fully expects the improvements generated by the QEP to significantly improve student learning, which will in turn have a positive effect on retention and graduation. This will have a positive effect on the Plan’s sustainability and ROI: students will stay enrolled for more terms, generating more tuition revenue, which will allow the College to sustain support for the QEP. These gains will not be realized for two to three years, but the College has sufficient reserve funds on hand to finance the QEP in the interim.

In addition, a portion of QEP expenses will be met by funds provided by the Student Government Association (SGA), which are drawn from student activity funds. The Student Government currently pays for 50% of tutoring expenses. The College will continue to draw on SGA fund to support tutoring services.

The following budget, prepared by the QEP Design Team with recommendations from QEP-related departments, delineates the five-year projected expenditures for implementation of the QEP. The QEP Design Team presented the budget for review by the Leadership Team on September 23, 2015. The President approved the budget on September 23, 2015.

"Math Multiplies Opportunities" QEP Proposed Budget

	Projected Activities	AY2015 AY2016 Prep Years	AY2017 1st Year	AY2018 2nd Year	AY2019 3rd Year	AY2020 4th Year	AY2021 5th Year	5 Year Total
Personnel								
	Focus groups facilitator	$5700	$5000	$5000	$5000	$5000	$5000	$30700
	QEP Director Salary	$32000	$62000	$62000	$62000	$62000	$62000	$341000
	QEP Director Benefits	$16000	$31000	$31000	$31000	$31000	$31000	$170500
	Oakwood Tutors (40 weeks/year and 48 hr/week @ $22/hr)	$22176	$44352	$44352	$44352	$44352	$44352	$243936
	Forsyth Tutors (40 weeks/year and 48 hr/week @ $22/hr)	$22176	$44352	$44352	$44352	$44352	$44352	$243936
	Barrow/Dawson Tutors (40 weeks/year and 36 hr/week @ $22/hr)	$15840	$31680	$31680	$31680	$31680	$31680	$174240
	Jackson Tutor (40 weeks/year and 12 hr/week @ $22/hr)	$5280	$10560	$10560	$10560	$10560	$10560	$58080
	Substitute pay (for faculty travelling to conferences)	$2500	$5000	$5000	$5000	$5000	$5000	$27500
	Personnel Subtotal	$121,672	$233,944	$233,944	$233,944	$233,944	$233,944	$1,289,892
Consultation & Training								
	Initial training & orientation (Dr. Mark Smith)	$1500	$0	$0	$0	$0	$0	$1500
	Math QEP design consultation & training (Dr. Paul Nolting)	$8000	$8000	$0	$0	$0	$0	$16000
	Math faculty training on affective domain content (Dr. Paul Nolting et al.)	$3000	$3000	$3000	$3000	$3000	$3000	$18000
	Math faculty training on use of manipulatives for instruction and other special topics (Dr. Paul Nolting et al.)	$2000	$2000	$2000	$2000	$2000	$2000	$12000
	Tutor training	$0	$3000	$3000	$3000	$3000	$3000	$15000
	Adjunct training	$0	$5000	$5000	$5000	$5000	$5000	$25000
	BANNER script developer	$0	$4000	$0	$0	$0	$0	$4000
	Consulting Subtotal	$14,500	$25,000	$13,000	$13,000	$13,000	$13,000	$91,500
Facilities & Equipment								
	Tutoring Center computers	$0	$0	$0	$0	$0	$0	$0
	Tutoring Center phones (x3)	$800	$0	$0	$0	$0	$0	$800
	Tutoring Center furniture	$0	$0	$0	$0	$0	$0	$0
	Facilities Subtotal	$800	$0	$0	$0	$0	$0	$800

	Projected Activities	AY2015 AY2016 Prep Years	AY2017 1st Year	AY2018 2nd Year	AY2019 3rd Year	AY2020 4th Year	AY2021 5th Year	5 Year Total
Software								
	TutorsBox Online Tutoring Whiteboard licensing fees	$0	$200	$200	$200	$200	$200	$1000
	Instructional software	$0	$10000	$10000	$10000	$10000	$10000	$50000
	Software Subtotal	$0	$200	$200	$200	$200	$200	$51000
Instructional Materials								
	Classroom & Tutoring Center instructional manipulatives	$500	$500	$500	$500	$500	$500	$3000
	Tutoring Center texts and supplementary materials	$6000	$500	$500	$500	$500	$500	$8500
	Inst. Materials Subtotal	$6,500	$1,000	$1,000	$1,000	$1,000	$1,000	$11,500
Marketing Materials & Position Advertising								
	Position opening advertising	$5000	$1000	$1000	$1000	$1000	$1000	$10000
	Printing	$3000	$0	$0	$0	$0	$0	$3000
	Kick-off promotional materials	$13000	$0	$0	$0	$0	$0	$13000
	Full roll-out promotional materials	$0	$10000	$0	$0	$0	$0	$10000
	Marketing Subtotal	$21,000	$11,000	$1,000	$1,000	$1,000	$1,000	$36,000
Travel & Conferences								
	SACSCOC Conference for QEP Director	$0	$2000	$2000	$2000	$2000	$2000	$10000
	Intra-campus travel reimbursement	$500	$1000	$1000	$1000	$1000	$1000	$5500
	Registration for National Association for Developmental Education (NADE) National Summit on Developmental Mathematics (x4 2016 – 2017, x2 2018 - 2021)	$300	$300	$300	$300	$300	$300	$1800
	Travel and lodging for NADE National Summit on Developmental Mathematics (x3 2016 – 2017, x2 2018 - 2021)	$4000	$6000	$6000	$6000	$6000	$6000	$34000
	Registration for Georgia Association for Developmental Education (GADE) State Conference on Learning Support (x4 2016 – 2017, x2 2018 - 2021)	$150	$375	$375	$375	$375	$375	$2025
	Travel and lodging for GADE State	$400	$1000	$1000	$1000	$1000	$1000	$5400

	Projected Activities	AY2015 AY2016 Prep Years	AY2017 1st Year	AY2018 2nd Year	AY2019 3rd Year	AY2020 4th Year	AY2021 5th Year	5 Year Total
	Conference on Learning Support (x4 2016 – 2017, x2 2018 - 2021)							
	Institutional memberships for American Mathematics Association of Two-Year Colleges (AMATYC) Institutional Memberships (x3)	$1440	$1440	$1440	$1440	$1440	$1440	$8640
	Travel and lodging for AMATYC conference	$0	$6000	$6000	$6000	$6000	$6000	$30000
	Institutional memberships for Georgia Mathematical Association of Two-Year Colleges (GMATYC) Institutional Memberships (x5)	$0	$1750	$1750	$1750	$1750	$1750	$8750
	Registration and travel for Kellogg Institute	$0	$5535	$5535	$5535	$5535	$5535	$27675
	Travel/Conf. Subtotal	$6,790	$25,400	$25,400	$25,400	$25,400	$25,400	$133,790
Assessment Materials & Fees								
	Abbreviated Math Anxiety Scale (AMAS; Hopko, et al.)	$0	$0	$0	$0	$0	$0	$0
	Betz-Hackett Mathematics Self-Efficacy Scale Manual (x20)	$1000	$0	$0	$0	$0	$0	$1000
	Self-Description Questionnaire III (SDQIII)	$0	$0	$0	$0	$0	$0	$0
	Assessment Subtotal	$1000	$0	$0	$0	$0	$0	$1000
Miscellaneous								
	Professional organization membership: AMATYC	$495	$495	$495	$495	$495	$495	$2970
	Misc. Subtotal	$495	$495	$495	$495	$495	$495	$2970
	Personnel Subtotal	$121,672	$233,944	$233,944	$233,944	$233,944	$233,944	$1,289,892
	Consulting Subtotal	$14,500	$25,000	$13,000	$13,000	$13,000	$13,000	$91,500
	Facilities Subtotal	$800	$0	$0	$0	$0	$0	$800
	Software Subtotal	$0	$10200	$10200	$10200	$10200	$10200	$51000
	Inst. Materials Subtotal	$6,500	$1,000	$1,000	$1,000	$1,000	$1,000	$11,500
	Marketing Subtotal	$21,000	$11,000	$1,000	$1,000	$1,000	$1,000	$36,000
	Travel/Conf. Subtotal	$6,790	$25,400	$25,400	$25,400	$25,400	$25,400	$133,790
	Assessment Subtotal	$1000	$0	$0	$0	$0	$0	$1000
	Misc. Subtotal	$495	$495	$495	$495	$495	$495	$2970
	Total	$172,757	$307,039	$285,039	$285,039	$285,039	$285,039	$1,619,952

IMPLEMENTATION TIMELINE

Timeframe	QEP Activities	Stakeholders Involved
October 2015	Add Facebook & social media updates	QEP Marketing Lead
October 2015	Table Tents on all tables at Fall Picnics	QEP Marketing Lead
October 2015	Raffle – “How many candy corns in the jar?” at Fall Picnics with accompanying flyer for QEP	QEP Marketing Lead
October 2015	Explanation of QEP in Dr. Perren’s 5 Things	QEP Marketing Lead
October 2015	QEP update in Mallory’s October Newsletter	QEP Marketing Lead
October 2015	QEP update in Daily Memo (running weekly)	QEP Marketing Lead
October 2015	Posters and table tents at all campuses by mid-October (refreshed in early November if necessary)	QEP Marketing Lead
October 2015	Flyer/email to all full time and adjunct faculty requesting they read a blurb to the students in order to educate them on the QEP	QEP Marketing Lead
October 2015	Determine textbook to be used and any tasks related to a change	Full-time Math Faculty
October 2015	Design and print QEP desktop notepads	QEP Marketing Lead/DMPT Faculty
October 2015	Develop focus group questions for Learning Support students and faculty	Design Team
October 2015	Develop professional development and training surveys	Design Team
October 2015	Develop tutoring survey	Design Team
October 2015	Develop Student Evaluations of Faculty Instruction for Learning Support courses	Design Team
October 2015	Deliver training on math Learning Support placement to faculty advisors	Design Team representative
October 2015	First issue of QEP newsletter distributed to students via college-wide email	Amy O’Dell
October 2015	Work with Curriculum Coordinator to code redesigned math Learning Support courses in Banner	Design Team Chair
October 2015	Coordinate with Dean of General Studies to schedule pilot Learning Support courses for spring 2016	Design Team Chair
October 2015	Advertise for and hire Math Success Center tutors	IE staff/Design Team Chair
October 2015	Advertise for and hire QEP Director	IE staff/HR staff/Design Team Chair
October 2015	Coordinate with program faculty at division faculty meetings to develop first set of occupation-specific application problems	Design Team representatives
October 26 – 27 2015	Deliver training for math faculty and tutors on teaching content in the affective domain, use of manipulatives, and tutoring math students	Dr. Paul Nolting, Kim Nolting, Dr. Marnie Phipps, math faculty, Math Success Center staff
October 27, 2015	Review QEP with all faculty and staff	IE Staff, Design Team
November 5, 2015	Deliver training for TEAMS as a communication tool	Student Navigator
November 2015	Window clings to all building entrances at Oakwood, Dawson, and Forsyth campuses	QEP Marketing Lead
November 2015	Email to all students educating them about the QEP	QEP Marketing Lead
November 2015	T-shirts and pens given to all faculty and staff at Institution Day to wear on November 10.	QEP Marketing Lead

November 2015	Banners displayed	QEP Marketing Lead
November 2015	Weekly (or more) descriptive posts on Facebook and Twitter	QEP Marketing Lead
November 2015	Follow-up explanation of QEP in Dr. Perren's 5 Things in early November	QEP Marketing Lead
November 2015	QEP "advertisement" in Mallory's November Newsletter	QEP Marketing Lead
November 2015	Purchase learning tools such as math manipulatives	IE Office
November 2015	MMO logo on all computer desktops in student labs and main offices	QEP Marketing Lead
November 2015	Weekly (or more) descriptive posts on Facebook and Twitter	QEP Marketing Lead
Implementation Team Activities Begin		
November 16 2015	Implementation Team Kick-off Meeting	Implementation Team
December 2015	Begin space configuration for Math Success Centers	Implementation Team representatives/IE staff/Facilities staff
December 2015	Begin development of revised Advisor Training Manual	Implementation Team sub-committee
Spring 2016	Host a grand opening for the Tutoring Center	QEP Marketing Director
Spring 2016	Weekly math faculty meetings (throughout term)	Math faculty
February 2016	Georgia Association for Developmental Education (GADE) Conference	QEP Director, math faculty
March 2016	National Association for Developmental Education (NADE) Conference	QEP Director, math faculty
Spring 2016	Collect occupation-based math activities from program faculty	QEP Implementation Team
Spring 2016	Deliver first iteration of redesigned Math Learning Support classes	Math faculty
Spring 2016	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Tutoring satisfaction surveys • Math Success Center usage logs • Professional Development satisfaction surveys	QEP Director & focus group facilitator
Spring 2016	Monthly QEP Implementation Team meetings	Implementation Team
Spring 2016	NADE/GADE "Teach the teacher" presentation	Math faculty
Spring 2016	Refresher advisor training	Academic Dean
Spring 2016	Continuing monthly QEP Newsletter and social media updates	QEP Marketing Director
Spring 2016	Semi-annual update from President to Local Board and Foundation Trustees	President
Spring 2016	Annual updates by Program Coordinators to Program Advisory Committees	Program faculty
Spring 2016	On-going updates to QEP Website	QEP Marketing Director
Spring 2016	Semesterly communications from President to faculty and staff in the "Five Things" email	President
Spring 2016	Semesterly update by QEP Director to faculty in Faculty	QEP Director

	Meetings	
Spring 2016	QEP booth and activities at spring student picnics at each campus	QEP Marketing Director
Summer 2016	Continue delivering pilot courses of the math Learning Support redesign	Math faculty
Summer 2016	Weekly Math faculty meetings (throughout term)	Math faculty
July 2016	Kellogg Institute	Math faculty
Summer 2016	Feature QEP success stories on social media and website	QEP Marketing Director
Summer 2016	Collect annual math and program Student Learning Outcomes Assessment Reports	QEP Director & IE Staff
Summer 2016	Continuing training for math faculty and tutors on teaching content in the affective domain, use of manipulatives, and tutoring math students	Dr. Paul Nolting, Kim Nolting, Dr. Marnie Phipps, math faculty, Math Success Center staff
Summer 2016	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Tutoring satisfaction surveys • Math Success Center usage logs • Professional Development satisfaction surveys	QEP Director & focus group facilitator
Summer 2016	Continuing monthly QEP Newsletter and social media updates	QEP Marketing Director
Summer 2016	On-going updates to QEP Website	QEP Marketing Director
Summer 2016	Semesterly communications from President to faculty and staff in the “Five Things” email	President
Summer 2016	Semesterly update by QEP Director to faculty in Faculty Meetings	QEP Director
Summer 2016	Refresher advisor training	Academic Dean
Summer 2016	Refresher training for TEAMS as a communication tool	Student Navigator
Year One of QEP Plan Begins		
Fall 2016	All math Learning Support classes migrated to redesigned model	Math faculty
Fall 2016	Weekly math faculty meetings (throughout term)	Math faculty
Fall 2016	Collect occupation-based math activities from program faculty	QEP Implementation Team
September 2016	AMATYC National Conference	QEP Director, Math faculty
Fall 2016	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Math Success Center satisfaction surveys	QEP Director & focus group facilitator

	• Math Success Center usage logs • Professional Development satisfaction surveys	
Fall 2016	Monthly QEP Implementation Team meetings	Implementation Team
Fall 2016	AMATYC "Teach the teacher" presentation	QEP Director, Math faculty
Fall 2016	Refresher advisor training	Academic Dean
Fall 2016	Continuing monthly QEP Newsletter and social media updates	QEP Marketing Director
Fall 2016	Semi-annual update from President to Local Board and Foundation Trustees	President
Fall 2016	On-going updates to QEP Website	QEP Marketing Director
Fall 2016	Semesterly communications from President to faculty and staff in the "Five Things" email	President
Fall 2016	Semesterly update by QEP Director to faculty in Faculty Meetings	QEP Director
Fall 2016	QEP booth and activities at fall student picnics at each campus	QEP Marketing Director
December 2016	Attend SACSCOC Annual Meeting	QEP Director & IE Staff
February 2017	Georgia Association for Developmental Education (GADE) Conference	QEP Director, math faculty
February 2017	Georgia Mathematical Association of Two-Year Colleges (GMATYC) Conference	QEP Director, math faculty
March 2017	National Association for Developmental Education (NADE) Conference	QEP Director, math faculty
Spring 2017	Collect occupation-based math activities from program faculty	QEP Implementation Team
Spring 2017	Weekly math faculty meetings (throughout term)	Math faculty
Spring 2017	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Math Success Center satisfaction surveys • Math Success Center usage logs Professional Development satisfaction surveys	QEP Director & focus group facilitator
Spring 2017	Monthly QEP Implementation Team meetings	Implementation Team
Spring 2017	NADE/GADE "Teach the teacher" presentation	QEP Director, Math faculty
Spring 2017	Refresher advisor training	Academic Dean
Spring 2017	Continuing monthly QEP Newsletter and social media updates	QEP Marketing Director
Spring 2017	Semi-annual update from President to Local Board and Foundation Trustees	President
Spring 2017	Annual updates by Program Coordinators to Program Advisory Committees	Program faculty
Spring 2017	On-going updates to QEP Website	QEP Marketing Director
Spring 2017	Semesterly communications from President to faculty and staff in the "Five Things" email	President
Spring 2017	Semesterly update by QEP Director to faculty in Faculty	QEP Director

	Meetings	
Spring 2017	QEP booth and activities at spring student picnics at each campus	QEP Marketing Director
Summer 2017	Feature QEP success stories on social media and website	QEP Marketing Director
Summer 2017	Collect annual math and program Student Learning Outcomes Assessment Reports	QEP Director & IE Staff
Summer 2017	Kellogg Institute	Math faculty
Summer 2017	Continuing training for math faculty and tutors on teaching content in the affective domain, use of manipulatives, and tutoring math students	Dr. Paul Nolting, Kim Nolting, Dr. Marnie Phipps, math faculty, Math Success Center staff
Summer 2017	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Tutoring satisfaction surveys • Math Success Center usage logs Professional Development satisfaction surveys	QEP Director & focus group facilitator
Summer 2017	Continuing monthly QEP Newsletter and social media updates	QEP Marketing Director
Summer 2017	On-going updates to QEP Website	QEP Marketing Director
Summer 2017	Semesterly communications from President to faculty and staff in the “Five Things” email	President
Summer 2017	Semesterly update by QEP Director to faculty in Faculty Meetings	QEP Director
Summer 2017	Refresher advisor training	Academic Dean
Summer 2017	Refresher training for TEAMS as a communication tool	Student Navigator
Recurring Activities for QEP Years 2 - 5		
Fall, Spring, Summer	Collect occupation-based math activities from program faculty	QEP Implementation Team
Fall, Spring, Summer	Administer and collect semesterly QEP assessments • Banner Student Advisements Reports • Pre- and post- math anxiety, self-efficacy, and self-concept scales • Student Evaluations of Faculty Instruction • Math Learning Support courses final grades • Math Learning Support student and faculty focus groups • Tutoring satisfaction surveys • Math Success Center usage logs • Professional Development satisfaction surveys	QEP Director & focus group facilitator
Fall, Spring, Summer	Weekly math faculty meetings (throughout term)	Math faculty
Fall, Spring, Summer	Monthly QEP Implementation Team meetings	Implementation Team
Fall, Spring	Refresher advisor training	Academic Dean
Fall, Spring,	Continuing monthly QEP Newsletter and social media	QEP Marketing Director

Summer	updates	
Fall, Spring	Semi-annual update from President to Local Board and Foundation Trustees	President
Fall, Spring, Summer	On-going updates to QEP Website	QEP Marketing Director
Fall, Spring, Summer	Semesterly communications from President to faculty and staff in the "Five Things" email	President
Fall, Spring, Summer	Semesterly update by QEP Director to faculty in Faculty Meetings	QEP Director
Fall	AMATYC National Conference	QEP Director, Math faculty
Fall	AMATYC "Teach the teacher" presentation	QEP Director, Math faculty
Fall, Spring	QEP booth and activities at fall student picnics at each campus	QEP Marketing Director
December	Attend SACSCOC Annual Meeting	QEP Director & IE Staff
February	Georgia Mathematical Association of Two-Year Colleges (GMATYC) Conference	QEP Director, math faculty
Spring	GMATYC "Teach the teacher" presentation	QEP Director, math faculty
Spring	NADE/GADE Conference	QEP Director, Math faculty
Spring	NADE/GADE "Teach the teacher" presentation	QEP Director, Math faculty
March	National Association for Developmental Education (NADE) Conference	QEP Director, math faculty
Summer	Kellogg Institute	Math faculty
Summer	Collect annual math and program Student Learning Outcomes Assessment Reports	QEP Director & IE Staff
Additional Activities for QEP Year 5		
	Write Fifth Year Interim Report and submit to SACSCOC	Implementation Team, QEP Director, & IE Staff

II. ASSESSMENT OF THE PLAN

The **purpose** of Lanier Tech's QEP is to increase student learning in the mathematics Learning Support program such that students emerge with the skills and attitudes necessary for success in college-level mathematics courses. The **goals** of the plan are to:

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

Lanier Technical College's Quality Enhancement Plan includes three major **strategies** to enhance student learning: 1) redesign of instructional delivery for Learning Support courses, 2) enhanced tutoring services, 3) targeted professional development activities.

To determine progress toward and success of the QEP, Lanier Tech will assess the progress on goals listed above as well as the effectiveness of each of the three major strategies.

ASSESSMENT OF PLAN GOALS

Assessment of Goal 1: Improving student learning in LTC's math Learning Support courses

Student Learning Outcomes (SLOs) are assessed annually. Faculty are directed to collect assessment data in the fall and spring semesters, and in the summer semester to analyze and reflect on the data and use it to determine improvements to instruction for the coming academic year. Lanier Tech's Institutional Effectiveness Staff worked with the math faculty to completely revise the SLO assessments for the math Learning Support program and align it with the learning outcomes detailed in this QEP.

Division.: Math Learning Support FY2016 Program SLO Person/Title Completing Form: Susan Baker & <QEP Director>
Date:

Purpose: The purpose of learning support is to provide educational opportunities to individuals that will enable them to achieve performance levels in English, mathematics, and/or reading required to enter and succeed in occupational/technical programs.

Program Description: The learning support program assists students in acquiring the necessary skills to successfully continue college level study. The program accomplishes its mission through developmental courses in reading, English, and mathematics. In addition to offered coursework, counseling, tutoring and computer-assisted instruction are also offered.

Student Learning Outcome	Courses Assessment Delivered In	Means of Assessment	Summary of Assessment Results	Use of Assessment Results
1. Students will solve quantitative and spatial mathematical relationships.	MATH 1012A MATH 0090B	Chapter exams	**MATH 1012A:** *Quantitative* Fractions 53% Decimals 73% Ratios & Proportions 79% Percentages 80% *Spatial* Measurement/Conversion 78% Geometric Concepts 70% Basic Statistics 81%	<What do we learn from these results?> <What changes to instruction will we make based on what we learned?>

			MATH 0090B: *Quantitative* Real Numbers/Alg. Expressions 87% Linear Eq. & Inequalities 71% Systems of Linear Eq. 66% Polynomial Operations 72% Factoring Polynomials 72% Rational Expressions and Eq. 59% Radical Expressions and Eq. 85% *Spatial* Graphs of Linear Eq. & Inequalities 67% Graphing Quadratic Eq. 86% Example Results	
2. Students will solve applied math problems.	MATH 1012A MATH 0090B	Criterion-referenced final exam	**MATH 1012A:** Fractions 71% Decimals 80% Ratios & Proportions 71% Percentages 89% Measurement/Conversion 53% Geometric Concepts 51% Basic Statistics 81% **MATH 0090B:** Percentages 43% Linear Eq. 54% Quadratic Eq. 86% Polynomials 38% Example Results	<What do we learn from these results?> <What changes to instruction will we make based on what we learned?>
3. Students will apply estimation and mental computation strategies.	MATH 1012A MATH 0090B	Criterion-referenced chapter quizzes or final exams	**MATH 1012A:** Measurement 53% Ratios & Proportions 77% Percentages 82% **MATH 0090B:** Factoring Polynomials 72% Radical Expressions and Eq. 85% Graphing Quadratic Eq. 86% Example Results	<What do we learn from these results?> <What changes to instruction will we make based on what we learned?>
4. Students will identify relevant and irrelevant data.	MATH 1012A MATH 0090B	Application problems and story problems	**MATH 1012A:** Fractions 71% Decimals 88% Ratios & Proportions 71% Percentages 89% Measurement/Conversion 53% Geometric Concepts 51% Basic Statistics 81%	<What do we learn from these results?> <What changes to instruction will we make based on what we learned?>

			MATH 0090B: Linear Eq. 54% Quadratic Eq. 86% Polynomials 38% Example Results	

Because the Student Learning Outcome Assessment Report has been completely revised, the first opportunity to gather data establishing a baseline is spring 2016 when the pilot courses are delivered. These data were used to establish baseline performance for diploma-level and degree-level students by averaging all scores with equal weight.

The QEP Design and Implementation Teams determined that a 10% improvement in performance over the life of the plan is both achievable and significant. Accordingly, satisfactory progress has been defined as a 2% improvement over the baseline in each year of the plan.

Using these baseline data and yearly targets, the following table displays the College's targets for improvement on Goal 1 over the life of the QEP.

Diploma Students						
Year	**Baseline Performance**	**First Year (2017)**	**Second Year (2018)**	**Third Year (2019)**	**Fourth Year (2020)**	**QEP Target Year (2021)**
Target Cohort Proficiency Score	69.04% combined assessment score	70.42%	71.80%	73.18%	74.56%	75.94%
Actual Cohort Proficiency	69.04% combined assessment score	To Be Determined	TBD	TBD	TBD	TBD

Degree Students						
Year	**Baseline Performance**	**First Year (2017)**	**Second Year (2018)**	**Third Year (2019)**	**Fourth Year (2020)**	**QEP Target Year (2021)**
Target Cohort Proficiency Score	68.79% combined assessment score	70.17%	71.54%	72.92%	74.29%	75.67%
Actual Cohort Proficiency	X% combined assessment score	To Be Determined	TBD	TBD	TBD	TBD

Instrument	Data Collected	Timeframe/Schedule	Responsible Party
Annual math Learning Support Student Learning Outcomes Assessment Reports	Math Learning Support Student Learning Outcome results	Each semester	Institutional Effectiveness Staff, QEP Director, & LTC math faculty

Assessment of Goal 2: Improving Application of Math Skills in Occupational Courses

LTC will use annual program-level Student Learning Outcome Assessment Reports to assess Goal 2. A sample outcome from a program-level Assessment Report from LTC's Medical Assisting program is shown below:

Student Learning Outcome	Assessment Means or Measures	Summary of Assessment Results	Use of Assessment Results
2. Students will solve applied math problems.	Written adult, children, and weight conversion calculation exam.	Sample Population: 74 Total Population: 74 2014 2015 Adult Calculations 73% 88% Children Calculations 58% 73% Weight Conversions 73% 88% Results Sample	FY 2015 data indicates a significant improvement in student performance in all 3 categories. These results directly reflect the continued efforts of both the MA instructors and the math faculty who have drilled the occupational worksheets in the foundational math courses and students mastering basic math skills. Adult calculations increased by 15 pts. along with weight conversions. These two categories remained relatively consistent campus wide with the Forsyth campus reporting the highest percentage. Children's calculations also increased 15 points from 58% to 73%. This category is the hardest for students to grasp due, not only due to math skills, but the ability of students to be problem solvers and relate math to real life situations. The Oakwood campus reflects a decline in this area and could be contributed to loss of full time faculty member in the middle of semester. Although there was decline from this campus, college wide the numbers reflect improvement. The MA department will continue to communicate and coordinate dialog with the math faculty and continue teaching strategies, coordination of math assessments, referring students for tutoring, and supporting staff with mentoring and sharing resources. This data is exciting to see since the faculty have devoted considerable effort to this outcome over the past several years with mixed results until 2015.

As shown in the Implementation Plan and Timeline, LTC's Institutional Effectiveness Staff worked with the Program Coordinators to develop at least one well-crafted and rigorous math or math-related outcome assessment for each academic program.

Data used to establish the baseline for Goal 2, collected in AY 2015 and AY 2016, is summarized in the following table.

Allied Health Programs	Outcome	Results
Dental Assisting		*The Dental Assisting program is the one LTC/TCSG diploma program with no math requirement. The curriculum is currently being revised to include mathematics. Baseline data for this program will be established in AY2017.*
Dental Hygiene	Students will accurately calculate values necessary to determine correct radiographic exposure parameters.	Sample: 12 Population: 12 Converting impulses & seconds 66.7% Calculating exposure parameters 91.7% Calculating dosage w/ inverse square 95.8% *Outcome average: 84.7%*
Health Information Technology	Students will performing mathematical calculations used in the Health Information Technology field.	Calculating Rates 55% Expressing Rates as % 95% Expressing Rates as Ratios 85% Rounding 93% *Outcome average: 82%*
Healthcare Assistant/Science/Nurse Aide	Students will use measurements and calculations relevant to the Healthcare Assistant/Nurse Aide field	Sample: 10 Population: 10 Blood Pressure 80% Respirations 100% Pulse 90% Recording Output 80% Weights 90% *Outcome average: 88%*
Medical Assisting	Students will be able to properly calculate drug dosages.	Sample: 71 Total: 71 Adult Calculations 89% Children Calculations 68% Weight Conversions 89% *Outcome average: 82%*
Paramedic Technology	Student performance on the following topics will be evaluated	Sample: 26 Population: 26

	prior to, and after the pharmacology section of the paramedic program to assess the effectiveness of primary math education, as well as the effectiveness of math education within the paramedic course.	Fractions 62% Decimals 62% Ratio/Pro 75% Percent 38% Scientific Notation 0% Averages 100% *Outcome average: 56%*
Pharmacy	Students will accurately calculate dosages of prescription by using pharmaceutical calculations.	Sample: 5 Population: 5 Basic Mathematical Skills 96% Conversion of Clinical Numbers 100% Conversion of Measurement System 100% Dosage Calculations 88% Alligations Calculations 70% Concentration Calculations 90% Dilution Calculations 0% Powder Drug Calculations 100% Flow Rate Calculations 0% *Outcome average: 72%*
Physical Therapist Assistant	Students will perform calculations and conversions used in the Physical Therapy field.	Sample: 11 Population: 11 Numbers & Operations 82.7% Algebraic Applications 90.9% Data Interpretation 72.7% Measurement 81.8% *Outcome average: 82.0%*
Practical Nursing	Students will solve applied math problems used in the Nursing field.	Sample: 11 Population: 11 Simple Conversions 97% Multi-step Conversions 95% Estimation Problems 91% Data Interpretation/Dosage Calcs 91% IV Calculations 97% *Outcome average: 94%*
Radiologic Technology	Students will perform calculations and conversions used in the Radiological Technology field.	Sample: 19 Population: 19 Numbers & Operations 78.9% Algebraic Applications 84.2% Data Interpretation 73.8% Measurement 65.8% *Outcome average: 75.7%*

Surgical Technology (2016)	Students will perform calculations and conversions used in the Surgical Technology field.	Sample: 12 Population: 12 Civilian/military time 100% Using fractions 91.6% Using decimals 83.0% Fraction/decimal conversions 100% Lbs. / Kilograms Conversion 87.5% Decimal/Percent conversions 83.0% Using ratios & proportions 87.5% Fahrenheit/Celsius conversions 100% Using the metric system 95.8% Terms 95.8% *Outcome average:* *92.4%*
Business and Computer Programs		
Accounting (2016)	The students will be able to compute depreciation of plant (fixed) assets using a variety of depreciation methods.	Sample: 26 Population: 26 Straight line: 100% Units of Production: 88.5% *Outcome average:* *94.3%*
Business and Office Technology (2015)	Students will use complex formulas and functions efficiently in a Microsoft Excel workbook.	Sample: 95 Population: 95 PMT Function (on-ground) 78% PMT Function (online) 78% FV Function (on-ground) 20% FV Function (online) 22% IF Function (on-ground) 67% IF Function (online) 78% Nested IF Function (on-ground) 33% Nested IF Function (online) 39% *Outcome average:* *52%*
Computer Information Systems	Students will apply mathematical concepts to configure and troubleshoot computers and networks.	Sample: 11 Population: 11 Calculating IPv6 addresses 44.4% Allocating bandwidth 66.7% Determining wiring distances 72.2% Geometric concepts 100% Calculating subnet masks (binary) 80.0% *Outcome average:* *72.7%*
Business Management	Students will understand the decisions process that must be made by managers and owners of businesses. Additionally, students will use basic math to implement	Hybrid/Lecture Sample: 18 Population: 18 Accounting & Financial Analysis 78%

	accounting and financial plans.	Online Sample: 41 Population: 41 Accounting & Financial Analysis 85% *Outcome average: 82%*
Emergency Management		*New Program: Outcome and baseline data will be established AY2017.*
Marketing Management	Students will understand the decisions process that must be made by managers and owners of businesses. Additionally, students will use basic math to implement accounting and financial plans.	Sample: 23 Population: 23 Negotiating price & buyer concerns 84%
Technical and Industrial Programs		
Air Conditioning Technology	Students will solve mathematical problems applicable to the Air Conditioning/Heating Repair field.	Sample: 19 Population: 19 Place values 92% Fractions & decimals 89% Measurements 93% Fahrenheit/Celsius 96% Percentages 96% Algebraic Concepts 95% *Outcome average: 94%*
Automotive Collision Repair	Students will demonstrate knowledge of proper paint mixing procedures.	Sample: 16 Population: 16 Measurements 100% Mixing Scales 100% Proportional Mixing 44% Parallax Errors 100% *Outcome average: 86%*
Automotive Technology	Students will use Ohm's law to diagnose faults in electrical circuits.	Sample: 32 Population: 32 Electrical fundamentals 88% Electrical circuits diagnosis 88% *Outcome average: 88%*
Building Automation Systems		*New Program: Outcome and baseline data will be established AY2017.*
Electrical Systems	Students will solve problems used in Electrical Construction, involving amperes, resistance,	Sample: 5 Population: 5 Calculating Amperes 75%

	watts, and measurements.	Calculating Resistance 80% Calculating Watts 60% Fractional Measurements 80% *Outcome average: 74%*
Electrical Utility Technology	Students will calculate power in AC circuits.	Sample: 5 Population: 5 P reactive (3) 87% P true: (2) 80% P apparent (2) 90% Power Factor (4) 70% Overall Average 80% *Outcome average: 81%*
Engineering Technology		*New Program: Outcome and baseline data will be established AY2017.*
Industrial Systems Technology	Students will calculate flow rates and select appropriate hoses based on the results of these calculations.	Sample: 13 Population: 13 Program variable-frequency drive 69% Control behavior of drive 46% Determine flow rate 46% Convert RPM to GPM 62% Determine hose size 31% *Outcome average: 51%*
Machine Tool Technology	Students will solve mathematical problems used in machine tooling.	Sample: 85 Population: 85 Adding/Subtracting Fractions 88% Adding/Subtraction Integers 96% Addition/Subtraction 58% Area 55% Exponents 65% Fraction > Decimal Conversion 71% Fraction Conversion 74% Geometric concepts 72% Percent > Decimal Conversion 83% Ratios 88% Volume 81% Working with XY axes 63% *Outcome average: 75%*
Motorsports Vehicle Technology	Students will use mathematical calculations to properly configure motorsports vehicles	Sample: 11 Population: 11 Measurement accuracy 88.9% Application/Adjustment 97.6%

		Outcome average: *93.3%*
Welding	Students will solve welding problems requiring accurate measurements and calculations using angles, fractions, and decimal measurements.	Sample: 21 Population: 21 Weight Calculations 67% Length Calculations 71% Decimal/Fraction Conversions 69% Adding & Subtracting Fractions 43% Calculating Angles 67% Ruler Measurements 93% *Outcome average:* *68%*
Professional Programs		
Cosmetology/Esthetician	Students will correctly use measurements and formulas necessary for a practicing cosmetologist	Sample: 8 Population: 8 Arithmetic 100% Percentages 75% Measurements 100% Ratios 100% *Outcome average:* *94%*
Criminal Justice	Students will perform mathematical calculations to determine the speed of vehicles involved in accidents.	Sample: 9 Population: 9 Calculate drag factor 78% Measure length of skid marks 89% Apply gravitational constant (x 30) 100% Calculate drag factor x length x 30 89% Calculate square root 78% Convert result to speed 89% *Outcome average:* *87%*
Design and Media Production	Students will determine the correct fit for a job imposition onto a given Press-Sheet with a given product and press description.	Sample: 19 Population: 19 Calculate Prod. Image Width 66.67% Calculate Prod. Image Ht. 50.00% Calculate Port. Prod. Frt Across 50.00% Calculate Ls. Prod. Fit Across 50.00% Calculate Port. Prod. Fit Down 33.34% Calculate Ls. Prod. Fit Down 25.00% Calculate Ls. Prod. Max Fit 41.67% Calculate Port. Prod. Max Fit 41.67% Det. Which Imposition Fits more 50.00% *Outcome average:* *45.37%*
Drafting	Students will calculate dimensions on a mechanical	Sample: 7 Population: 7

	blueprint using direct, indirect, transferred, and calculated dimensions.	Transferred 100% Direct 100% Calculated direct 100% Direct calculated 100% Transferred and calculated 64% Transferred 86% *Outcome average: 92%*
Early Childhood Care and Education	Students will construct lesson plans and exercises for math tasks appropriate to Early Childhood Care & Education	Sample: Population: Sorting 100% Rote counting 93% Rational counting 93% One-to-one correspondence 100% Comparison 97% Ordering 93% Patterning 100% *Outcome average: 97%*
Fire Science Technology		*During spring semester 2016, the Program Director of the Fire Science Technology was on extended medical leave and was unable to participate in collecting the results needed to establish a baseline. Baseline data for this program will be collected and analyzed in fall 2016.*
Horticulture	Students will apply mathematical concepts to solve problems faced in the horticulture industry.	Sample: 6 Population: 6 Area calculations 26% Volume calculations 33% Angles and slopes 58% Unit conversions 72% Percentages 56% Ratios and proportions 17% Logarithmic scales (pH) 17% *Outcome average: 40%*
Interiors	Students will apply skills for estimating and pricing of a project with specific client profile and budget requirement.	Sample: 9 Population: 9 Select materials 89% Estimate materials 94% Calculate Pricing 93% Color Rendering 91% Presentation 82% *Outcome average: 90%*

Because different programs have different numbers of outcomes, simply averaging the scores would result in skewed data where the performance of students in some programs would have a greater effect on the overall score than that of students in other programs. Therefore each program's cumulative average was weighted by the number of students in the assessment sample to arrive at an overall baseline performance score of 76.00%.

Again, to ensure that the QEP makes a significant impact on student learning over the life of the plan, the College has set a target of 10% overall improvement for these metrics over five years, with an average 2% improvement each year.

The baseline data and yearly targets for improvement result in the following targets for Goal 2:

Year	Baseline Performance	First Year (2017)	Second Year (2018)	Third Year (2019)	Fourth Year (2020)	QEP Target Year (2021)
Target Cohort Proficiency Score	76.00% combined assessment score	77.52%	79.04%	80.56%	82.08%	83.60%
Actual Cohort Proficiency	76.00% combined assessment score	To Be Determined	TBD	TBD	TBD	TBD

APPENDICES

APPENDIX A – STATE AND SERVICE AREA DEMOGRAPHICS

Lanier Technical College

Service Area Demographics

Based on 2013 U.S. Census Estimates

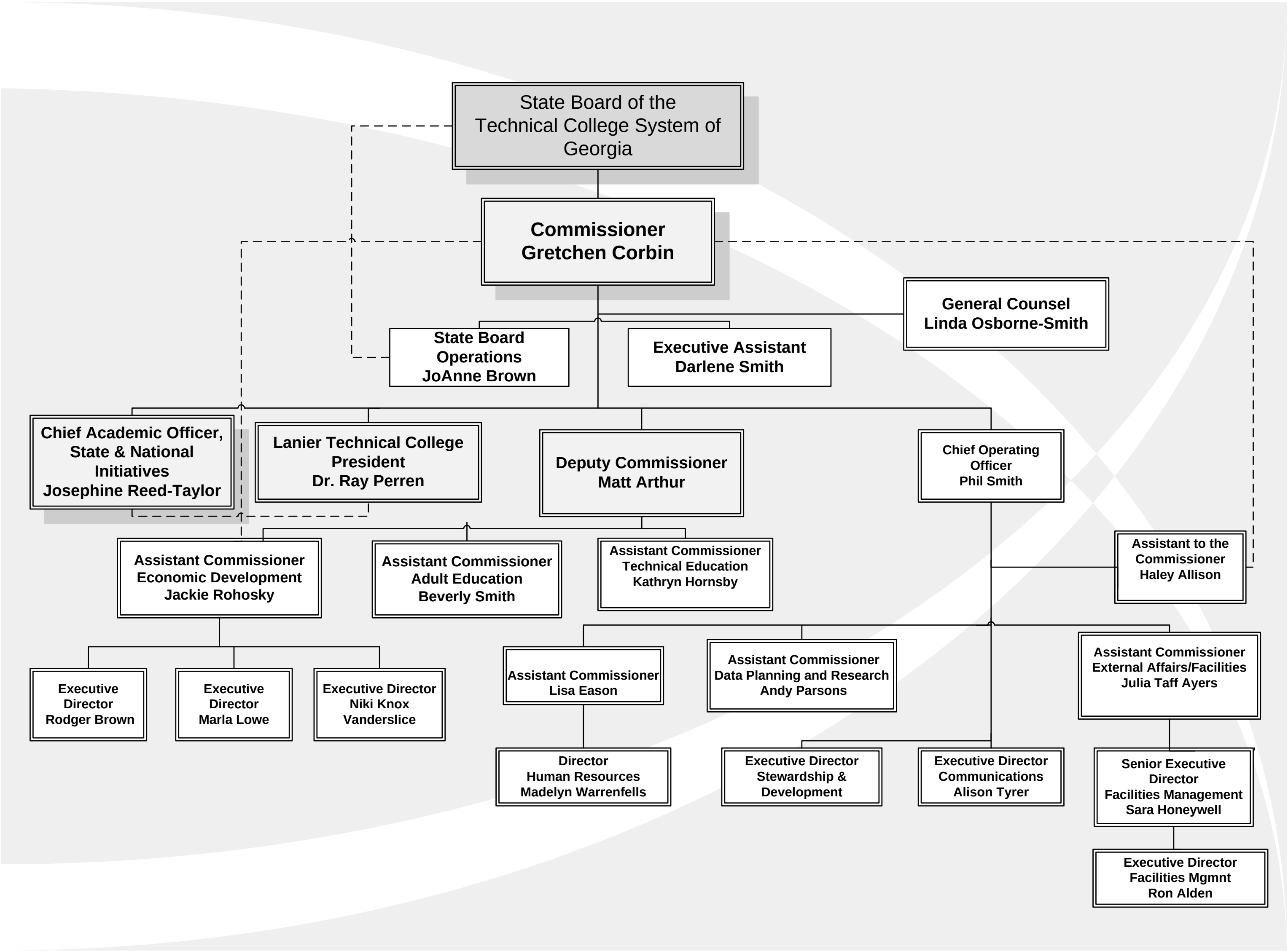
County	Population	Median Age (Years)	% Male	% Female	Population Age 25 and Older	% Age 25 and Over	Age 25 and Over w/o High School Credential	% Age 25 and Over w/o High School Credential	Age 25 and Over with at least Associate Degree	% Age 25 and Over with at least Associate Degree	Unemployment Rate August 2015 (Georgia Department of Labor)
Banks	18,333	38.8	51.3%	48.7%	12,251	66.8%	3,001	24.5%	2,254	18.4%	5.3%
Barrow	69,933	34.2	49.6%	50.4%	44,770	64.0%	8,014	17.9%	11,461	25.6%	5.2%
Dawson	22,387	40.8	49.4%	50.6%	15,517	69.3%	2,203	14.2%	4,841	31.2%	4.9%
Forsyth	182,916	37.3	49.7%	50.3%	116,454	63.7%	10,015	8.6%	59,392	51.0%	4.5%
Hall	182,841	34.9	50.0%	50.0%	115,478	63.2%	24,481	21.2%	33,258	28.8%	4.8%
Jackson	60,577	37.5	49.6%	50.4%	39,851	65.8%	7,532	18.9%	10,401	26.1%	4.6%
Lumpkin	30,428	36.1	49.1%	50.9%	19,064	62.7%	2,860	15.0%	5,967	31.3%	5.3%
Lanier Total	567,415	36.3	49.8%	50.2%	363,385	64.0%	58,107	16.0%	127,574	35.1%	4.8%
Georgia	9,810,417	35.6	48.9%	51.1%	6,323,120	64.5%	967,437	15.3%	2,206,769	34.9%	6.0%

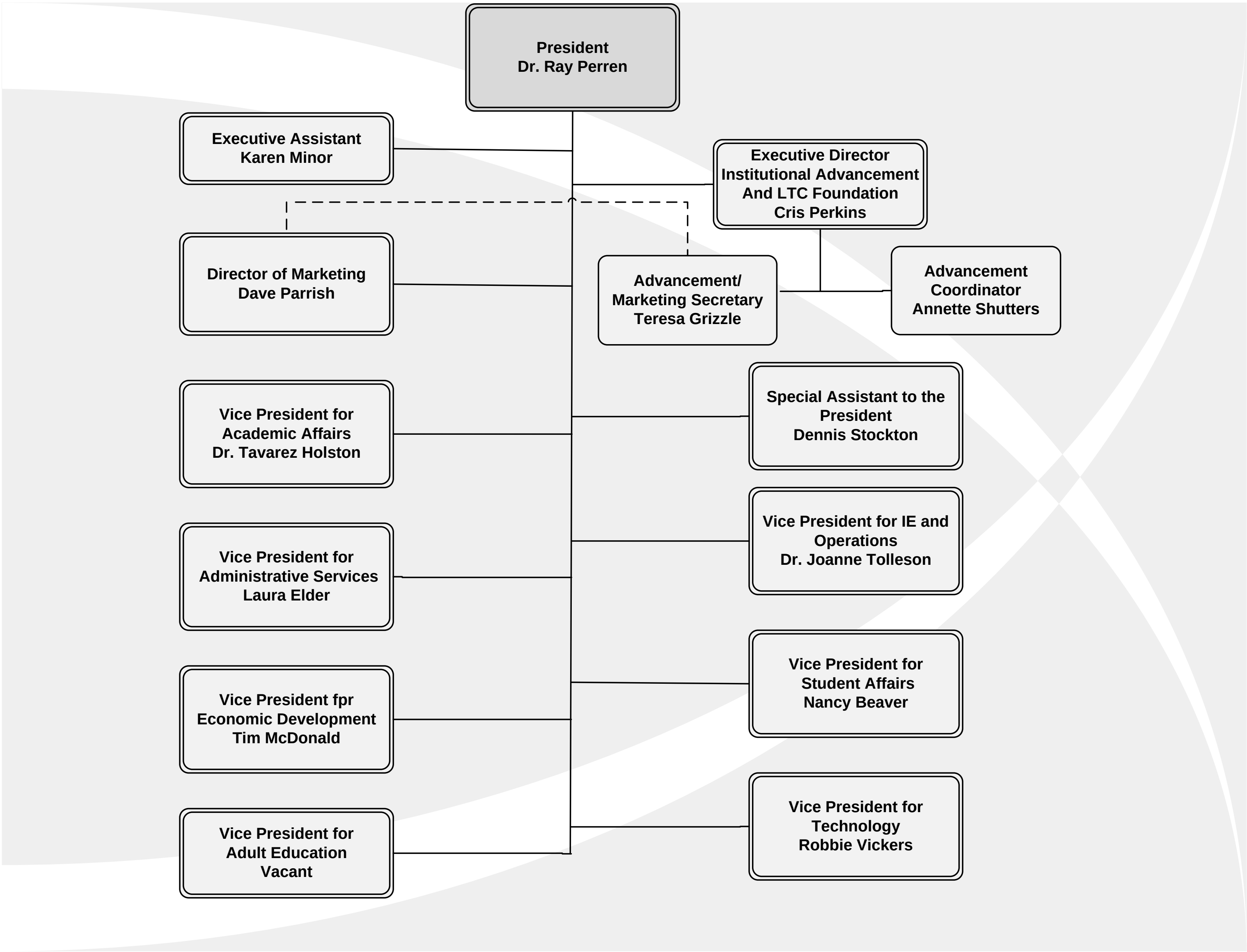
County	Population	% White	% African American	% American Indian	% Asian	% Hawaiian Pacific Islander	% Other Race	% Two or More Races	% Hispanic
Banks	18,333	93.3%	2.8%	0.1%	1.2%	0.0%	1.8%	0.7%	6.0%
Barrow	69,933	80.4%	11.5%	0.3%	3.4%	0.0%	2.0%	2.5%	9.0%

Dawson	22,387	94.9%	0.2%	0.4%	0.9%	0.0%	2.0%	1.5%	4.0%
Forsyth	182,916	85.8%	2.8%	0.2%	6.8%	0.0%	2.8%	1.7%	9.5%
Hall	182,841	82.0%	7.5%	0.4%	1.8%	0.03%	6.7%	1.6%	26.5%
Jackson	60,577	88.5%	7.2%	0.3%	1.8%	0.12%	1.0%	1.0%	6.4%
Lumpkin	30,428	94.0%	2.5%	0.5%	0.5%	0.0%	1.5%	1.0%	4.5%
Lanier Total	567,415	85.2%	5.7%	0.3%	3.5%	0.02%	3.6%	1.6%	14.0%
Georgia	9,810,417	60.6%	30.7%	0.3%	3.4%	0.05%	3.0%	2.0%	8.9%

County	Population	Median Income for Workers	% Population Below Poverty Level
Banks	18,333	$27,432	16.7%
Barrow	69,933	$31,051	13.7%
Dawson	22,387	$26,998	15.6%
Forsyth	182,916	$41,215	7.6%
Hall	182,841	$27,124	18.7%
Jackson	60,577	$31,749	15.9%
Lumpkin	30,428	$22,179	18.1%
Lanier Total	567,415	$32,457	14.0%
Georgia	9,810,417	$29,205	18.2%

APPENDIX B – LTC ORGANIZATIONAL CHART




President
Dr. Ray Perren
Executive Assistant
Karen Minor
Executive Director
Institutional Advancement
And LTC Foundation
Cris Perkins
Director of Marketing
Dave Parrish
Advancement/
Marketing Secretary
Teresa Grizzle
Advancement
Coordinator
Annette Shutters
Vice President for
Academic Affairs
Dr. Tavarez Holston
Special Assistant to the
President
Dennis Stockton
Vice President for
Administrative Services
Laura Elder
Vice President for IE and
Operations
Dr. Joanne Tolleson
Vice President fpr
Economic Development
Tim McDonald
Vice President for
Student Affairs
Nancy Beaver
Vice President for
Adult Education
Vacant
Vice President for
Technology
Robbie Vickers

APPENDIX C – QEP TEAM ROSTERS

QEP Topic Selection Team Roster	
Team Members	**Title & Campus**
Theresa Lindsey, Chair	Faculty, Business Administration Technology, Forsyth
Susan Baker	Faculty, Mathematics, Forsyth
Nancy Beaver	Vice President of Student Affairs, Oakwood
Mike Brandt	Faculty, Welding, Dawson
Donna Brinson	Academic Dean, Public & Personal Services, Forsyth
Angelia Brown	Faculty, Cosmetology, Dawson
David Byers	Faculty, Dental Hygiene, Oakwood
Rushia Cooper	Faculty, Business Administration Technology, Jackson & Barrow
Johnna Connell	Faculty, Medical Assisting, Barrow
Larry Cranford	Faculty, Management/Marketing, Forsyth
Brad Gadberry	Director of Institutional Effectiveness, Forsyth
Shena Gazaway	Faculty, Allied Health, Jackson & Barrow
Beth Hefner	Faculty, Early Childhood Care & Education, Oakwood
Annamarie Keck	Student, GOAL Runner-Up
Howard Ledford	Academic Dean, General Studies, Jackson
Cheree Madison	Faculty, Psychology, Oakwood
Jason Palmer	Faculty, English, Oakwood
Kari Register	Special Populations Coordinator, Oakwood
Christian Tetzlaff	Faculty, Motorsports Vehicle Technology, Oakwood
Kathryn Thompson	Director of Library Services, Oakwood
Joanne Tolleson	VP of IE and Operations, Forsyth
Bob Wells	Faculty, Radiologic Technology, Oakwood

QEP Design Team Roster	
Team Members	**Title & Campus**
Susan Baker, Chair	Faculty, Mathematics, Forsyth
Janice Alves	Faculty, Mathematics, Oakwood
Nancy Beaver	Vice President of Student Affairs, Oakwood
Donna Brinson	Academic Dean, Public & Professional Services, Forsyth
Johnna Connell	Faculty, Medical Assisting, Barrow
Laura Elder	Vice President of Administrative Services, Oakwood
Brad Gadberry	Director of Institutional Effectiveness, Forsyth
Chearra Hines	Student, Forsyth
Tavarez Holston	Vice President of Academic Affairs, Oakwood
Theresa Lindsey	Faculty, Business Administration Technology, Forsyth
Cheree Madison	Faculty, Psychology, Oakwood
Amy McGehee	Faculty, Mathematics, Oakwood & Dawson
Amy O’Dell	Faculty, Interiors, Forsyth
Jeff Shrader	Faculty, Mathematics, Oakwood
Christian Tetzlaff	Faculty, Motorsports Vehicle Technology, Oakwood
Kathryn Thompson	Director of Library Services, Oakwood
Joanne Tolleson	Vice President of IE & Operations, Forsyth

QEP Implementation Team Roster	
Team Members	**Title & Campus**
TBD	QEP Director, TBD
Susan Baker	Faculty, Mathematics, Forsyth
Janice Alves	Faculty, Mathematics, Oakwood
Nancy Beaver	Vice President of Student Affairs, Oakwood
Donna Brinson	Academic Dean, Public & Professional Services, Forsyth
Johnna Connell	Faculty, Medical Assisting, Barrow
Pennie Eddie	Faculty, Accounting, Oakwood & Barrow
Laura Elder	Vice President of Administrative Services, Oakwood
Brad Gadberry	Director of Institutional Effectiveness, Forsyth
Chearra Hines	Student, Forsyth
Tavarez Holston	Vice President of Academic Affairs, Oakwood
Howard Ledford	Dean, General Education, Jackson
Cheree Madison	Faculty, Psychology, Oakwood
Amy McGehee	Faculty, Mathematics, Oakwood & Dawson
Amy O'Dell	Faculty, Interiors, Forsyth
David Roberson	Faculty, Drafting Technology, Oakwood
Christian Tetzlaff	Faculty, Motorsports Vehicle Technology, Oakwood
Kathryn Thompson	Director of Library Services, Oakwood
Joanne Tolleson	Vice President of IE & Operations, Forsyth
TBD	Faculty, Mathematics, Oakwood & Barrow

APPENDIX D – QEP TOPIC SELECTION QUESTIONNAIRE

As a member of the Lanier Technical College community, what do **you** think Lanier Tech should choose as its **QEP** topic? Remember that the topic must demonstrate **commitment** to **on-going improvement** of a particular **aspect of student learning** for a **5-year period.** The topic must be able to have **measurable results.**

Please select only **three** topics ranking in priority from 1 (highest rank) to 3

- ❑ Communication Skills *(presentation skills, public speaking, professional presence)*
- ❑ Writing Skills *(academic writing, business writing)*
- ❑ Distance Education *(demonstration of increased skills in online learning environment)*
- ❑ First Year Experience *(high school-to-college transition, awareness of college support services, career choice, academic expectations)*
- ❑ Math Skills *(improving math in occupational courses)*
- ❑ Reading Skills *(college-level comprehension)*
- ❑ Study Skills *(effective study habits and techniques)*
- ❑ Technology in the Classroom (*mastery of technology to increase learning)*
- ❑ Other: ____
- ❑ Other: ____
- ❑ Other: ____

APPENDIX E – FOCUS GROUP QUESTIONS

For Faculty

- What are your students' attitudes about math in your program?
- What are your attitudes about math?
- Do your students have the math skills necessary for your program level courses?
    - If not, what do you do?
- When should students in your program take their math courses?
- What are your students' weakest areas in math?
- What are their strongest areas?
- What types of math skills do you incorporate into your curriculum?
    - How do you teach these skills?
- How well can your students apply theoretical math skills to practical occupational tasks?
- Do you have an SLO tracking math data?
    - If so, what outcome is being tracked and what do the data show?
- What ideas do you have for improving math skills?
- Do you currently teach math in your occupational courses?
- Would you feel uncomfortable being asked to teach students the basic math skills that prepare them to solve problems in your occupational courses?
    - If yes, why?
- What causes students to struggle with math in your courses? How could this be fixed?

For Students Currently Enrolled in Math:

- What do you like most about math?
- What do you like least about math?
- Were you required to complete Learning Support math?
    - If so, how many semesters did it take you to complete the class?
    - Did your Learning Support class help you in your next course?
- Did you take your math class online or on campus? Did the format you chose work out well for you?
- What challenged you the most in math?
- What has helped you to succeed in your math class?
    - How much work outside of class do you do for your math course?
- What strong math skills will make you more marketable in your field?
- What do you think prevents students from doing well in math courses?
- If you could change one thing about math classes at LTC, what would it be?

For Students Currently Enrolled in Occupational Courses:

- What do you like most about math?
- What do you like least about math?
- Were you required to complete Learning Support math?
    - If so, how many semesters did it take you to complete the class?
- Have you completed your program's math requirement?
    - If no, why not?
- Did you meet with your advisor about when to take your math course(s)?
    - If no, why not?
- Did you take your math class online or on campus? Did the format you chose work out well for you?
- How do you use math in your occupational classes?
    - Of the areas discussed above, which are the most challenging?
- Do you think having strong math skills will make you more marketable in your chosen field?
- How do instructors in your program explain the math you need in your field?
- Are you getting the math instruction you need from your program teacher?
- If you could change one thing about learning to use math in your occupational courses, what would it be?

APPENDIX F – REFERENCES

Andrews, A., & Brown, J. (2015). The effects of math anxiety. *Education*, *135*(3), 362-370.

Belenky, D. M., & Nokes, T. J. (2009). Examining the role of manipulatives and metacognition on engagement, learning, and transfer. *Journal Of Problem Solving*, *2*(2), 102-129. http://dx.doi.org/10.7771/1932-6246.1061

Bonham, B. S., & Boylan, H. R. (2012). Developmental mathematics: Challenges, promising practices, and recent initiatives. *Journal Of Developmental Education*, *36*(2), 14-16, 18, 20-21. Retrieved from http://eric.ed.gov/?id=EJ1035672

Boylan, H. R., & Nolting, P. (2011). Improving success in developmental mathematics: An interview with Paul Nolting. *Journal of Developmental Education*, *34*(3), 20-27. Retrieved from http://eric.ed.gov/?id=EJ986275

Di, X., & Jaggars, S. S. (2014). Performance gaps between online and face-to-face courses: Differences across types of students and academic subject areas. *Journal Of Higher Education*, *85*(5), 633-659.

Gallard, A. J., Albritton, F., & Morgan, M. W. (2010). A comprehensive cost/benefit model: developmental student success impact. *Journal of Developmental Education*, *34*(1), 10-25. Retrieved from http://eric.ed.gov/?id=EJ942877

Gerhard, G., & Burn, H. E. (2014). Effective engagement strategies for non-tenure-track faculty in precollege mathematics reform in community colleges. *Community College Journal Of Research And Practice*, *38*(2-3), 208-217. http://dx.doi.org/10.1080/10668926.2014.851967

Hardré, P. L. (2012). Community college faculty motivation for basic research, teaching research, and professional development. *Community College Journal Of Research And Practice*, *36*(8), 539-561. http://dx.doi.org/10.1080/10668920902973362

Helms, J. L. (2014). Comparing student performance in online and face-to-face delivery modalities [Abstract]. *Journal Of Asynchronous Learning Networks*, *18*(1). Retrieved from http://olj.onlinelearningconsortium.org/index.php/olj/article/view/348

Hopko, D. R., McNeil, D. W., Lejuez, C., Ashcraft, M. H., Eifert, G. H., & Riel, J. (2003). The effects of anxious responding on mental arithmetic and lexical decision task performance. *Journal Of Anxiety Disorders*, *17*(6), 647-665. doi:10.1016/S0887-6185(02)00240-2

James, C. L. (2006). ACCUPLACER Online: Accurate placement tool for developmental programs?. *Journal of Developmental Education*, *30*(2), 2-8.

Jameson, M. M., & Fusco, B. R. (2014). Math anxiety, math self-concept, and math self-efficacy in adult learners compared to traditional undergraduate students. *Adult Education Quarterly*, *64*(4), 306-322. doi:10.1177/0741713614541461

Li, K., Zelenka, R., Buonaguidi, L., Beckman, R., Casillas, A., Crouse, J., & ... Robbins, S. (2013). Readiness, behavior, and foundational mathematics course success. *Journal Of Developmental Education*, *37*(1), 14-36. Retrieved from http://icsps.illinoisstate.edu/2014/04/readiness-behavior-and-foundational-mathematics-course-success/

Marley, S., & Carbonneau, K. (2014). Theoretical perspectives and empirical evidence relevant to classroom instruction with manipulatives. *Educational Psychology Review*, *26*(1), 1-7.

Perez, A. M., McShannon, J., & Hynes, P. (2012). Community college faculty development program and student achievement. *Community College Journal Of Research And Practice*, *36*(5), 379-385. http://dx.doi.org/10.1080/10668920902813469

Wernersbach, B. M., Crowley, S. L., Bates, S. C., & Rosenthal, C. (2014). Study skills course impact on academic self-efficacy. *Journal Of Developmental Education*, *37*(3), 14-33.

Young, S., & Duncan, H. E. (2014). Online and face-to-face teaching: How do student ratings differ? [Abstract]. *Journal Of Online Learning & Teaching*, *10*(1), 70-79. Retrieved from http://jolt.merlot.org/Vol10_No1.htm

Zavarella, C. A., & Ignash, J. M. (2009). Instructional delivery in developmental mathematics: Impact on retention. *Journal Of Developmental Education*, *32*(3), 2-4, 6, 8, 10, 12-13. Retrieved from http://files.eric.ed.gov/fulltext/EJ868668.pdf

Zientek, L. R., Yetkiner Ozel, Z. E., Fong, C. J., & Griffin, M. (2013). Student success in developmental mathematics courses. *Community College Journal Of Research And Practice*, *37*(12), 990-1010. http://dx.doi.org/10.1080/10668926.2010.491993

Job Title: QEP Director

JOB SUMMARY

The QEP Director is responsible for overseeing all aspects of Lanier Technical College's five-year Quality Enhancement Plan.

MAJOR DUTIES

- Teaches math Learning Support courses at a reduced load;
- Educates math faculty on the QEP assessments used;
- Collects, compiles, and analyzes QEP assessment data;
- Develops semester schedules for all Learning Support math classes in coordination with other Math faculty;
- Writes and presents status reports on progress of the QEP;
- Coordinates with Institutional Effectiveness Office to write annual QEP Impact Report;
- Collects, compiles, and analyzes Student Learning Outcomes assessment data;
- Collect and analyze data on Student Success Center effectiveness;
- Identifies and employs consultants and trainers to sustain successful implementation of the QEP;
- Interview and hire tutors;
- Provide intensive and ongoing training for tutors;
- Schedules, records, and submits tutors' work hours;
- Inventories and orders tutoring, testing, and assessment supplies;
- Provides close coordination with classroom teachers;
- Maintain currency in state-of-the-art educational technologies and methodologies;
- Serve as point-of-contact for members of the public seeking information on LTC's QEP.

COMPETENCIES

- Excellent verbal and written communication skills;
- Experienced with Microsoft Office Suite;
- Demonstrated ability to plan and execute schedules and projects.

MINIMUM QUALIFICATIONS

MA or MED in Mathematics, or equivalent
Teaching experience

PREFERRED QUALIFICATIONS

Experience dealing with the public
Strong background in statistics
Experience in educational research

Job Title: Math Tutor

JOB SUMMARY

The Math Tutor is responsible for tutoring students in math and math study skills.

MAJOR DUTIES

- Tutors student(s) in math and math study skills;
- Monitors and reinforces tutee progress;
- Conducts learning style inventories and discusses results with students;
- Assigns manageable tasks and provides positive feedback;
- Discusses student(s) progress with appropriate faculty and staff;
- Carefully listens to student(s) and offers encouragement and support;
- Maintains a positive, warm attitude that encourages the student(s) to learn;
- Provides oral and written reports as required;
- Performs basic administrative duties to support the daily operations of the tutoring program;
- Supports math faculty in classrooms as needed.

COMPETENCIES

- Skill in the operation of computers and job-related software programs including Microsoft Office;
- Oral and written communication skills;
- Skill in interpersonal relations and in dealing with the public;
- Decision making and problem solving skills.

MINIMUM QUALIFICATIONS

BA or BS in Mathematics or Mathematics Education or related field, or

BA or BS in Elementary or Middle Grades Education, or

Junior- or senior-level student enrolled in a Mathematics or Mathematics Education

PREFERRED QUALIFICATIONS

Experience working with students
Interpersonal skills that promote a positive learning environment
Educational philosophy includes a belief that all students can succeed

MATH 0090A SYLLABUS

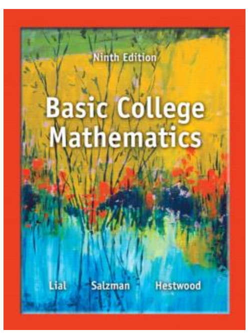
SPRING 2016 LEARNING SUPPORT MATH WITH STUDY SKILLS CRN: 30124

Contact Hours:	3	**Campus:**	[campus]	**Course Type:**	A
Credit Hours:	3	**Location:**	[room num]	**Total Class Minutes:**	2250
Prerequisite(s):	**Appropriate placement test score**	**Class Days:**	[meeting days]	**Minutes in Class:**	2250
Co-requisite(s):	MATH 1012	**Class Time:**	[Begin – End]	**Minutes Online**	0
				% Online:	0%

Instructor

Instructor:	Susan Baker
Email:	Sbaker2@laniertech.edu
Phone:	678.341.6603
Fax:	678.989.3191
Office:	A156
Office Hours:	1:00 pm – 2:00 pm Monday to Thursday

Required Textbook & Materials



Title:	Basic College Mathematics
Edition	9th
Author:	Margaret L. Lial, Stanley A. Salzman, Diana L. Hestwood
Publisher:	Pearson
ISBN:	10: 0321900383 13: 9780321900388
Software:	None
Materials:	Notebook, pencil, calculator

Course Description

A review of basic mathematical skills used in the solution of occupational and technical problems, including fractions, decimals, percentages, ratios and proportions, measurement and conversion, geometric concepts, technical applications, and basic statistics, with supplementary instruction in math study skills, reducing math anxiety, learning styles, and time management.

Course Competencies and Student Learning Outcomes

- Whole Numbers
  - State the meaning of digits in standard notation and recognize place value
  - Perform mathematical operations involving whole numbers
  - Solve simple equations
  - Solve application problems involving whole numbers

- Solve problems involving exponential notation and order of operations
    - Determine the factorizations of whole numbers
    - Use the rules of divisibility
- Fractions
    - Define fractions
    - Identify proper, improper, and mixed fractions
    - Change fractions to equivalent fractions
    - Compare fractions
    - Solve problems requiring addition, subtraction, multiplication, and division of fractions
    - Apply the order of operations in simplifying expressions
    - Solve application problems with fractions
- Decimals
    - Define decimals
    - Identify decimal place values
    - Read decimals
    - Write decimals
    - Round decimals off to specified place values
    - Solve problems requiring addition, subtraction, multiplication, and division of decimals
    - Substitute fractions for decimals and decimals for fractions
    - Compare decimals
    - Solve application problems involving decimal notation
- Percent and Ratio/Proportion
    - Find fraction notation for a ratio or a rate
    - Convert from percent to decimal
    - Convert from decimal to percent notation
    - Convert from percent to fraction notation
    - Rewrite fractions as percentages
    - Solve percent problems using percent equations
    - Solve percent problems using proportions
    - Solve application problems involving percentages
- Measurement
    - Change linear measures involving American and Metric units from one unit of measure to another
    - Change weight and mass units from one unit of measure to another
    - Change capacity from one unit of measure to another
    - Change time and temperature from one unit of measure to another
- Geometry
    - Classify basic geometric figures
    - Use the appropriate formula to calculate the perimeter of a polygon
    - Use the appropriate formula to calculate the area of a rectangle, square, parallelogram, triangle, and trapezoid
    - Use the appropriate formula to calculate the radius, diameter, circumference, and area of a circle.
    - Use the appropriate formula to calculate the volume of a rectangular solid, circular cylinder, sphere, and circular cone
- Math Study Skills
    - Improve the memory process
    - Improve note-taking skills
    - Improve reading and homework techniques
    - Improve skills by creating study cards
    - Create a mind map

- Improve chapter reviewing techniques
- Improve math test-taking skills

- Overcoming Math Anxiety
  - Describe techniques to help reduce anxiety
  - Describe techniques to help manage time
  - Create a semester calendar
  - Explain the effect of anxiety and stress on learning
  - Describe techniques to help reduce physical stress
  - Describe techniques to help reduce mental stress

Grading Scale - Lanier Technical College Policy

The grading scale is detailed in the Catalog and Student Handbook and listed below for reference. All faculty members follow this scale when assigning grades to reflect a given student's performance in the classroom.

LTC Grading Policy: Academic and grading requirements are established in accordance with state requirements and may vary by program. However, minimum standards for training at Lanier Tech become a permanent record of the school and are available to other schools, state officials, and potential employers with the student's written approval through the Student Services Office.

Grade	Numerical Equivalent	Grade Point
A	90-100	4
B	80-89	3
C	70-79	2
D	60-69	1
F	0-59	0

Course Grading Method and Specific Requirements

Quizzes: Quizzes will cover math related skills. Students who are absent for a quiz will be given a grade of zero (0) for that quiz. Approximately twenty percent of the quiz grades will be dropped.

Tests: Tests will be given in class and may cover several textbook sections or chapters from *Winning at Math*. Students who are absent for a test will be given a grade of zero (0) for that test. **Tests may only be taken once.** Please see your instructor in case of extenuating circumstances.

Final Project: There will be a group written project and presentation for the final exam at the end of the course. This project is intended to help students define improvement in math study skills, math anxiety, new learning styles, and time management. A grade of 70% indicates you are able to identify some factors involved in math study skills, math anxiety, new learning styles, and time management. **The final project must be presented during your scheduled class time.**

Course Evaluation/Grading Procedures (Quizzes, Tests, and Final Project):

Quizzes	25%
Tests	50%
Final Project	25%
Final Grade	100%

Course Specific Information

MATH 0090A, Learning Support Math with Study Skills, is delivered as a co-requisite class with MATH 1012. Students must pass both MATH 0090A and MATH 1012A to advance in their program. Students who fail a quiz or exam will be scheduled for a tutoring session in the Student Success Center.

MATH 1012A SYLLABUS

SPRING 2016 FOUNDATIONS OF MATHEMATICS CRN: 30125

Contact Hours:	3	**Campus:**	[campus]	**Course Type:**	A
Credit Hours:	3	**Location:**	[room num]	**Total Class Minutes:**	2250
Prerequisite(s):	**Appropriate placement test score**	**Class Days:**	[meeting days]	**Minutes in Class:**	2250
Co-requisite(s):	MATH 0090A	**Class Time:**	[Begin – End]	**Minutes Online**	0
				% Online:	0%

Instructor

Instructor:	Susan Baker
Email:	Sbaker2@laniertech.edu
Phone:	678.341.6603
Fax:	678.989.3191
Office:	A156
Office Hours:	1:00 pm – 2:00 pm Monday to Thursday

Required Textbook & Materials

Title:	Basic College Mathematics
Edition	9th
Author:	Margaret L. Lial, Stanley A. Salzman, Diana L. Hestwood
Publisher:	Pearson
ISBN:	10: 0321900383 13: 9780321900388
Software:	None
Materials:	Notebook, pencil, calculator

Course Description

Emphasizes the application of basic mathematical skills used in the solution of occupational and technical problems. Topics include fractions, decimals, percentages, ratios and proportions, measurement and conversion, geometric concepts, technical applications, and basic statistics.

Course Competencies and Student Learning Outcomes

- Fractions
  - Simplify fractions
  - Multiply and divide fractions
  - Add and subtract fractions
  - Add, subtract, multiply, and divide mixed numbers
  - Solve application problems with fractions
  - Perform hierarchy of operations
- Decimals
  - Read and write decimal word names
  - Identify place value
  - Round decimal notation
  - Add and subtract decimal notation
  - Multiply decimal notation

- Divide decimal notation
    - Convert between fraction notation and decimal notation
    - Solve application problems with decimal notation
    - Perform hierarchy of operations
- Ratios and Proportions
    - Define ratios and rates
    - Simplify ratios in fraction form
    - Find unit rates
    - Solve a proportion using cross products
    - Solve application problems involving proportions
- Percentages
    - Convert between percent and decimal notation
    - Convert between percent and fraction notation
    - Solve basic percent problems
    - Solve application problems involving percentages
- Measurement and Conversion
    - Convert measurements of length, weight/mass, and capacity within the American system
    - Convert measurements of length, weight/mass, and capacity within the Metric system
    - Convert measurements between the American and Metric systems
    - Solve application problems involving measurement
- Geometric Concepts
    - Identify basic two and three dimensional figures
    - Find the perimeter of polygons and circumference of circles
    - Find the area of polygons and circles
    - Solve for volume of three-dimensional objects
    - Identify and solve problems involving angles.
- Technical Applications
    - Apply mathematical concepts of varied occupational applications
- Basic Statistics
    - Solve applications involving circle, bar, and line graphs
    - Solve applications involving frequency distributions and histograms
    - Find the mean, weighted mean, median, and mode for a set of data

Grading Scale - Lanier Technical College Policy

(See MATH 0090A Syllabus)

Course Grading Method and Specific Requirements

(See MATH 0090A Syllabus)

Course Evaluation/Grading Procedures (Tests, Homework Quizzes, and Exams):

Quizzes	15%
Tests	60%
Final Exam	25%
Final Grade	100%

A grade of 'C' or better (70 overall average or above) is required for some programs. Check with your program advisor.

Course Specific Information

MATH 1012A, Foundations of Mathematics, is delivered as a co-requisite class with MATH 0090A. Students must pass both MATH 1012A and MATH 0090A to advance in their program. Students who fail a quiz or exam will be scheduled for a tutoring session in the Student Success Center.

MATH 0090B SYLLABUS

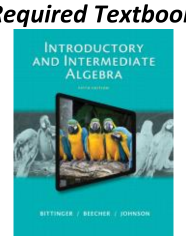
SPRING 2016LEARNING SUPPORT MATH WITH ALGEBRAIC CONCEPTS CRN: 30126

Contact Hours:	3	**Campus:**	[campus]	**Course Type:**	A
Credit Hours:	3	**Location:**	[room num]	**Total Class Minutes:**	2250
Prerequisite(s):	**Appropriate placement test score**	**Class Days:**	[meeting days]	**Minutes in Class:**	2250
Co-requisite(s):	MATH 0090B	**Class Time:**	[Begin – End]	**Minutes Online**	0
				% Online:	0%

Instructor

Instructor:	Susan Baker
Email:	Sbaker2@laniertech.edu
Phone:	678.341.6603
Fax:	678.989.3191
Office:	A156
Office Hours:	1:00 pm – 2:00 pm Monday to Thursday

Required Textbook & Materials



Title:	Introductory and Intermediate Algebra
Edition	5th
Author:	Bittinger, Beecher, Johnson
Publisher:	Pearson
ISBN:	10: 0321951786 13: 9780321951786
Software:	None
Materials:	Notebook, pencil, calculator

Course Description

This course is an in-depth study of basic and intermediate algebra skills, including introduction to real numbers, algebraic expressions, solving linear equations, graphs of linear equations, polynomial operations, polynomial factoring, inequalities, rational expressions and equations, linear graphs, slope, systems of equations, radical expressions and equations, and quadratic equations.

Course Competencies and Student Learning Outcomes

- Introduction to Real Numbers and Algebraic Expressions
    - Add real numbers
    - Subtract real numbers
    - Multiply real numbers
    - Divide real numbers
    - Identify and use the properties of real numbers
    - Simplify algebraic expressions using the order of operations
    - Combine like terms
    - Define absolute value and use in calculations
- Linear Equations and Inequalities
    - Solve linear equations using the addition principle
    - Solve linear equations using the multiplication principle
    - Solve linear equations using the addition and multiplication principles together

  - Solve formulas for an indicated variable
  - Solve applications involving percentages
  - Solve application problems involving direct and inverse variation
  - Solve linear inequalities
  - Solve application problems with linear inequalities
- Graphs of Linear Equations and Linear Inequalities
  - Graph linear equations using intercepts
  - Find the slope of a line given two points, from an equation and in an applied problem
  - Find the slope-intercept equation
  - Graph using the slope and the y-intercept
  - Recognize parallel and perpendicular lines Cognitive Analysis
  - Graph inequalities in two variables
- Systems of Linear Equations
  - Solve systems of equations in two variables using the graphing, substitution, and elimination methods
  - Solve applications problems using systems of equations
  - Solve applications problems involving motion using systems of equations
- Polynomial Operations
  - Use the rules for exponents to simplify expressions
  - Solve applied problems using scientific notation
  - Add and subtract polynomials
  - Multiply and divide polynomials
  - Identify polynomials that are special products
  - Perform operations with polynomials in several variables
- Factoring Polynomials
  - Factor the GCF from any polynomial
  - Factor binomials: difference of squares, sum and difference of cubes
  - Factor trinomials
  - Factor 4-term polynomials
- Rational Expressions and Equations
  - Simplify rational expressions
  - Multiply rational expressions
  - Divide rational expressions
  - Find least common multiples and denominators
  - Add rational expressions
  - Subtract rational expressions
  - Solve rational expressions
  - Solve rational equations
  - Solve application problems using rational equations and proportions
  - Simplify complex rational expressions
- Radical Expressions and Equations
  - Multiply and simplify radical expressions
  - Simplify quotients involving radical expressions
  - Add and subtract radical expressions
  - Solve radical equations
  - Solve applications with right triangles
  - Simplify expressions involving higher roots and rational numbers as exponents
- Quadratic Equations
  - Solve quadratic equations using the principle of zero products
  - Solve quadratic equations using the principle of square roots
  - Solve quadratic equations by completing the square
  - Solve quadratic equations using the quadratic formula

- Solve application problems using quadratic equations
- Graph quadratic equations
- Evaluate and graph functions Cognitive Evaluation
- Determine whether a graph is that of a function
- Solve applied problems involving functions and their graphs

Grading Scale - Lanier Technical College Policy

(See MATH 0090Q Syllabus.)

Course Grading Method and Specific Requirements

(See MATH 0090Q Syllabus)

Course Evaluation/Grading Procedures (Quizzes, Tests, and Final Exam):

Quizzes	15%
Tests	60%
Final Exam	25%
Final Grade	100%

A grade of 'C' or better (70 overall average or above) is required for some programs. Check with your program advisor.

Course Specific Information

MATH 0090B, Learning Support Math with Algebraic Concepts, is delivered as a co-requisite class with MATH 0090Q, Learning Support with Study Skills. Students must pass both MATH 0090B and MATH 0090Q to advance in their program. Students who fail a quiz or exam will be scheduled for a tutoring session in the Student Success Center.

APPENDIX L – SAMPLE SYLLABUS, MATH 0090Q

MATH 0090Q SYLLABUS

SPRING 2016 LEARNING SUPPORT MATH WITH STUDY SKILLS CRN: 30125

Contact Hours:	3	**Campus:**	[campus]	**Course Type:**	A
Credit Hours:	3	**Location:**	[room num]	**Total Class Minutes:**	2250
Prerequisite(s):	**Appropriate placement test score**	**Class Days:**	[meeting days]	**Minutes in Class:**	2250
Co-requisite(s):	MATH 0090B	**Class Time:**	[Begin – End]	**Minutes Online**	0
				% Online:	0%

Instructor

Instructor:	Susan Baker
Email:	Sbaker2@laniertech.edu
Phone:	678.341.6603
Fax:	678.989.3191
Office:	A156
Office Hours:	1:00 pm – 2:00 pm Monday to Thursday

Required Textbook & Materials

Title:	Winning at Math: Your Guide to Learning Mathematics through Successful Study Skills
Edition	6th ed.
Author:	Dr. Paul Nolting
Publisher:	Academic Success Press
ISBN:	978-0-940287-63-1
Software:	NA
Materials:	NA

Course Description

This course is an in-depth study basic and intermediate algebra skills, including introduction to real numbers, algebraic expressions, solving linear equations, graphs of linear equations, polynomial operations, polynomial factoring, inequalities, rational expressions and equations, linear graphs, slope, systems of equations, radical expressions and equations, and quadratic equations, with supplementary instruction in math study skills, reducing math anxiety, learning styles, and time management.

Course Competencies and Student Learning Outcomes

(All competencies and outcomes from MATH 0090B plus the following)

- Math Study Skills
    - Assess and use math learning strengths
    - Improve the memory process
    - Improve listening and note-taking skills
    - Improve reading and homework techniques

    - Improve math test-taking skills
- Overcoming Math Anxiety
    - Describe how math is different and its benefits
    - Manage math anxiety and PTSD
    - Reduce test anxiety
    - Create a positive study environment
    - Manage time
    - Develop a math success plan

Grading Scale - Lanier Technical College Policy

The grading scale is detailed in the Catalog and Student Handbook and listed below for reference. All faculty members follow this scale when assigning grades to reflect a given student's performance in the classroom.

LTC Grading Policy: Academic and grading requirements are established in accordance with state requirements and may vary by program. However, minimum standards for training at Lanier Tech become a permanent record of the school and are available to other schools, state officials, and potential employers with the student's written approval through the Student Services Office.

Grade	**Numerical Equivalent**	**Grade Point**
A	90-100	4
B	80-89	3
C	70-79	2
D	60-69	1
F	0-59	0

Course Grading Method and Specific Requirements

Quizzes/Case Studies/In College Field Trips/Assignments: Quizzes, case studies, in college field trips, and other assignments will cover math related skills and/or material from the *Winning At Math* textbook. Students who are absent the day of a grade will be given a grade of zero (0). Approximately twenty percent of the quiz grades will be dropped.

Final Project: There will be an individual written project and presentation for the final exam at the end of the course. This project is intended to help students understand the significance of math in their programs. **The final project must be presented during your scheduled class time.**
Course Evaluation/Grading Procedures (Quizzes, Tests, Final Project):

Quizzes/Lab/Assignments	75%
Final Project	25%
Final Grade	100%

Course Specific Information

MATH 0090Q, Learning Support Math with Study Skills, is delivered as a co-requisite class with MATH 0090B, Learning Support with Algebraic Concepts. Students must pass both MATH 0090Q and MATH 0090B to advance in their program. Students who fail a quiz or exam will be scheduled for a tutoring session in the Student Success Center.

APPENDIX M – SAMPLE MATH LEARNING SUPPORT ASSESSMENT

MATH 0090B Name ______________________________

Sections 4.1 – 4.6

Test #4

1.When dividing terms with the same base, you should add, subtract, or multiply the exponents. (circle one)

2.When multiplying terms with the same base, you should add, subtract, or multiply the exponents. (circle one)

3.When raising a power to a power, you should add, subtract, or multiply the exponents. (circle one)

4.When a constant (other than zero) is raised to a zero power, the answer is always ____________.

5.When adding or subtracting terms, you should combine exponents or coefficients. (circle one)

6.When multiplying a binomial by a binomial the acronym FOIL is used. What do each of the letters represent?____

7.Express using a positive exponent. $\frac{1}{b^{-4}}$

8.Multiply and simplify. $(2t)^3(2t)^2$

9. Divide and simplify. $\frac{z^9}{z^{14}}$

10.Simplify. Assume d ≠ 0. $(3d^{-3})^2$

11. Simplify. $\left(\frac{t^4}{6}\right)^{-3}$

12.Express the number 0.000722 in scientific notation.

13.Multiply. Write the result using scientific notation. $(5.3 \times 10^4)(6.4 \times 10^{-2})$

14.A thin layer of paint is 7×10^{-7}m thick. In contrast, a coin is 3.01×10^{-3}m thick. How many layers of paint are in a stack that is the height of the coin? Leave your answer in scientific notation. (Hint: set up as a division problem)

15.Classify the following polynomials as a monomial, binomial, trinomial, or none of these.

a) $x^2 - 8x + 16$ ________________________ b) $5x^4 + 7$ ___________________________

16. Using the polynomial below:

$$3x^2 + \frac{4}{5}x + 5$$

Identify the coefficients of each term ______________________

Identify the degree of each term __________________________

17. Collect like terms and then arrange them in descending order.

$2x + 2x + 3x - x^5 - 5x^5$

For #18 – 24 perform the indicated operation. Simplify and leave your answer in descending order.

18. $(x^8 - 5) + (x^8 + 5)$

19. $(-8x + 6) - (x^2 + x - 5)$

20. $2x(-x + 5)$

21. $(x + 4)(x - 4)$

22. $(x^2 + x + 6)(x - 6)$

23. $(x + 6)(x + 9)$

24. $(3x + 5)^2$

25. Using the figure below, write an algebraic expressing of the area when:

a. viewing the figure as a large rectangle ____________________

b. viewing the figure as the sum of 4 smaller rectangles ____________________