

QEP E&H & you

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, ...

$$2 \cdot \cos\left(\frac{\pi}{5}\right) = \phi \quad \text{or} \quad 2 \cdot \sin\left(\frac{\pi}{5}\right) = \sqrt{3 - \phi}$$

Quality Enhancement Plan Quantitative Literacy for the 21st Century

Emory & Henry
COLLEGE

Quantitative Literacy for the 21st Century

The college mathematics curriculum of the twentieth century has served many students well. Those entering scientific fields or planning to teach science benefited from the focus on algebra, logic, and formal systems; those in humanities or social sciences could focus on elementary statistics. More recently, however, campuses have become aware that this traditional curriculum leaves many students unable to cope with the flood of quantitative information that they will encounter in their careers and daily lives in our increasingly data-oriented age. Such students often feel significant math anxiety, a fear that traditional mathematics courses usually do not satisfactorily address. As a result, a sizable number of students postpone a required mathematics course until their junior or senior year, where it is of little use in their college work. Students preparing to teach elementary school, for instance, wrestle with algebra or pre-calculus concepts when they should be focusing on graphing, statistics, or simple budget preparation. Others are often placed in mathematics courses without an assessment of their current skills. Mathematically anxious faculty members avoid quantitative topics that might be enlightening or even central to classroom projects.

After a series of campus conversations that included students, faculty, staff, administrators, and alumni, Emory & Henry College has chosen Quantitative Literacy (QL) as the topic of our Quality Enhancement Plan. QL is the ability to formulate, evaluate, and communicate conclusions and inferences from quantitative information and to use these skills in academic, professional, and personal contexts. The quantitatively literate person employs analytical arguments and reasoning built upon fundamental concepts and skills of mathematics and statistics. This QEP seeks to place quantitative literacy on an equal footing with other basic skills such as writing, oral presentation, and computer literacy. Moving beyond a single required mathematics course, we wish to broaden the quantitative spectrum of topics encountered by the typical Emory & Henry student.

Our plan contains two significant goals related to student learning:

- To improve the mathematical reasoning and quantitative literacy skills of Emory & Henry College students.
- To strengthen the visibility of quantitative literacy as an important component of our students' liberal arts education both in and out of the classroom.

Under each goal, we specify multiple measurable student learning objectives, and we note the people or areas that will be responsible for assessment of each objective. We also note specific implementation strategies for each learning objective, including timelines, leadership responsibilities, and the resources needed to accomplish each objective. The assessment plan is integrated into each student learning objective and into the comprehensive timeline in Section IV (*Implementation of the QEP*).

Some of the specific implementation strategies for the above goals include:

- Workshops for faculty designed to encourage faculty to learn about student development in quantitative areas, to encourage development of appropriate modules within a discipline, and to contribute to a manual for advising related to quantitative literacy.
- Creation of a QL Center, whose director will oversee placement testing, supervise a cadre of student tutors, provide training seminars, and assess the progress of the QL program. This facility will be integrated with the Powell Resource Center, an existing department providing many levels of assistance to students.
- Precise placement examinations to be administered upon matriculation and used for advisement and course selection.
- A quantitative literacy proficiency requirement, including creation and adoption of 100-level quantitative literacy courses.
- Co-curricular seminars and workshops on personal finance and related topics.

We envision a five-year program, beginning the summer following approval of the QEP. The implementation team, serving as a search committee, will lead the search for a director. Interested faculty will attend QL workshops each summer. As a result of the workshops, faculty will be encouraged to develop QL modules and to contribute to a QL manual for the campus. Within three years, we expect curriculum proposals for creating new QL courses or for changing some of the existing mathematics courses to reflect these topics. Assessment will include placement statistics, numbers of students completing the QL requirements, class performance in quantitative areas, use of the QL center, and student course evaluations.

The committed budget for this effort — including director's salary, test instruments, outfitting a QL center, stipends for faculty, computers and software, and the usual office expenditures — is approximately \$450,000 over the five-year period.



Emory & Henry College

Quality Enhancement Plan

Quantitative Literacy for the 21st Century

TABLE OF CONTENTS

Section I. Introduction

- A. Why Quantitative Literacy?
- B. Working Definition of Quantitative Literacy
- C. College Overview
- D. Emory & Henry College Mission and Strategic Plan
- E. Choosing and Developing the Quality Enhancement Plan:
A Descriptive Chronology

Section II. Summary of Major Data Supporting the QEP Committee's Work

- A. A National Movement toward Quantitative Literacy
- B. Review of Best Practices
- C. Institution-Specific Data
 - 1. Table 1. Response to Focus Group Questions 1 and 2
 - 2. Table 2. Response to Focus Group Question 3

Section III. Goals, Objectives, Implementation Strategies, and Assessment

Section IV. Implementation of the QEP

- A. Overview
- B. Proposed Implementation Timeline

Section V. Resources

- A. Personnel
- B. Administrative and Faculty Time
- C. Physical Space
- D. Budget

Section VI. Works Cited

Appendices

- A. Emory & Henry Strategic Plan
- B. Membership of the QEP Committee
- C. Review of the Emory & Henry College Quality Enhancement Plan
- D. Timeline of QEP Development
- E. Documents Used by the QEP Committee
- F. Percentages of Upper-class Students Enrolled in 100-level Statistics and Mathematics Courses, 2000-2005
- G. Survey Results from Online Student Assessment
- H. Proposed Budget for the QEP
- I. Examples of QL Test Questions



I. Introduction

A. Why Quantitative Literacy?

When John Jones and his friend Ann Smith arrived for their first semester at Emory & Henry College, the two English majors scanned the list of required courses. “Should we take the math class now and get it over with?” asked Ann. “No, let’s wait,” counseled John. “If we leave it till our senior year, maybe they’ll change the requirements by that time, and we can get out of it.” Ann hesitated. “Yeah, but I’m not a math person at all,” she said. “If I wait till I’m a senior and I flunk, I’ll be stuck.” “Oh, we can get by with baby math or something,” John replied. “And it doesn’t matter, anyway. We’re English majors. What do we need to know about math?”

At the other end of the registration hall, pre-med student Jim Miller happily signed up for calculus and chemistry. When he got back his first chemistry assignment, however, he was shocked to see that his professor had recommended a tutor: “You seem to have trouble representing data visually,” the professor had written; “you know the equations, but you don’t know what they mean.” Later, when Jim talked to his friend Mary, a sociology major, he was depressed: “I guess I need more help than I thought,” he said. “Me, too,” replied Mary. “Last year, I gave a survey as part of my Sociology of the Family course. When I showed the results to the professor, she said I’d interpreted the data wrong. She recommended another stats class, but I know it won’t do any good. I just don’t have a ‘numbers’ sort of brain.”

Unfortunately, these scenarios occur all too frequently among college students. Not surprisingly, Jeffrey Bennett and William Briggs in *Understanding and Using Mathematics: A Quantitative Reasoning Approach* list “math requires a special brain” as a common misconception about our ability to understand and perform mathematics-based work (4). Even those who plan careers in fields that require a high degree of mathematical skill often come to class lacking basic knowledge, while humanities and social sciences students too often conclude that quantitative literacy (QL) or numeracy is either irrelevant to them or is beyond them. At Emory & Henry, our surveys suggest that too many students perceive mathematics and quantitative literacy as barriers rather than opportunities. Many social science and humanities majors postpone their mathematics requirements until late in their academic program; many never recognize the importance of such material to their lives beyond a limited career focus.

Yet the range of mathematical and quantitative skills that students need both in their careers and in their lives is wider now than it has been in the past. In fact, the Emory & Henry College mission statement recognizes that students need to “engage...in educational experiences that lead to lives of service, productive careers, and global citizenship.” Full global citizenship in the twenty-first century requires, among other skills, the ability to evaluate the many political and social arguments based on data. By increasing students’ ability to evaluate data-based arguments, improving their mathematical reasoning and quantitative literacy skills, and strengthening the visibility of quantitative literacy as an important component of liberal arts education, our Quality Enhancement Plan (QEP), *Quantitative Literacy for the 21st Century*, will help us meet two signifi-

cant goals of *A Strategic Plan for Emory & Henry College, 2004-2009*. In creating a quantitative learning center, with a professional director, student tutors, and a wide range of QL support services, we move closer to Goal 5 of the strategic plan, which is to “ensure that the quality of Emory & Henry’s student life and academic support programs match its academic program.” As students increase the QL skills that help them in both academics and citizenship, the College meets Goal 4, which is to “develop and implement a comprehensive academic plan that enhances our commitment to social responsibility”

No student, regardless of major or interest, can afford to graduate without becoming quantitatively as well as linguistically literate. Fortunately, quantitative literacy is within the reach of all students. But they need help to get there, help that the college can provide through classes, workshops, tutors, and help centers and by creating a campus climate that supports and encourages numeracy.

B. Working Definition of Quantitative Literacy

Quantitative literacy is the ability to formulate, evaluate, and communicate conclusions and inferences from quantitative information and to use these skills in academic, professional, and personal contexts. The quantitatively literate person employs analytical arguments and reasoning built upon fundamental concepts and skills of mathematics and statistics. Quantitative literacy requires two key sets of skills:

1. **Mathematical Skills** — Mathematical skills form the foundation for the development, use, and mastery of quantitative skills. Thus, a person who is quantitatively literate should be able to
 - a. *Perform basic computational and arithmetic operations*, both with and without using a calculator or similar device.
 - b. *Perform basic algebraic and/or logical operations that involve various levels of abstraction*. Such operations include
 - translating a problem into a mathematical model or algebraic equation
 - using variables to represent concepts
 - solving simple algebraic equations

2. **Quantitative Skills** — Quantitatively literate persons also should be able to
 - a. *Demonstrate basic problem solving skills*. Such skills include
 - defining a problem
 - devising a plan to solve the problem
 - formulating a mathematical relationship that relates the quantities of interest
 - analyzing and evaluating proposed and alternative solutions
 - recognizing unwarranted assumptions
 - checking solutions against appropriate empirical data and/or initial conditions
 - b. *Apply quantitative techniques and analytical skills to “real world” problems*. This application includes
 - structuring arguments based on data
 - demonstrating inductive and deductive reasoning skills related to data
 - weighing evidence, analyzing data
 - reading and interpreting graphs, charts, and tables
 - interpreting statistical and mathematical information and putting such information to meaningful use in a given context

- identifying which problems may be solved using quantitative techniques and which are better addressed using other methods.

Finally, a person who is quantitatively literate should not fear quantitative techniques, but should have the knowledge and confidence to evaluate and use such techniques when appropriate.

(Material in this definition is adapted from the Dartmouth Initiative, Michigan State University's Quantitative Literacy Task Force Final Report, and comments from faculty and staff at Emory & Henry College.)

C. College Overview

Founded in 1836, Emory & Henry College is a Methodist-affiliated liberal arts school located in the mountains of southwestern Virginia. Named for the Christian leadership of Bishop John Emory and the statesmanship of patriot Patrick Henry, Emory & Henry enrolls approximately 1,000 students per year. Although drawn primarily from the local Appalachian region of southern Virginia and eastern Tennessee, the student body represents a mix of ages and backgrounds from more than twenty-five states and several foreign countries. These students are served by more than seventy full-time faculty, providing a faculty-student ratio of one to eleven. About two-thirds of the students live on the 330-acre rural campus; one third are commuters. Many are first-generation college students, while others represent the third and even fourth generations of their families to attend Emory & Henry.

Once enrolled, students select a specialized program of study from twenty-one academic departments and a number of interdisciplinary majors. Along with traditional disciplines such as English, languages, religion, political science, biology, and chemistry, the college offers programs in international studies, athletic training, Appalachian studies, public policy and community service, and environmental studies, among others. The most popular fields are education (a contextual and support area), business (management with accounting), mass communications, and psychology. Students supplement a major with either a minor or an interdisciplinary contextual and support area; they also complete a general studies curriculum that provides a solid liberal arts foundation for their specialized programs. In addition to course requirements, General Studies includes the Lyceum Program, a schedule of cultural events that encourages students to experience the liberal arts through musical and theatrical performances, dance recitals, lectures, art exhibits, films, debates, and fiction and poetry readings.

Extracurricular activities are varied, ranging from intramural sports and the Outdoor Adventure Program to Student Government and service organizations such as AmeriCorps and Habitat for Humanity. In athletics, the college participates in the Old Dominion Athletic Conference (ODAC), part of the NCAA Division III. Emory & Henry offers seven men's and seven women's varsity teams.

The academic program is administered by the Dean of Faculty, who oversees

- Library / Information Technology Services
- Powell Learning Resource Center
 - o Academic Support Services
 - o Career Services
 - o Counseling Services
 - o Advising and First-Year Student Registration
 - o First-year Experience Program and General Studies 100
 - o Academic Early Warning Program
- Office of the Registrar
- Five Academic Divisions —
 - o Education / Physical Education

- o Humanities, which includes
 - English
 - Languages
 - Philosophy
 - Religion
- o Natural Sciences, which includes
 - Biology
 - Chemistry
 - Environmental Science (Science Track)
 - Mathematics and Computer Science / Computer Information Management
 - Physics
 - Psychology
- o Social Sciences, which includes
 - Business
 - Economics
 - Environmental Studies (Policy Track)
 - Geography
 - History
 - International Studies
 - Mass Communications
 - Political Science
 - Public Policy and Community Service
 - Sociology / Anthropology
- o Visual and Performing Arts, which includes
 - Art
 - Music
 - Theatre

Each academic division is directed by a faculty member who serves as division chair. The five chairs, along with the editor of college publications, comprise the Academic Council, which meets weekly with the Dean of Faculty.

D. Emory & Henry College Mission and Strategic Plan

In the fall of 2005, the Emory & Henry college community and the Board of Trustees reaffirmed the College's mission statement:

"Increase in Excellence," the historic motto of Emory & Henry College, expresses our intention to be a learning community that moves toward fulfilling every student's potential. Bishop John EMORY, along with the founders of Methodism, symbolizes our belief in the union of faith and learning, while Governor Patrick HENRY symbolizes our commitment to freedom and civic virtue.

We affirm the Christian faith as our spiritual and moral heritage and encourage all our members to grow in faith as they grow in knowledge. We believe in the worth of each person's religious and cultural heritage, inasmuch as that heritage leads to service to others in our region and the larger world.

We affirm the liberal arts as our intellectual foundation and believe that excellence results when everyone actively participates in the educational process. We challenge all persons to confront historical and contemporary ideas and issues and to develop the ability to think critically about all areas of human experience. These traditions provide the context for our pursuit of excellence, as we engage a diverse group of well-qualified men and women in educational experiences that lead to lives of service, productive careers, and global citizenship.

The task of shaping the general aims of the mission statement into specific goals for the College falls first to the Strategic Planning and Priorities Committee (SPPC), established in its current form in 1997. The SPPC consists of the following representatives of the campus community:

President	Dean of Faculty
Dean of Students	Dean of Admissions
Chief Financial Officer	Director, Library and IT
Chief Development Officer	Director of Public Relations
Academic Division Chairs	Athletic Director
Director of Assessment	Director of General Education

In 2002-2003, the SPPC, in consultation with campus constituencies (students, faculty, staff, alumni), created the College's current Strategic Plan, officially adopted by the Board of Trustees in November, 2003. The Strategic Plan offers five main goals that focus on major areas of interest to the institution: recruitment, finances, physical plant, academic programs, and student life.

Goal 1: Recruit and retain up to 1,100 students.

Goal 2: Generate the financial resource necessary to support existing programs at a competitive level.

Goal 3: Develop and maintain a physical environment that supports existing programs and an increased enrollment as efficiently and effectively as possible.

Goal 4: Develop and implement a comprehensive academic plan that enhances our commitment to social responsibility through informed discussion and action in regard to public issues.

Goal 5: Ensure that the quality of Emory & Henry's student life and academic support programs match its academic program by promoting broad-based engagement by all students in co-curricular activities, especially those that place an emphasis on citizenship, leadership, and social responsibility.

(A full copy of the Strategic Plan can be found in Appendix A.)

E. Choosing and Developing the Quality Enhancement Plan: A Descriptive Chronology

The faculty and administrators of Emory & Henry College agree with the statement of the Southern Association of Colleges and Schools in its *Principles of Accreditation* that "student learning is at the heart of the mission of all institutions of higher learning." The Quality Enhancement Plan (QEP) allows us the chance to create and implement a long-term program to improve students' educational experience at Emory & Henry.

Summer/Fall, 2005

Planning for the QEP began during the summer of 2005. In conjunction with the campus-wide review of the College's mission statement, we began to focus on ways that we could use the QEP to improve student learning in the context of both the general mission and the specific goals of the Strategic Plan. As a liberal arts school, Emory & Henry faces the important challenge of maintaining the quality and benefits of a traditional liberal education while at the same time assuring that students' experiences in college prepare them for the vocational, technological, and

ethical demands of life in the twenty-first century. The QEP provides an opportunity to meet both these goals.

As our enrollment increases and diversifies (in keeping with Goal 1 of the Strategic Plan), so do our students' academic and personal needs. We began our search for the most effective QEP with these needs — and the requirements/strengths of modern liberal arts education — in mind.

Our initial planning involved gathering information from various groups concerning their views on our students' most significant needs and on the ways that Emory & Henry might be best suited to meet these needs. During September 2005, members of the SPPC canvassed their particular constituencies. Each division chair met with the faculty members in their divisions, and administrators and department heads solicited ideas from their offices. We also assessed student opinion by means of data we collected by administering two nationally-normed student surveys: the Cooperative Institutional Research Program (CIRP), given to first-year students, and the 2003 National Survey on Student Engagement (NSSE). (*See section on Institution-Specific Data [p.18] for further information on these instruments.*)

On October 10, 2005, the SPPC met to hear the results of these meetings and surveys. Many groups submitted written reports; others presented their findings orally. A consensus emerged to the extent that we all wanted a QEP that would relate curricular academic requirements to knowledge that students will need outside the classroom. Two specific proposals gained the most support: the Natural Sciences Division's suggestion of a quantitative literacy QEP, and the Humanities and Visual/Performing Arts Division's idea for a re-evaluation and potential revision of our current General Studies curriculum.

Both proposals focused on ways that our academic programs could be used to increase student learning and to provide practical content, critical thinking skills, and ethical strategies that students could apply to their lives after graduation. The three divisions were asked to revisit their constituencies and prepare expanded plans to be presented to the SPPC at its November meeting.

At this meeting, each group made a case for its particular proposal. After listening to the presentations, the SPPC members concluded that, although both proposals had merit and would make effective QEPs, the plan to address and improve quantitative skills would best suit our students' current needs. The proposal for a Quantitative Learning Center (QLC) was particularly attractive, since the College has a tradition of establishing focused learning centers to address particular needs. The Powell Resource Center, for instance, provides academic, counseling, and career services, while the Writing Center supports academic writing across disciplines. At this early stage, we envisioned a QLC that could follow the model of the Writing Center, providing services ranging from help with individual student assignments to broad-based placement tests and assessments of campus-wide QL requirements.

The vote for the quantitative literacy proposal was unanimous.

Before work could begin on the QL plan, two significant changes occurred in the college's administration: our president, Dr. Thomas Morris, was asked to serve as the state Secretary of Education in the cabinet of the newly-elected Virginia governor, and our Dean of Faculty, Dr. Paul Blaney, decided to return to classroom teaching. Replacing Dr. Morris was Dr. Rosalind Reichard, who officially joined the College on August 7, 2006. Replacing Dr. Blaney was Dr. Chris Qualls, associate professor of psychology.

Spring, 2006

In January, 2006, a subcommittee of the Strategic Planning and Priorities Committee organized the QEP leadership team, herein called the QEP Committee. Dr. Qualls appointed two co-chairs of the QEP Committee: Dr. James Warden, associate professor of physics and chair of the Natural Sciences Division, and Ms. Meighan Sharp, assistant dean for academic affairs and director of the Powell Resource Center. As one of the authors of the original quantitative literacy proposal, Dr. Warden was a logical choice for chair, as was Ms. Sharp, whose wide familiarity with students' academic concerns and whose oversight of the academic programs of all first-year students make her well-suited to assessing a broad range of student needs.

Within a few days of their appointments, the co-chairs had contacted the full QEP committee: one member from each academic division, two student members, one alumni representative, and five staff members representing the student life office, the business office, the development office, the library, and the admissions office. The Dean of Faculty and the faculty representative to the Board of Trustees served *ex-officio*. (A full list of committee members is in Appendix B.) The committee selection was based on our desire for representation from both on- and off-campus constituencies; our goal was to allow every interested party the chance to help shape the QEP. While not every campus member was expected to participate in implementing the final plan, the overall design allowed for the insight and experience of a wide variety of contributors. In addition to each major academic division, the committee included representatives from the main administrative and academic offices, from alumni, and from the current student body.

At its first meeting on January 27, the committee approved a detailed timeline for soliciting opinions and ideas from a wide campus constituency, developing the drafts, and completing the QEP in time for the SACS campus visit in February 2007. The committee met several times during the spring semester. An Editing Subcommittee, comprised of Dr. Warden, Ms. Sharp, and Dr. Kathleen Chamberlain (English) prepared a preliminary draft of the QEP shared first with the committee and then with the campus at large; this Draft 1 was completed in March. Using suggestions and additions from the campus community, Draft 1, Version 2 was completed on April 14.

Summer/Fall 2006

During the summer of 2006, committee members further refined the document, leading to Draft 2, completed September 22, and shared with the campus community for additional responses. In October 2006, the committee solicited additional feedback from the campus community and sent the proposal to Dr. Caren Diefenderfer, chair of the mathematics department at Hollins University and known for her work in the field of quantitative reasoning, for her comments (see Appendix C Review of the Emory & Henry College Quality Enhancement Plan *for the full report*). The third and final draft was completed by November 15 and sent to the publications director for design and formatting. After being proofread by the QEP Committee and selected faculty and staff in December 2006, the final version was sent to SACS in preparation for our on-site review in February 2007. A complete description of the timeline for QEP development, including a log of activities completed by the committee, is in Appendix D. (Copies of all documents used by the QEP Committee are available in Appendix E.)



II. Summary of Major Data Supporting the Work of the QEP Committee

A. A National Movement toward Quantitative Literacy

The terms *quantitative literacy* or *numeracy* may be defined by many in the academy as demonstrating mastery of only the most basic computational skills — skills that should be adequately developed prior to college. However, national research indicates that quantitative literacy goes beyond mere facility with numbers. Lynn Steen¹, a mathematician and proponent of quantitative literacy, suggests that developing quantitative literacy is akin to developing writing skills: “Although the principles of grammar and organization are more or less established during school-level instruction, students’ sophistication in writing continues to grow through college and well beyond” (*Achieving Quantitative Literacy* 25-26). At the college level, educators often address the basics of college writing with an introductory composition course, and then continue to integrate more complex writing requirements in discipline-specific courses. Steen states “[Quantitative literacy] skills involve sophisticated reasoning with elementary mathematics more often than elementary reasoning with sophisticated mathematics” (10). Students who are quantitatively literate will demonstrate proficiency in reading, understanding, and using a wide range of quantitative data in academic, personal, and professional settings.

The need to work toward quantitative literacy or numeracy at all levels is well-documented. The recently published findings from *The National Survey of America’s College Students* sponsored by the Pew Charitable Trusts and measuring the prose, document, and quantitative literacy of college students nearing graduation, further support the need to address quantitative literacy at the college level. The study shows that, of the three types of literacy measured, U.S. college students struggle most with quantitative literacy. A full 20% of four-year college students completing the survey showed “*Basic* or below” quantitative literacy, a significantly higher percentage than those who scored “*Basic* or below” in prose or document literacy (Baer, Cook, and Baldi 5). Although the authors point out that American college students are not decreasing in their levels of literacy as compared to past generations, the demands of modern society with regard to the need for quantitative literacy have significantly increased (Baer, Cook, and Baldi 5). Robert Orill, Executive Director of the National Council on Education and the Disciplines (NCED), reflects, “Few would disagree that, with the arrival of the computer age, the enviroing conditions that must be addressed in arriving at a definition of numeracy are undergoing rapid and often bewildering change....[W]e live in a society ‘awash in numbers’ and ‘drenched with data’” (cited in Steen, *Mathematics and Democracy* xv).

¹The author/editor of four books and numerous articles on QL, Dr. Steen received his Ph.D. in mathematics from the Massachusetts Institute of Technology. He is now Professor of Mathematics at St. Olaf College, where he has taught since 1965. Dr. Steen is also Fellow of the American Association for the Advancement of Science and a former Executive Director of the Mathematical Science Education Board of the National Research Council.

Indeed, the Association of American Colleges and Universities (AAC&U) in their 2005 report *Liberal Education Outcomes* cites the need for quantitative literacy as one of the “key outcomes that all students, regardless of major or academic background, should achieve during undergraduate study” (2). However, nationally, only 44% of faculty responding to the 2004 Faculty Survey of Student Engagement (FSSE) reported that they structure their courses so that students at their institutions have opportunities to “analyze quantitative problems ‘very much’ or ‘quite a bit’” (cited in Association of American Colleges and Universities 5). Recently, the corresponding *National Survey of Student Engagement* (NSSE) added similar questions to measure students’ perceptions of the extent to which they are engaging in quantitative work at the college level.

Lynn Steen’s *Achieving Quantitative Literacy: an Urgent Challenge for Higher Education* is a recent work on quantitative literacy and a synopsis of the major ideas from a national forum on the topic. Five findings on quantitative literacy emerged from the Forum:

Finding 1. Preparation: Most students finish their education ill-prepared for the quantitative demands of informed living.

Finding 2. Awareness: The increasing importance of quantitative literacy is not sufficiently recognized by the public or by educational, political, and policy leaders.

Finding 3. Benchmarks: The lack of agreement on QL expectations at different levels of education makes it difficult to establish effective programs for QL education.

Finding 4. Assessment: QL is largely absent from our current systems of assessment and accountability.

Finding 5. Professional Support: Faculty in all disciplines need significant professional support in order for them to enhance the role of quantitative literacy in their courses (10-11).

These findings suggest areas that need to be addressed for any higher education institution grappling with the best way to increase quantitative literacy in its students.

B. Review of Best Practices

While reviewing the national literature, the Emory & Henry QEP research team (a sub-committee of the QEP Committee) found a broad range of institutions that had implemented some form of a quantitative literacy program. The team was especially interested in colleges that shared traits with Emory & Henry; in particular, the research group wanted to know about programs at smaller liberal arts colleges. Based both on demographic traits and on the possibility of creating a similar program at Emory & Henry, the researchers identified QL programs at Hamilton College, Hollins University, Skidmore College, and Wellesley College as worthy of additional review. Three of these four colleges are substantially more selective than Emory & Henry, but all offer insight into the best practices of quantitative literacy or reasoning programs at the college level.

We found several best practices that Emory & Henry should consider adopting.

First, all four programs have implemented a quantitative literacy or reasoning assessment tool that students complete soon after they arrive on campus. (*See sample QL questions in appendix G.*) Students need to pass the exam at a designated level to demonstrate proficiency. At three of the colleges, students who do not meet the

proficiency level are then assigned to an introductory quantitative reasoning course that they must complete sometime in the first two years of college. The fourth institution assigns students to a non-credit tutorial that they must complete prior to retaking the exam. Some of the programs refer to this first encounter with quantitative literacy as the “basic skills” component.

Next, all four institutions require that students complete an upper-level course designated as having a quantitative component. The colleges have handled this requirement in various ways, but most appear to have set the parameters for quantitative projects within the courses and then encouraged interested faculty to design or re-design courses to meet the quantitative requirement. Students must complete both the basic skills component and the discipline-specific course to fulfill the college requirement.

To support the quantitative literacy or reasoning requirement on their campuses, Hollins University, Hamilton College, and Wellesley College have a designated space that serves as the quantitative literacy center; Skidmore does not. At Hollins, Hamilton, and Wellesley, the quantitative centers house a tutoring program, staff support for faculty and student development, and other curricular and pedagogical resources, although Wellesley’s QR program is under the auspices of their Center for Teaching and Learning.

Finally, in email correspondence with three of the four colleges, faculty or staff responsible for the quantitative literacy component identified “assessment” as an issue that requires careful attention. Respondents indicated that they felt the success of their programs was “hard to quantify” (O’Neill) or that they “had not done enough [with assessment]” (Effinger).

These best practices are further supported by a publication of the Mathematical Association of America (MAA), *Quantitative Reasoning for College Graduates: A Complement to the Standards*. In this publication, the Subcommittee on Quantitative Literacy Requirements list four conclusions about quantitative literacy at the undergraduate level:

Conclusion 1. Colleges and universities should treat quantitative literacy as a thoroughly legitimate and even necessary goal for baccalaureate graduates.

Conclusion 2. Colleges and universities should expect every college graduate to be able to apply simple mathematical methods to the solution of real-world problems.

Conclusion 3. Colleges and universities should devise and establish quantitative literacy programs each consisting of a foundation experience and a continuation experience, and mathematics departments should provide leadership in the development of such programs.

Conclusion 4. Colleges and universities should accept responsibility for overseeing their quantitative literacy programs through regular assessments (1-3).

Fortunately, Hollins University (Emory & Henry’s neighbor in Southwest Virginia) was chosen as a pilot site for a National Science Foundation grant, “The Development of Assessment Instruments for the Study of Quantitative Literacy” (Diefenderfer et al. 3). Hollins is also a member of the widely-recognized National Numeracy Project. The QEP research team suggested that the proximity of Hollins University, and its similarity in terms of selectivity and size, would make the institution a good resource for Emory & Henry as it implements its QEP. In an earlier, approved NSF grant proposal for Hollins University’s initial quantitative reasoning program, the authors of the grant suggest that “the QL program at [Hollins] will provide a model to follow for other liberal arts universities, especially those accredited by the Southern Association of Colleges and Schools (SACS)” (Diefenderfer and Hammer 1).

C. Institution-Specific Data

The QEP Committee gathered institution-specific data concurrently with the review of national literature and best practices. Data specific to Emory & Henry College take three forms: Information from nationally-normed instruments; information from college records regarding math class enrollment patterns; and qualitative and quantitative data gathered during the QEP development process from all major constituent groups, including current students, faculty, staff, and alumni.

Nationally-normed instruments: Emory & Henry College first-year students have completed the Cooperative Institutional Research Program (CIRP) freshman survey — the “largest and oldest empirical study of higher education”— since its inception in 1966. The CIRP institutional profile that is generated from survey results provides detailed information about the demographics, preparedness, and beliefs of incoming first-year students. The CIRP asks three questions related to math ability, two of which are particularly useful for assessing the quantitative needs of Emory & Henry students: “Have you had any special tutoring or remedial work in mathematics?” and “Do you feel you will need any special tutoring or remedial work in mathematics?”

For the first year class of fall, 2005, a significantly higher percentage of respondents indicated that they had both *had* tutoring or remedial work in mathematics and would *need* tutoring or remedial work in mathematics while at college than in any other subject (English, reading, social studies, science, foreign language, or writing). 15% of respondents indicated that they had had special tutoring or remedial work in mathematics prior to attending Emory & Henry, and 22.1% anticipated needing additional help in mathematics while at college. Students’ responses for the other academic areas were significantly lower. The next most frequent response for areas in which students had sought tutoring prior to college was in the area of foreign languages (5.2%), while the next most frequent response for anticipated need for tutoring in college was in writing (11.9%). (Cooperative Institutional Research Program 5, 9). Such responses indicate that incoming students perceive themselves to be less prepared in mathematics than other subjects and that they may feel more anxiety about succeeding in mathematics than in other subjects.

Information from college records: A review of enrollment patterns for 100-level mathematics and statistics courses revealed that over 40% of students enrolled in statistics courses over the past five years were students at the junior or senior level. A substantially smaller percentage of juniors and seniors enrolled in other 100-level math classes. (*A complete table with enrollment patterns in 100-level math courses may be found in Appendix F.*) In general, these data lead us to suspect that Emory & Henry students who do not need to take math in the first two years as pre-requisites for other courses are waiting to fulfill the math requirement until they are juniors or seniors. The practice of waiting until late in one’s college career to take a quantitative course prevents these students from utilizing the quantitative skills they would have learned in these courses to enrich their overall undergraduate education.

Qualitative and quantitative data gathered during QEP development process: One of the benefits of studying or working at a small college is the opportunity to be involved in important decisions about student learning. The QEP Committee decided to tap into faculty, staff, and student enthusiasm for involvement by promoting a series of campus conversations about quantitative literacy at Emory & Henry. The Committee was pleased with the high participation rate in the sixteen focus groups that met during February, 2006. Close to 90% of full-time faculty and 35% of full-time staff participated in the campus discussions. When it became clear that most students’ busy schedules would prevent them from attending a focus group, the student subcommittee worked with the college to create an online survey measuring students’ perceived needs for quantitative literacy. Approximately 30% of the student body participated in the survey. (*See complete survey results in Appendix G.*)

The tables below summarize information gathered from faculty division meetings, staff luncheons, and student focus groups. Table 1 summarizes answers to the first two questions asked by the focus group moderators, which relate to quantitative issues or needs observed or experienced at Emory & Henry. Table 2 summarizes the

possible solutions generated by the focus groups (the questions asked are noted in at the top of each table). The column titled “# Groups” indicates the number of focus groups that mentioned the listed issue in their responses.

Table 1. Response to Focus Group Questions 1 and 2

Question #1:

Faculty/Staff: What types of quantitative skills do you think are important for students to know in your discipline? In general?

Students: What types of quantitative reasoning skills do you think are important for you to learn while you’re in college (or before you graduate)?

Question #2:

Faculty/Staff: What types of problems have you encountered or observed when you’ve discussed/tried to use quantitative skills in the classroom?

Students: Where in your college experience have you struggled the most with quantitative reasoning?

Major Category	Sub-Topics Discussed or Noted in Focus Groups	# Groups	Division
Mathematical Skills (Academic and Professional)			
	Basic statistics: computing, evaluating, understanding material in context	4	
	Graphs: read, create, interpret, and draw conclusions	4	
	Basic algebra: setting up equations, calculate ratios/proportions	4	
	Skills for PRAXIS, GRE, and other standardized tests	4	
	Discipline specific quantitative skills (varies)	3	
	Charts: read, create, interpret, and draw conclusions	3	
	Critical thinking: interpreting data (and more generally)	2	
	Timelines: read, create, interpret, and draw conclusions	2	
	Understanding difference between measured and pure numbers	1	NS
	Basic geometry: measurement skills	1	VPA
	Excel spreadsheets: use and understand	1	VPA
	Read and interpret cross tabs (cross classification tables)	1	SS
	Understanding independent and dependent variables	1	SS
	Understand basic concepts of scientific experimentation	1	SS
Interpret Research (Academic)			
	Interpret research in a variety of settings/disciplines	3	
	Understand logical and quantitative reasoning	3	
	Read, interpret, and evaluate logic of a theoretical essay	2	
	Dissect and evaluate theories, method, and methodology	1	SS
	Understand diff. between quantitative and qualitative methods	1	SS

Apply Quantitative Techniques (Academic and Professional)

Draw conclusions and make inferences about graphs, charts, tables (including reading and interpreting polls)	5	
Apply equations to specific situations	4	
Understand quantitative aspects of organizational management	3	
Understand relationship of numbers to context	1	SS

Personal Quantitative Skills

Personal finance: balancing a checkbook, figuring interest rates, understanding credit and debt, investing, insurance budgeting, currency conversion, time and timecards, understanding financial aid (packages, loans, interest)	8	
Academic: calculating grades, GPA, understanding distribution of points on a test or assignment	4	

NOTES: # **Groups** indicates the number of individual focus groups that noted the issue as an area of concern
Division (SS, NS, VPA, EDUC, HUM) is noted if only one division mentioned the topic

Table 2. Response to Focus Group Question 3

Question #3:

Faculty, Staff, and Students: What do you think the college could do to deal with some of the issues you've described? Follow-up: Given adequate resources, what possible solutions would you create?

Suggestions	# Groups
Better advising and placement related to quantitative classes	4
Diagnostic and placement testing	7
Encourage students to take math classes early	4
Emphasize practical applicability/real world applications	6
Establish quantitative learning center	5
Address math "anxiety"	3
Focus on quantitative literacy across the curriculum	4
Focus on personal finance	4
Add a quantitative literacy component to GNST 100	4

NOTES: # **Groups** indicates the number of individual focus groups that noted the issue as an area of concern

Alumni Data: Information from alumni also suggests the need to encourage true quantitative literacy among Emory & Henry students. For example, the 2001 alumni survey conducted by the Spencer Foundation asked Emory & Henry alumni of the 1970s, 1980s, and 1990s about the extent to which their college experience assisted them in applying mathematics and statistics. Thirty-seven percent of the alumni who responded reported that their college experience helped them "little" or "not at all" in applying mathematics and statistics (Pascarella, *et. al.*, *Appalachian*).

Additionally, forty-two alumni shared their thoughts on quantitative literacy through the alumni listserv. Alumni who responded to a query on the E&H Alumni Listserv during the data gathering process emphatically reinforced the need for students to master practical quantitative skills, especially skills based in statistics and personal finance. Many respondents indicated that they use some form of statistics or personal finance in complex ways nearly every day in their professional and personal lives.

One alumnus wrote, *"I have been surprised how frequently I need my math skills... In public administration, the use of data is becoming more and more critical, and I find that data analysis is something that takes more and more of my time and energy... [T]he main point is that statistics is more important to my profession than I ever would have imagined. I think the class I took treated it as important for researchers primarily, but management of almost any program or service, takes sophistication in understanding and using data."*



III. Goals, Objectives, Implementation Strategies, and Assessment

The goals, objectives, implementation strategies, and assessment plan for Emory & Henry College’s Quality Enhancement Plan flow from our definition of quantitative literacy in Section IB of this document (p. 4-5); from our research of best practices in quantitative literacy; from the data gathered in campus focus groups and forums; and from our desire to better prepare Emory & Henry students for active citizenship in a world that demands increasing use of mathematical reasoning and the skills associated with quantitative literacy.

The section below outlines our two major goals, five student learning objectives, and multiple implementation strategies for ensuring that we meet our stated objectives for student learning. Each student learning objective a) includes our plans for measuring and assessing the goal and b) names a person who will be responsible for coordinating the assessment. In each implementation strategy, we identify a) the date of completion, b) the person and/or department responsible for implementing the strategy, and c) necessary resources. In Section IV, we provide a detailed five-year timeline for implementation of our QEP; the dates listed below refer to the timeline in Section IV. In Section V, we provide more detailed information about the resources noted below, including the personnel, physical space, and budget needed for enacting our quality enhancement plan.

Goal I: To improve the mathematical reasoning and quantitative literacy skills of Emory & Henry College students.

Student Learning Objective IA (Mathematical Skills): Students will demonstrate the ability to perform basic computational and algebraic operations by the end of their second year at E&H.

Measurement/assessment: Beginning with the cohort of students entering E&H in the fall of 2010, 100% of students will complete or transfer in credit for a 100-level mathematics course with a grade of C- or better by the end of their second year. As with other college courses, students may also use appropriate AP credit or dual enrollment credit (as designated by the Office of the Registrar) to meet this requirement. We will generate a report on the percentage of students achieving this standard using student academic records and Datatel.

People/areas responsible for assessment: Director of Quantitative Learning Center (QLC) and Registrar’s Office.

Student Learning Objective IB (Quantitative Skills): Students will demonstrate fundamental problem solving skills and apply quantitative techniques and analytical skills to real-world problems.

Measurement/assessment: Beginning with the cohort of students entering E&H in the fall of 2010, 100% of students will meet a quantitative literacy requirement by the end of their second year either by passing a proficiency test with a score of 70% or better or by completing a new 100-level quantitative literacy course with a grade of C minus or better. We will track the percentage of successful students by creating a database of proficiency assessment scores and/or using student academic records from Datatel.

People/areas responsible for assessment: Director of QLC and Registrar's Office

Student Learning Objective IC (Standardized Tests): Students who take standardized tests such as the PRAXIS (for teacher certification) or the GRE (for graduate school admittance) will show improved performance on the mathematical/quantitative sections of these tests.

Measurement/assessment: We will collect baseline data from 2008-2010. We will set a specific assessment goal for the cohort of students entering E&H in the fall of 2010 after evaluating the baseline data.

People/areas responsible for assessment: Director of QLC, Education Department, and individual students reporting scores.

Implementation Strategies for Student Learning Objectives IA, IB, and IC:

- **Create a quantitative learning center (QLC)** — including appointing a faculty and staff implementation team, acquiring space for the QLC, and hiring a Director of the QLC. The Director of the QLC and the implementation team will provide support for student learning and faculty development and will provide campus-wide resources related to quantitative literacy and mathematical reasoning. The implementation team will serve as the hiring committee for the Director of the QLC.

Dates complete:

August 2007 — Appoint faculty and staff implementation team

August 2007 — Designate QLC office space

July 2008 — Hire Director of QLC

Person/area responsible: Dean of Faculty (with assistance of implementation team)

Resources needed: Budget for QLC, including salary for Director and funds for a QL library, instructional software, and equipment; support for Dean of Faculty in the search process; administrative assistance for the QLC center and director; designated space for the QLC (both office space and space for working with students); student work-study funds and training materials for appropriate tutors and supplemental instructors; and additional administrative support for the Powell Resource Center, which will oversee the QLC and its director.

- **Develop and implement a quantitative literacy proficiency requirement, including creation and adoption of 100-level quantitative literacy courses.**

Date complete: May 2010

People/areas responsible: Director of the QLC, faculty and staff implementation team, and E&H faculty members.

Resources needed: Administrative assistance for faculty and Director of QLC; salaries and office space for additional faculty needed to teach any QL classes that result from creating a proficiency requirement.

- **Design or acquire an appropriate instrument for measuring proficiency in quantitative reasoning/literacy that may be used as both a pre- and a post-test.**

Date complete: May 2009 (to allow for selective preliminary testing to examine validity of instrument)

Person/area responsible: Director of the QLC and faculty/staff implementation team.

Resources needed: Funds for instruments (included as part of overall QLC budget).

- **Develop and implement placement testing in mathematical reasoning and quantitative literacy to improve placement of students in appropriate mathematics courses and to obtain baseline data of our students' quantitative abilities.**

Date complete: August 2008 (We will begin preliminary testing and placement to help us examine the validity of the instrument.)

August 2009 (placement implemented for all students)

People/areas responsible: Director of QLC with Department of Mathematics

Resources needed: Funds for instruments (included as part of overall QLC budget); administrative planning time to implement testing program and interpret results; and release time and/or stipends for faculty and staff who work on this project.

- **Investigate instructional software in quantitative literacy and mathematics.**

Date complete: July 2009

Person/area responsible: Director of QLC

Resources needed: Funds for instructional software; administrative planning/research time; and possible funds for travel to institutions using QL software to enhance student learning.

- **Develop and distribute additional training resources for faculty advisors in the areas of mathematics placement and the quantitative literacy proficiency requirement.**

Date complete: July 2009

People/areas responsible: Director of QLC with Asst. Dean of Academic Affairs.

Resources needed: Budget for creating training materials and administrative planning time for planning and implementing new training module.

- **Offer and assess preparation programs for students taking the PRAXIS, GRE, GMAT, LSAT and other tests in preparation for graduate or professional work.**

Date complete: August 2009

People/areas responsible: Director of QLC, Neff Center faculty, staff of Powell Resource Center.

Resources needed: Administrative planning time; budget for creating and/or contracting for test-prep programs; and space for offering the preparation programs.

- **Integrate into the QLC academic support (e.g., tutoring program, instructional software) for quantitative literacy and mathematics.**

Date complete: August 2009

People/areas responsible: Director of QLC, Director of Academic Support, faculty representative from Department of Mathematics.

Resources needed: Training materials for tutors; student work-study funds for tutors; administrative time for training and working with student and other volunteer tutors.

- **Integrate assessment of Goal I and Student Learning Objectives IA, IB, and IC into all parts of QL program. Overall assessment will occur on an annual basis, culminating in our five-year SACS review in 2012.**

Date complete: 2007-2012

Person/area responsible: Director of QLC

Resources needed: Budget for software to track various indicators of success; administrative and faculty time to review evaluations of programs, data on student learning, and participation by the Emory & Henry community.

Goal II: To strengthen the visibility of quantitative literacy as an important component of our students' liberal arts education both in and out of the classroom.

Student Learning Objective IIA (QL Course Modules): Students will encounter more courses with quantitative elements/modules across the E&H curriculum.

Measurement/assessment: In 2007-2009, we will collect baseline data on the number of quantitative components currently in use in E&H courses. We will set a specific change goal after evaluating the baseline data and goals from other institutions with QL/QR programs and prior to the first faculty workshops (see implementation strategies below). We also will use pre- and post-evaluations of classes incorporating QL modules and/or a comparison of course ratings before and after incorporating QL modules through our ANGEL instructional technology system.

Person/area responsible for assessment: Director of QLC and faculty/staff implementation team.

Student Learning Objective IIB (Co-curricular QL): Students will have the opportunity to increase knowledge of personal finance and related topics through co-curricular seminars and workshops.

Measurement/assessment: In 2007-2009, we will collect baseline data on co-curricular opportunities to increase knowledge of personal finance and related topics. We will set a specific assessment goal after evaluating the baseline data and prior to the first co-curricular opportunities scheduled for 2008-2010 (see implementation strategies below).

Person/area responsible for assessment: Director of QLC and faculty/staff implementation team.

Implementation Strategies for Student Learning Objectives IIA and IIB:

- **Plan and offer ongoing voluntary summer faculty development workshops for implementing QL across the curriculum. Faculty members who attend the workshops will learn about QL and explore ways to incorporate QL modules into existing courses. Provide opportunities for faculty to travel to regional or national training sessions on quantitative literacy so that they can serve as resources for other faculty interested in integrating QL into the curriculum.**

Date complete: starting July 2009

Person/area responsible: Director of QLC

Resources needed: Budget for faculty stipends, facilitator stipends, travel, and workshop materials; administrative planning time for coordinating the workshops; and release time for faculty, if necessary.

- **Begin to offer mini-grants to faculty who want to develop QL modules for existing courses.**

Date complete: starting July 2009

People/areas responsible: Director of QLC and Dean of Faculty

Resources needed: Mellon funds for mini-grants. Administrative time needed for grant review process. ANGEL instructional technology for assessment.

- **Create a QL manual for faculty.** This manual will guide current faculty and will introduce new full-time and adjunct faculty to the campus QL effort. To be updated annually.

Date complete: July 2009 and subsequent years

Person/area responsible: Director of QLC, faculty and staff implementation team, and Assistant Dean of Academic Affairs

Resources Needed: Mellon funds for mini-grants.

- **Plan and offer at least two co-curricular seminars and/or workshops on personal finance and related topics each semester through lyceum events, residence hall programs, and other venues.**

Date complete: Workshops begin in September 2008

People/areas responsible: Director of QLC, Assistant Dean of Students, various faculty and staff as appropriate.

Resources needed: Departmental budgets as appropriate.

- **Integrate assessment of Goal II and Student Learning Objectives IIA and IIB into all parts of QL program. Overall assessment of Goal II will occur on an annual basis, culminating in our five-year SACS review in 2012.**

Date complete: 2008-2012

Person/area responsible: Director of QLC

Resources needed: Budget for software to track various indicators of success; administrative and faculty time to review evaluations of programs, data on student learning, and participation by the Emory & Henry community.



IV. Implementation of the QEP

A. Overview

Together, the two goals of our QEP — improving the mathematical reasoning and quantitative literacy skills of Emory & Henry College students and strengthening the visibility of quantitative literacy as an important component of our students' liberal arts education — comprise a significant and long-term project. We will implement this project over five years, with curricular additions occurring approximately halfway through the period. As the foundation for our QEP, we will establish a quantitative learning center (QLC; as described in Goal I of the previous section.) Section B (below) shows our five-year time line for establishing the center and for taking other necessary steps to develop quantitative literacy across the Emory & Henry campus.

B. Proposed Implementation Timeline

Year One (FY 2007-2008)

- Acquire/confirm temporary office space for the Director of Quantitative Learning Center (QLC) pending planned renovation of Wiley Hall in 2008-2009.
- Hire a full-time director of the QLC, who reports to the Director of the PRC (for administrative work with the QLC)
- Appoint a faculty advisory team for the QLC

Year Two (FY 2008-2009)

- Full-time director of QLC begins work.
- Director visits appropriate QL centers at other institutions
- QLC open in limited capacity in temporary location (pending planned renovation of Wiley Hall)
- Investigate placement experiences of other institutions
- Research, and design or acquire, appropriate instruments to measure proficiency and establish placement in quantitative reasoning/literacy and/or 100-level mathematics courses
- Investigate instructional software in QL and mathematics
- Begin to build library of instructional software and testing instruments
- Plan initial summer faculty development workshops on QL across the curriculum (implement workshops in FY 2009-2010)
- Selective preparation for PRAXIS, GRE, and other examinations offered

Year Three (FY 2009-2010)

- QLC opens in permanent location as part of the Powell Resource Center in renovated space in Wiley Hall

- Implement selective preliminary testing and placement of incoming students to examine validity of placement instrument/s
- Develop manuals and training for faculty advisors related to QL
- Begin faculty training for correct QL/mathematics placement
- Integrate academic support for quantitative literacy and mathematics in the Center
- Recruit and train tutors who will work in the QLC
- Continue to build library of instructional software and testing instruments
- Development and approval of 100-level quantitative literacy courses by faculty
- Adoption by faculty of new quantitative proficiency requirements
- Offer initial voluntary summer faculty development workshops on quantitative literacy across the curriculum
- Begin offer of mini-grants for faculty who wish to develop quantitative skills modules within existing courses
- Offer co-curricular seminars and workshops on personal finance and related topics
- Preparation for PRAXIS, GRE, and other examinations continues

Year Four (FY 2010-2011)

- Implement quantitative literacy proficiency requirement for cohort of students entering in fall 2010
- Develop and implement placement testing in mathematical reasoning and quantitative literacy for all students entering fall 2010
- Begin review of assessment and placement database to aid in placement evaluation
- Instructional software use for academic support is fully implemented
- Continue to offer tutoring in quantitative skills and mathematics
- Second summer of faculty workshops on quantitative literacy across the curriculum
- Continue faculty mini-grants for quantitative skills module development in various disciplines
- Continue to offer co-curricular seminars and workshops on personal finance and related topics
- Preparation for PRAXIS, GRE, and other examinations continues

Year Five (FY 2011-2012)

- Assess initial offering of quantitative literacy courses
- Refinement of placement criteria
- Continue testing, placement, and assessment of placement of all incoming students
- Continue to offer tutoring in quantitative skills and mathematics
- Third summer of faculty workshops on quantitative literacy across the curriculum
- Depending on analysis of course modules development, determine whether continued mini-grant support is needed for course module development.
- Continue to offer co-curricular seminars and workshops on personal finance and related topics
- Preparation for PRAXIS, GRE, and other examinations continues
- Begin analysis of new course modules, placement, and progress toward proficiency requirement and initial report to campus community.
- Formal evaluation of progress toward QEP Goals I and II and all student learning objectives
- Develop formal plan for continuation of QEP and report to SACS
- Continue testing, placement, and assessment of placement of all incoming students
- Continue to offer tutoring in quantitative skills and mathematics
- Continue to offer co-curricular seminars and workshops on personal finance and related topics
- Preparation for PRAXIS, GRE, and other examinations offered



V. Resources

In Section III (Goals, Objectives, Implementation Strategies, and Assessment), we note various resources that we will need to successfully accomplish the goals of our Quality Enhancement Plan. The resources fall into four categories: A) personnel needs; B) administrative and faculty time (release time, planning time, etc.); C) physical space (for the Quantitative Learning Center); and D) budget or funding needs (for running the QLC, providing stipends, etc.). Below we outline in more detail our needs in these four areas, and we note the College's commitment of these resources.

To integrate the Quantitative Learning Center with other academic support services, the QLC will be part of the Powell Resource Center, which currently houses the areas of academic support, career services, counseling services, advising and first-year registration, the academic early warning program, and the first-year experience program (including the required course General Studies 100).

A. Personnel

Director of the Quantitative Learning Center: This full-time, faculty position represents a new budget line. The College has committed funds for this position, as part of the budget for the QLC (see appendix E). The faculty member, who will have release time to serve as the Director of the QLC, will report to the Assistant Dean of Academic Affairs/Director of the Powell Resource Center for daily work with the QLC; for tenure and review purposes, the director will be part of a department and follow the faculty chain of command up to the Dean of Faculty. The QLC Director will have a Ph.D. in mathematics education or a related field and will be familiar with the elements of a successful quantitative literacy program. The position will carry less than a full-time faculty teaching load in QL and mathematics or a related field.

Student Tutors: The director will recruit and train a staff of student tutors for the QLC each semester and work closely with faculty to see that student needs are met. The College has committed funds for tutor stipends, as part of the budget for the QLC (see appendix H).

Administrative Assistant: A part-time (50%) administrative assistant (either new or with newly-designated responsibilities) will be needed to help the Director of the QLC. The College has committed funds for this position, as part of the budget for the QLC (see appendix H).

B. Administrative and Faculty Time

In Section III, we noted people and areas that will take responsibility for assessment tasks and implementation strategies for the QEP. In the case of the Director of the QLC, this time is a part of the new job description; in the case of current faculty and administrators, we will consider their time as a finite resource and plan accordingly. As noted in Section III, we will use a faculty and staff implementation team to assist the Director of the QLC in implementing and assessing the quantitative literacy program. The group will be an ad hoc committee, but will count as a standing committee (in terms of limiting other committee assignments) for those faculty members assigned to it. The implementation team will include faculty members from each division (including a member of the

mathematics department), and staff representatives. The current QEP chairs will serve in a limited capacity, if necessary, as consultants to the implementation team.

The faculty and staff implementation team will serve five functions:

- 1) The team will serve as a search committee for the Director of the QLC.
- 2) The team will investigate and propose curricular change based on the goals and objectives of the QEP.
- 3) The team will serve as an advisory group to the Director of the QLC.
- 4) The team will work to assess the work of the QLC based on the goals and objectives of the QEP.
- 5) The team will report to the faculty and staff on a bi-annual basis.

The team will serve staggered terms of four, three, and two years; the Dean of Faculty will appoint new team members at the end of each term of service. Because of the specific and unique nature of faculty and administrative time as a resource, we are continuing to evaluate the budget needs in this area.

C. Physical Space

Space for the Quantitative Learning Center and its Staff: We want to provide personalized support services in a comfortable atmosphere that will enable students to develop the skills, concepts, and confidence to become more effective learners in QL and mathematics. To that end, we will need to designate appropriate campus space for the QLC. In terms of organization, the QLC will be part of the support system of the Powell Resource Center, which is currently housed with other classrooms and administrative and faculty offices in Wiley Hall. Wiley Hall will undergo a major renovation during the fiscal year 2008-2009, and we will assign appropriate space for the QLC in Wiley Hall as part of the renovation process. Prior to 2009, the office of the Director of the QLC will be on the first floor of Wiley Hall, in space that currently houses adjunct faculty. We anticipate that characteristics of the permanent QLC will include a centralized location in Wiley Hall with ample space for the following:

- An office for the Director of QLC
- A pleasant, non-threatening environment
- Space for computer-based instruction (approximately 6-10 computer stations and a “smartboard” or similar technology)
- Space for individual and small-group tutoring sessions by students, supervised by the director
- A supplementary QL resource library for faculty and students (software, videos, etc.)

The College has committed space for the QLC as part of the Wiley Hall renovation process.

D. Budget

Creating the Quantitative Learning Center, with a full-time staff member and facilities, will require a significant budget. A detailed proposed budget of approximately \$450,000 over five years, beginning in fiscal year 2007-08 and including a director’s salary, instructional materials, instructional facilities, and workshop stipends, is included in Appendix H. The budget was prepared by members of the QEP Committee, the Finance Director, the CFO of the College, and the Development Office. The College will seek grant opportunities to provide at least partial support for the Quantitative Learning Center. The College also included a budget line for the QEP in the 2006-07 fiscal year operating budget for preliminary expenses. (*See Appendix H for Proposed Five-Year Budget for the QEP.*)



Section VI. Works Cited

Works Cited

- Association of American Colleges and Universities. *Liberal Education Outcomes: A Preliminary Report on Student Achievement in College*. Washington, DC, 2005. <<http://www.aacu.org/advocacy/pdfs/LEAP%5FReport%5FFINAL.pdf>>
- Baer, Justin, Andrea Cook, and Stéphane Baldi. *The National Survey of America's College Students: The Literacy of America's College Students*. Washington, DC: American Institutes for Research, 2006. <<http://www.air.org/news/documents/The%20Literacy%20of%20Americas%20College%20Students%5Ffinal%20report.pdf>>
- Bennett, Jeffrey and William Briggs. *Using and Understanding Mathematics: A Quantitative Reasoning Approach*. Boston: Pearson Education, Inc., 2005.
- Brown, Alice. *In the Shadow of the Mountains: A Study of Alumni of Mountain Colleges, Report on Year Two*. Appalachian College Association, 2002. Cooperative Institutional Research Program. *2005 CIRP Institutional Profile: Emory and Henry College; First-time Full-time Students*. Los Angeles: Cooperative Institutional Research Program, 2005.
- Diefenderfer, Caren, Ruth Doan, and Christina Salowey. "The Quantitative Reasoning Program at Hollins University." *Peer Review* 6 (Summer 2004): 13-16.
- Diefenderfer, Caren, and P.W. Hammer, "NSF Grant: A Faculty Development Program for Quantitative Reasoning Across the Curriculum." *Hollins University: A Virginia Private Liberal Arts College*. 16 Feb. 2006 <www1.hollins.edu/homepages/hammerpw/qrgnantssummary.htm>
- Mathematical Association of America. *Quantitative Reasoning for College Graduates: A Complement to the Standards*. 1998. 14 November 2006. <https://enterprise.maa.org/ecomtpro/Timssnet/products/TNT_products.cfm>.
- National Study of Student Engagement (NSSE). *The College Student Report for Emory & Henry College*. 2003, 2006.
- Pascarella, Ernest, et al. *Appalachian Region Alumni Outcomes Survey*. Unpublished paper presented at the Appalachian College Association Meeting, Charleston, WV, 2001.
- . *In the Shadow of the Mountains: Effects of Private Liberal Arts Colleges in Central Appalachia*. Summary Report to the Mellon and Spencer Foundations. Appalachian College Association, n. d.
- "Quantitative Literacy." Special Issue. *Peer Review* 6 (Summer 2004).
- "Quantitative Literacy Center." *Hamilton College*. 17 Feb. 2006. <<https://my.hamilton.edu/academics/resource/qlit/index.html>>

Works Cited (continued)

"Quantitative Reasoning Across the Curriculum: Hollins University." *Hollins University: A Virginia Private Liberal Arts College*. 16 Feb. 2006 <<http://www1.hollins.edu/homepages/hammerpw/qrhothomepage.htm>>

"Quantitative Reasoning at Skidmore." *Skidmore College*. 6 Feb. 2006 <<http://www.skidmore.edu/qr/index.html>>

"Quantitative Reasoning at Wellesley College." *Wellesley College*. 7 Feb. 2006. 15 Feb. 2006 <<http://wellesley.edu/QR/>>

Southern Association of Colleges and Schools. *Principles of Accreditation*. 2004. 13 March 2006 <<http://www.sacscoc.org/pdf/PrinciplesofAccreditation.PDF>>

Steen, Lynn Arthur. *Achieving Quantitative Literacy: An Urgent Challenge for Higher Education*. Washington, DC: Mathematical Association of America, 2004.

—. *Mathematics and Democracy. The Case for Quantitative Literacy*. Princeton, NJ: National Council on Education in the Disciplines, 2001.

"Study Packet for Qualitative Reasoning Assessment." Wellesley College, n. d.



Appendix A. A Strategic Plan for Emory & Henry College: 2004-2009

Over the past decade, Emory & Henry has grown steadily in strength and accomplishment. Dedicated faculty, staff, and students have grown in number, and the College is blessed with a loyal and supportive alumni constituency. Facilities and financial resources have improved significantly, and the institution's academic reputation has increasingly been recognized outside the region. Emory & Henry has continued to offer a quality education to a student body that has become more ethnically and geographically diverse.

Emory & Henry's mission is clear: to *"engage a diverse group of well-qualified men and women in educational experiences that lead to lives of service, productive careers, and global citizenship."* These experiences are grounded in the dual affirmations in our Mission Statement concerning "the Christian faith as our spiritual and moral heritage" and of "the liberal arts as our intellectual foundation." As a church-related college, Emory & Henry enables its students to use the power of a values-based, liberal arts education to engage the world.

Emory & Henry's academic program is grounded in the interrelatedness of liberal arts and career education. For many years, the College has distinguished itself with strong programs for preparing students for law, medical studies, church vocations, education, business, and more recently, mass communications. In the past two years, the College has introduced highly promising preparatory programs in athletic training and theatre. To its traditional majors, the College has also added programs in International Studies, Environmental Studies, and Public Policy and Community Service. The challenge which Emory & Henry has met over the years is to maintain the proper balance between liberal arts and career education, between general and disciplinary education. One of the pillars of liberal education is the reasonable match between educational preparation and work opportunities. At the heart of the curriculum are core courses deemed so important to a liberal arts education that they are required of all students across a period of four years. As noted in the Mission Statement and in the College *Catalog*, the mission of preparing students for "productive careers" incorporates the "centrality of values" and community service as significant motives behind vocational choices. Lives of service and global citizenship are seen as the outcomes of a liberal arts education. Because of its academic program, Emory & Henry recently was reclassified as a national liberal arts college. Emory & Henry is guided and supported by four distinct leadership boards.

The **Board of Trustees** provides governance, creates policy, and gives direction to the institution. The **Board of Visitors** supports the College financially, and its members serve as community ambassadors. The **Alumni Association Board** aids in the recruitment of prospective students and provides support to current students and alumni through career networking. The **Parents' Council** supports current students and parents through its counsel to the institution. The involvement, at different levels, of each of these leadership boards is crucial to the continued success of the College. Many challenges face America's private, liberal arts, church-related, primarily residential colleges. Emory & Henry must find its own solutions to those challenges and **continue to improve the quality of the learning experience for its students**. Based on community-wide input, research, and careful evaluation, **A Strategic Plan for Emory & Henry College: 2004-2009** is a distinctive, action-oriented, focused, and compelling blueprint for the

future that will guide the continued growth of this institution as a successful church-affiliated, liberal arts college of quality and prestige.

Goal I: Recruit and retain up to 1,100 students.

1. Fully implement a comprehensive Marketing Plan.

- Utilize research, data collection, and interpretation to define targeted student areas and populations.
- Continue to clarify the message to prospective students and make all campus constituencies aware of it.
- Continue to customize communications with prospects and applicants.
- Tailor publications and website to prospective students.

2. Educate and focus the College community on the importance of student retention.

- Collect and make available student retention data.
- Improve the retention rate as measured by the graduation rate.
- Formalize an Enrollment Management Team and define the role of each College employee in student retention.
- Develop a more extensive weekend activity schedule and increase the number of residential students.

3. Enhance the recruitment capacity of the Admissions & Financial Aid Offices.

- Assess the staffing needs of the office with special attention to increasing the number of professional persons with defined responsibilities beyond territory assignments.
- Fully utilize the Communication Management (letter flow) capabilities of the newly installed Datatel system.

4. Increase the number of applications and improve the yield rate (the percentage of admitted students who matriculate).

- Develop a validated and realistic prospect pool of students beginning 24 months prior to matriculation.
- Implement targeted communication management plan with preferred prospects.
- Continue to develop and evaluate the financial aid matrix to attract targeted students.
- Increase the number of student visits to campus and the website.

5. Increase the number and percentage of out-of-state students and students from recognized minority groups.

- Expand the student recruitment regions outside Southwest Virginia and Northeast Tennessee.

Goal II: Generate the financial resources necessary to support existing programs at a competitive level.

1. Increase the permanent endowment.

- Build the endowment to \$100 million through fund raising and investment strategies.
- Emphasize endowment gifts through major and planned giving programs.

2. Plan and execute a comprehensive capital funds campaign.

- Develop a campaign case statement based upon needs assessments, a feasibility study, and the strategic plan.

- Develop a plan for staffing, volunteers, and budget and make recommendations to the Board of Trustees.
- Assess gift potential in prospective donor pool and increase cultivation and solicitation of donors capable of making significant lead gifts of at least \$100,000.

3. Enhance fund raising capability.

- Develop a plan to deepen and broaden the prospective donor pool through increased emphasis on prospect research.
- Increase number, quality, the amount requested, and funding rate of grant proposals.
- Increase focus upon regional businesses, non-alumni friends, parents, and members of Board of Visitors.
- Raise minimum gift levels for all gift recognition clubs over a period of several years.
- Create Reunion Giving Program, initially at 25th and 50th reunions.
- Increase alumni participation rate for those classes within fifteen years of graduation.

4. Provide competitive salaries and compensation for faculty and staff.

- Develop a plan to provide faculty salaries and compensation packages that are competitive with peer institutions.
- Develop a plan to provide staff salaries and compensation packages that are competitive with businesses in the region.

Goal III: Develop and maintain a physical environment that supports existing programs and an increased enrollment as efficiently and effectively as possible.

1 . Provide appropriate classrooms, physical facilities, and equipment for academic programs, e.g. Mass Communications, Visual and Performing Arts, Appalachian Center for Community Service and Kelly Library.

- Develop a plan to enhance academic space in Miller Hall based on analysis of current space study, with priority given to ADA requirements, additional teaching and work space for Mass Communications, and completion of the television studio.
- Construct a Visual and Performing Arts Center.
- Explore options for relocation/expansion of the Appalachian Center for Community Service.
- Refurbish Kelly Library, including the installation of new furniture and carpeting as well as upgraded lighting.
- Construct a greenhouse.
- Remodel Wiley Hall auditorium.

2. Build and renovate student residence halls.

- Construct additional student housing in The Village.
- In existing residence halls, develop a plan for routine replacement of residence hall furniture.
- Explore alternative uses for McKinney House.
- Evaluate infrastructure of existing residence halls with respect to upgrades to plumbing and electrical wiring and the addition of air conditioning to residence halls.

3. Implement a comprehensive technology plan as it relates to infrastructure and equipment.

- Investigate the possibility of increased wireless technology for computer connectivity throughout the

campus.

- Resubmit application for Title III grant to support the College technology plan.

4. Enhance the adequacy of athletic and intramural fields and facilities.

- Develop a funding strategy for the construction of an outdoor running track.
- Provide permanent spectator seating for softball, baseball, and soccer fields.
- Create a soccer practice field.
- Consider the addition of lighting to all outdoor fields to increase usage.
- Upgrade the swimming pool.

5. Expand the bookstore and the Admissions House.

- Develop a plan to expand the current bookstore facility, relocate textbooks, and adequately house other merchandise and the deli.
- Explore options for the relocation/expansion of the Admissions House.

Goal IV: Develop and implement a comprehensive academic plan that enhances our commitment to social responsibility through informed discussion and action in regard to public issues.

1. Provide increased support for the academic programs currently in place.

- Develop a plan for rotating review of programmatic and major departmental offerings and requirements.
- Develop a plan for rotating review of General Studies programs.

2. Expand scholarship opportunities for outstanding students.

- Increase the number and amount of academic merit scholarships funded through College resources and endowment.
- Establish a process and intensify efforts to identify, prepare, and nominate students for Rhodes, Marshall, Truman, Goldwater, Rotary International, USA Today, and other appropriate scholarships.

3. Support opportunities for students and faculty to be engaged in the region and the larger world.

- Expand support for outreach programs including the Appalachian Center for Community Service through service learning and community service, the Education Department through the Southwest Virginia Public Education Consortium, and the Visual and Performing Arts Division.
- Increase study abroad opportunities for faculty and students.

4. Prepare students for engagement in the civic life of a democracy through political participation and public service.

- Add Lyceum programs with a focus on public policy issues.
- Revitalize debate within the tradition of the College's historic Literary Societies.

- Establish an Emory & Henry Research Center to poll the regional population on a wide range of political and social issues.

Goal V: Ensure that the quality of Emory & Henry's student life and academic support programs match its academic program by promoting broad-based engagement by all students in co-curricular activities, especially those that place an emphasis on citizenship, leadership, and social responsibility.

1. Create and implement a model orientation experience, utilizing the orientation week in conjunction with the Introduction to Collegiate Life course (General Studies 100).

- Utilizing student leader and student participant evaluations, review the current orientation program, report findings to the Student Life Committee of the Board of Trustees, and adjust program offerings.
- Work in conjunction with GNST 100 instructors to expand learning strategies and offerings for new students.
- Develop a plan for additional orientation programs based on student needs and trends from peer institutions.

2. Nurture and strengthen students' faith.

- Develop a plan to strengthen and increase on-campus religious life opportunities.
- Develop a plan to increase the number of off-campus religious life activities to give students opportunities to put their faith in action (e.g. mission trips, Habitat for Humanity, musical and drama presentations in Holston Conference churches).
- Develop a plan to increase student participation in all types of religious life activities.
- Continue to strengthen the partnership between the College and the Emory United Methodist Church.

3. Enhance the outdoor recreation program.

- Develop a plan to increase the number of outdoor recreation opportunities offered.
- Develop a plan to increase student participation in outdoor activities.
- Increase the number of student leaders through outdoor leadership training and development activities.

4. Coordinate the services of Administrative Offices to better meet student needs.

- Establish a peer mediator system with a focus on conflict resolution and diversity awareness.
- Develop and implement a peer-leader educator program.
- Enhance career services and graduate school advising.
- Seek grant opportunities to increase educational resources for students.
- Develop a plan to coordinate efforts among the Office of Student Life, the Powell Resource Center, the

Chaplain's Office, the Appalachian Center, and the Alumni Office to assist students in developing life skills.

Appendix B. The Emory & Henry QEP Committee Commissioned January, 2006

CHAIRS

Meighan Sharp	Asst. Dean for Acad. Affairs Director of Powell Resource Center	msharp@ehc.edu	6662
---------------	--	----------------	------

Jim Warden	Faculty, Physics	jwarden@ehc.edu	6762
------------	------------------	-----------------	------

COMMITTEE

Benita Bare	Finance Director	bbare@ehc.edu	6800
-------------	------------------	---------------	------

Harry Baya	Title III Instr. Tech.	hbaya@ehc.edu	6809
------------	------------------------	---------------	------

Lori Bruce	Student	lbruce04@ehc.edu	7059
------------	---------	------------------	------

Rebecca Buchanan	Assistant Dean of Students	rbuchanan@ehc.edu	6529
------------------	----------------------------	-------------------	------

Kathleen Chamberlain	Chair, Humanities Division Faculty, English	kchamberlain@ehc.edu	6805
----------------------	--	----------------------	------

Liz Daniels	Dean of Admissions	ldaniels@ehc.edu	6133
-------------	--------------------	------------------	------

Eric Grossman	Faculty, Education	egrossman@ehc.edu	6216
---------------	--------------------	-------------------	------

Patty Greany	Public Services Librarian	pcgreany@ehc.edu	6210
--------------	---------------------------	------------------	------

Justin Hoover	Student	jhoover04@ehc.edu	7175
---------------	---------	-------------------	------

Robert Pour	Faculty, Mathematics	rlpour@ehc.edu	6184
-------------	----------------------	----------------	------

Leann Vernon	Grants Writer	lvernon@ehc.edu	6125
--------------	---------------	-----------------	------

Julia Wilson	Faculty, Sociology/Anthropology	jwilson@ehc.edu	6237
--------------	---------------------------------	-----------------	------

EX OFFICIO

Chris Qualls	Dean of Faculty	cqualls@ehc.edu	6128
--------------	-----------------	-----------------	------

Matt Hankins	Deputy Clerk / P.I. Officer City of Martinsville (E&H alumnus)	mhankins@ci.martinsville.va.us (276) 403-5386 (work)	
--------------	--	---	--

Appendix C: Review of the Emory & Henry College Quality Enhancement Plan

Written by
Caren Diefenderfer
Professor of Mathematics
Hollins University
Roanoke, VA
November 2, 2006

I have reviewed the Emory & Henry College Quality Enhancement Plan: Quantitative Literacy for the 21st Century, Draft 2D that is dated September 25, 2006 with much interest. It is clear that a great amount of time, careful thought and thorough research went into this document. An engaged faculty and staff, coupled with financial support from the administration, play critical roles in the successful implementation of a QL program. These elements seem to be in place at Emory & Henry and I am hopeful that the QEP will result in an exemplary program that will enhance student learning.

I will proceed by commenting on the QEP section by section.

I. Introduction

In section A, Why QL, the document clearly identifies two critical issues for students. Students will delay taking a course that they perceive as bothersome or difficult, when given the freedom to do so. In the case of the current Emory & Henry math requirement, students often choose to satisfy this requirement by taking an introductory statistics course. However, when students opt to take this course in their junior or senior year, it means that they have limited opportunities to practice the skills and methods that they learn in this course. Requiring students to complete the introductory statistics (or QL) course in the first two years, with a second level requirement, for continued practice and review of the methods, will prepare students better for future quantitative demands of life and work.

Furthermore, many students do believe that they don't have a "numbers" brain. One of the goals of an introductory quantitative reasoning course is to dispel this myth. In fact, the Prologue of *Using and Understanding Mathematics: A Quantitative Reasoning Approach*, by Bennett and Briggs, presents six misconceptions, and they list "Math requires a special brain." as their Misconception One. Many educators believe that changing attitudes toward quantitative work will solve many of the issues connected with mathematical anxiety.

I was pleased to see that you created an Emory & Henry definition of quantitative literacy. Many have chosen to proceed without a definition (including those who wrote the well-received Math and Democracy) It is important for an institution to attempt to construct a definition, because it provides a first step in communicating with everyone - faculty in all disciplines, students, administration and staff. Your definition includes the important issues of formulating, evaluating and communicating, as well as describing various contexts (academic, professional and personal) that must be considered. The sets of skills that you list are very clear and comprehensive. This working definition is very strong.

It is important to include your Sections C-College Overview and D-Mission and Strategic Plan. In order to create a successful QL program, the design plan must consider the current strengths, weaknesses, traditions, and

style of your students and faculty. A large number of Macalester students go into professional work in public policy and this is why the Macalester program focuses on Public Policy. Hollins currently has many students majoring in the humanities and arts and this is why we designed our Applied Quantitative Reasoning requirement to include and encourage courses in these disciplines. The design of a program must reflect the campus interests and culture to be successful. You may not have yet discovered how your program will reflect the specific identity of your campus, but this is important to consider and build into your plan.

In Section E, you give a good chronology about how things have developed. Were the meetings contentious as you were deciding between the two possible QEPs? Does the current QEP have good support from those who were initially recommending a reevaluation and revision of the General studies curriculum? Do the Powell Learning Resource Center and the Writing Center currently work together or are they two separate entities? How will the QL Center fit into this structure? I am guessing that resources are tight and if these three centers can operate under one umbrella administration (and possibly in close proximity), you may see financial rewards from economy of scale. It would also be good for students to know that there is one Resource Center location, with several specialties. DePauw University in Greencastle, Indiana has an Academic Resource Center, with special tutors and directors for Q,(quantitative), S(speaking) and W(writing). Their center has been in existence for at least 25 years and they now have satellite locations for some of the specialized tutoring.

II. Summary of Data Supporting the Work

Section A gives a good overview of important studies and resources that exist to make a case for why QL is important and needed. One additional document that you may wish to consult is old, but still relevant. In 1994 the Quantitative Literacy subcommittee of the Committee on the Undergraduate Program in Mathematics (CUPM) of the Mathematical Association of America (MAA) published a document titled "Quantitative Reasoning for College Graduates: A Complement to the Standards." It is available as a pdf file at www.maa.org/past/ql/ql_toc.html.

The Review of Best Practices in Section B identifies four programs at other liberal arts colleges. I am honored that the Hollins program is among the ones you considered. The MAA has recently published a new volume in its Notes Series, titled *Current Practices in Quantitative Literacy*. Rick Gillman at Valparaiso was the editor and the book is available from the MAA at https://enterprise.maa.org/ecomtpro/Timssnet/products/TNT_products.cfm

I would also urge you to take a second look at the programs at Trinity College (Hartford, CT), Macalester College (St. Paul, MN) and DePauw University (Greencastle, IN). These three programs are very different and may give you some specific ideas of what will (or will not) work at Emory & Henry. Another resource may be the NSF funded project - Mathematics Across the Community College Curriculum. Information is available at <http://www.mac3.amatyc.org/>

When we started our program, we identified the Wellesley program as the one that was closest to what we wanted to accomplish and over the years I have worked closely with the people at Wellesley. Wellesley does have a center for QL tutoring. Support and tutoring for QR takes place at their Center for Learning and Teaching. I will attach email from Corrine Taylor (Director of QR at Wellesley) to the end of this report with the details.

The Institution-Specific Data in Section C reiterates that many Emory & Henry students are waiting until their junior or senior year to enroll in a course to meet the mathematics requirement. "The practice of waiting until late in one's college career to take a quantitative course prevents these students from utilizing the quantitative skills they would have learned in these courses to enrich their overall undergraduate education." [pp. 20-21, E&H QEP] This statement alone gives a compelling rationale for the implementation of quantitative reasoning requirements at Emory & Henry.

Results from the CIRP freshman survey, the on-campus focus groups, and an online survey also indicate that members of the campus community see a need for more specific quantitative requirements.

III. Goals, Objectives, Implementation Strategies, and Assessment

Goal I

Student Learning Objective 1A (Mathematical Skills):

When you state that any 100-level mathematics course will satisfy this requirement, do you intend to include AP scores of 3, 4 or 5 on an AP Calculus or Statistics exam? Will you include dual enrollment courses taken in high school? And will you include any 100-level community college course? (eg: remedial algebra)

Student Learning Objective 1B (Quantitative Skills):

Will this quantitative literacy requirement involve a new basic quantitative literacy course at E&H? Will several courses meet this requirement? The first complete bullet on p. 27 leads me to believe that you hope to create/offer several quantitative literacy courses. Will all the QL courses be at a basic/introductory level?

Student Learning Objective 1C (Standardized Tests):

Do you have enough students taking these tests to obtain significant data for comparison?

Designing and creating a quantitative learning center (QLC) will be a huge undertaking in terms of money, space and acceptance in the campus culture. There may not be enough time to do all of this between now and August 2007. It certainly is important to hire a Director, appoint an advisory team and begin to identify a possible location. How will you determine the composition of the advisory team? Will it be a part of the faculty governance structure or an ad hoc group?

Designing an appropriate instrument may become an ongoing process. Several institutions currently use and annually, revise their own quantitative assessments. A few institutions rely on SAT scores to make placements. There is a literacy project at Educational Testing Service (ETS) that involves prose, document and quantitative literacy. This is part of an adult literacy project, but the philosophy of the program and some of the specific questions that are available may be helpful as you develop an assessment instrument. They are developing questions to assess quantitative skills and some samples are available to the public.

The third bullet on p. 27 indicates that you understand the difference between QL/QR assessment and mathematics placement. The MAA has partnered with Maple on some relatively new math placement tests, which may be of interest to you.

Goal II

Student Learning Objective IIA (QL Course Modules):

Will students be required to take more than one quantitative course? Obtaining some baseline data now will be very helpful when you want to determine if this program has had a positive impact on student learning. On p. 30 you mention summer workshops for faculty members. There are numerous off campus opportunities for faculty development on quantitative literacy. The QL SIGMAA website, accessible from the MAA site www.maa.org maintains a good list of upcoming events. <http://pc75666.math.cwu.edu/~montgomery/sigmaaq/>

Some of these events will occur during the regular academic year. Often sending two or three faculty members to an off campus program is a good way to create new alliances and strengthen existing ones.

Writing a QL manual for faculty is a great idea and will be helpful, particularly to new faculty members, after the program is established. Using the Lyceum events, a well tested student and faculty development program at Emory & Henry, is an important way to link this new program to existing campus traditions.

IV. Implementation of the QEP

2007-2008

It is important to establish the faculty advisory team at the beginning of this process. This group can be your "think tank" and they will be a big help for a new director. They can also create several quantitative modules, courses, and samples that will serve to stimulate the thinking of additional faculty members. If possible, put Trinity

College and DePauw University on the list of places to visit. Both of these campuses have impressive centers. It would be quite beneficial to have some of the advisory team members attend quantitative literacy workshops this spring, summer or fall.

2008-2009

If some of your key people can attend a workshop in 2007-2008, they might be able to lead your on campus workshops in the summer of 2008. It is not always clear whether faculty will respond better to outside experts or local, trusted colleagues. Using a combination of workshop leaders is probably the best choice.

The timelines that you present look both complete and ambitious.

V. Resources

You include good details in this section and recognize that this program will cost a lot, in both time and finances. The report indicates that the administration is willing to invest resources in the program and this investment of time and money will be crucial to the success of the program.

VI. Conclusions

It may be ambitious to hope that you can accomplish all these things in five years. Time spent to include as many constituencies as possible in the decision making process in order to establish positive feelings and consensus is time well spent. We spent 98-99, 99-00 and 00-01 to develop the requirements and the first group of Q courses (and this was with NSF funding). Our success was definitely due to fact that we introduced our quantitative reasoning requirements as one piece of our new general education program. I do not think we would have been successful in introducing QL/QR requirements as a single addition to our general education program. Placing the QR requirements into a larger context allowed faculty members at Hollins to accept them as an important educational compo-

ment of every student's education.

Your program and report are well-organized and written. I wish you much success and hope you will contact me again if I can be of further assistance.

Appendix D: Timeline for Developing the QEP

The *Handbook for Reaffirmation of Accreditation* states: "Developing a QEP is a recursive rather than a linear process, much like any other important, deliberative, and reflective planning and writing. An institution should expect the focus and framework for the QEP to shift and evolve as the research, writing, talking, and campus participation occur." (26) To that end, the Emory & Henry QEP Committee welcomes the active participation of the entire campus community in developing a QEP that "rather than being merely a requirement for reaffirmation of accreditation, [will] result in significant, even transforming, improvements in the quality of student learning" (22).

Consultation Phase and Review of Best Practices

During early spring 2006, the QEP Committee presented to the three internal constituencies of the College (faculty, staff, and students) and to the alumni the central elements of the original prospectus "Quantitative Reasoning for the 21st Century" as developed during the fall and approved by the SPPC. Ideas and opinions were solicited and collated. The meetings for each constituency were handled differently, although we used a common set of guiding questions to focus each discussion. A subcommittee responsible for chairing each group of meetings was chosen in early February 2006.

Faculty members were convened by academic division. During February 2006, subgroups of the QEP Committee conducted discussion and brainstorming sessions with each division. Individuals were invited to contribute further by electronic mail within a reasonable deadline. A special e-mail account was provided for this communication.

During February 2006, staff members were invited to a series of three luncheon sessions at which they participated in discussions and brainstorming sessions. Individuals were invited to contribute further by electronic mail within a reasonable deadline.

Students were asked help to develop the QEP by providing feedback through focus groups, a class, and through the Resident Advisors, who work with all residential students on campus. Additionally, the student committee members and the QEP committee members representing student life decided that an online survey would be the most efficient way to solicit student opinion. This survey was administered by Mr. Kevork Horissian, the Director of Marketing Research and Enrollment Management; nearly 30% of enrolled students responded.

Our alumnus committee member solicited comments and feedback from Emory & Henry alumni, via electronic mail. Results were reported by March 1, 2006

The *Handbook* strongly encourages a focus of the QEP based upon "empirical data and an analysis of these data" (24), which include both internal institutional research and studies of best practices at the national level, possibly including peer institutions. While focus groups were being conducted, a subcommittee identified and collected a body of this data to support the needs assessment described in the original prospectus.

All focus groups, surveys, and preliminary institutional research were concluded before Spring Break 2006. Following Spring Break, a QEP subcommittee reviewed all reports. We evaluated the various ideas and proposals in terms of originality, practicality, and best fit to the mission of the College; we supported the proposals with additional research as needed. Finally, the subcommittee assembled all the material into a first draft of the full QEP, which the full committee reviewed near the end of March 2006.

Preliminary Review by SACS Representative

On April 12, 2006, Dr. David Carter, Associate Executive Director of the Commission on Colleges, visited the campus to discuss reaffirmation. While on campus, he met with the full QEP committee to address issues of resources and scope of the project.

Review Phase I

The draft QEP was circulated widely to the constituent groups by posting on the College web site and distributing a number of printed copies. The QEP Committee solicited critical remarks from all constituent groups by electronic mail.

Working QEP Draft II

A subcommittee responsible for an intermediate draft met during May 2006 to incorporate ideas contributed during the review phase. This group examined the draft for coherence and added some necessary background. Several faculty members, the Dean of Faculty, and the new President read Draft I carefully and suggested that the Objectives, Goals, Implementation Strategy, and Assessment sections of the QEP should be more clearly organized and more fully “operationalized.” To this end, in the early fall, the editing subcommittee completely rewrote several sections and made a number of suggested small corrections. The second draft was placed on the College web site for review by the campus community in late September 2006.

Finalizing the QEP

In the final phase of editing and creating our QEP, we considered comments from our outside reader, Dr. Caren Diefenderfer of Hollins University. We clarified the organizational structure of the QLC, modified the timeline to make it more manageable, and reworked the budget to reflect the changes in the final draft. The document was then passed to the College Publications Office for design and printing. The final document was forwarded to SACS evaluators on December 15, 2006.

Preparing for the Site Visit

Members of the campus community need to be familiar with the QEP and be able to discuss it with the SACS team during the site visit in February 2007. To facilitate this familiarity, the QEP Committee distributed copies of Dr. Steen’s book, *Mathematics and Democracy: The Case for Quantitative Literacy*, to all E&H faculty requesting it. In

addition, a publicity subcommittee consisting of Dr. Pour (mathematics), Justin Hoover (student), Rebecca Buchanan (assistant dean of students) and public relations staffers Dirk Moore and Brian Gillespie will design and carry out a publicity campaign aimed at informing the student body about the QEP during January and February 2007.

Appendix E. Documents Used by the QEP Committee

Campus Handout to Faculty, Staff, and Students (January 2006)

The Quality Enhancement Plan and You

The cited information is from *The Principles of Accreditation: Foundations for Quality Enhancement* (2001).

What is accreditation?

Accreditation is granted to Emory & Henry by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) through a peer review process that includes two major components: Compliance Certification and the Quality Enhancement Plan (QEP).

Why is it important to you?

All reputable institutions of higher education undergo reaffirmation of accreditation every 10 years. Reaffirmation of accreditation “signifies that an institution has a purpose appropriate to higher education and has resources, programs, and services to accomplish and sustain that purpose” (3). Institutions without accreditation are ineligible to receive federal funding or to participate in federal student aid programs. In addition, academic credit earned at unaccredited institutions is not accepted by accredited institutions.

For trustees, faculty, staff, and students, the process of accreditation is an opportunity to review the institution’s compliance with important core requirements and comprehensive standards; for those outside the institution, accreditation “indicates that an institution maintains clearly specified educational objectives that are consistent with its mission and appropriate to the degrees it offers, and that it is successful in achieving its stated objectives” (3).

What is the QEP?

The Quality Enhancement Plan, or QEP, is a document that “describes a carefully designed and focused course of action that addresses a well-defined issue or issues directly related to improving student learning” (9). The QEP is developed through a process that includes a significant portion of the Emory & Henry community. The process of developing the QEP is overseen by a committee that includes representation from faculty, staff, and students. Following campus-wide discussions during the 2005 fall semester, the Strategic Planning and Priorities Committee ultimately chose “Increasing Quantitative Skills for the 21st Century” as the QEP topic.

How can you have input into further development of the QEP?

During February, attend a discussion session sponsored by the QEP Committee. Faculty will discuss the QEP in division meetings, staff will choose from three different lunch meetings, and students will choose from multiple meetings held around campus. Watch for the dates and times.

The email address for QEP-related comments and questions is qep@ehc.edu. The committee will keep comments anonymous in the data collection process.

Why a QEP that emphasizes quantitative skills?

§ Quantitative skills include a wide range of mathematical and statistical tasks: reading and understanding a statistical article, developing a budget for a theatre production, or using advanced mathematics as part of a scientific paper. Students in every field will be required to use quantitative skills at some point in their careers.

§ 37% of Emory & Henry students from the 1970s, 1980s, and 1990s who responded to a 2001 alumni survey reported that their college experience helped them “little” or “not at all” in applying mathematics and statistics.

§ 50% of E&H students surveyed in the 2003 National Survey of Student Engagement (NSSE) reported that they analyze quantitative problems either “very little” or “some.”

§ Nationally, a recent survey sponsored by the Pew Charitable Trusts found that “20 percent of students at four-year institutions...were at or below the basic level [of quantitative literacy]” (cited in Lipka, Sara (2006, January 20). Many college students graduate with low proficiency in math and reading, study finds. *The Chronicle of Higher Education*.)

Quantitative skills and other benchmarks of quality

Excellence in quantitative skills will reflect positively on all departments campus wide. Solving real problems often demands mathematical literacy. To the extent that the QEP promotes application of real-world skills, all students will benefit.

Although the QEP focuses on quantitative skills, the wider reaffirmation of accreditation process ensures that the college is providing the full range of educational experiences consistent with the highest standards of post-secondary education.

Questions? Comments? Concerns?

Contact any of the QEP Committee members for more information or to take part in the QEP development process.

Appendix F. Percentages of Upper-class Students Enrolled in 100-level Statistics and Mathematics Courses, 2000-2005

Statistics Courses

(STAT 160, 161, 162, 163)

Acad. Yr.	JR	SR
2000-01	24	16
2001-02	31	14
2002-03	20	19
2003-04	24	25
2004-05	25	24

Mathematics Courses

(Math 120, 121, 123, 151)

Acad. Yr.	JR	SR
2000-01	11	7
2001-02	14	8
2002-03	12	8
2003-04	13	12
2004-05	13	14

Graphs for percentage of STAT students who are Juniors and Seniors and Percentage of 100-level math students who are juniors and Seniors will need to be redone here.

Appendix G: Survey Results from Online Student Assessment

Student QEP Survey, Administered February 2006

Survey Overview

Description

To find out what current students think about the Quality Enhancement Plan (QEP).

Instructions Provided To Respondents

Dear Emory & Henry Student, the College is looking for your input while designing its Quality Enhancement Plan (QEP). Please answer the following questions (the survey should require less than 3 minutes). Be assured that all of your responses will be held in the strictest confidence. There will be a random drawing from all survey respondents for 40 t-shirts.

Distribution

The survey was distributed via e-mail. The students were asked students to complete an online form.

E-mails sent:	925
Bounced back:	20
E-mails Delivered:	905

Respondent Metrics

Respondents:	265
Response rate:	29 %
First Response:	2/14/06 11:25 AM
Last Response:	2/22/06 03:47 PM

Survey Results — Published 2/27/2006

The following is a tabular depiction of the responses to each survey question. Additional comments provided by respondents, if any, are included after each table.

Section - Quantitative Skills

3. What types of personal quantitative skills do you think are important for you to learn while you are in college (or before you graduate)?

The percentages show weighted values as percentages of total number of respondents

16.3%	229	Understanding salary and tax information (net vs. gross pay, Medicare, SS, federal tax, state tax)
16.1%	227	Understanding loans and interest rates
15.5%	219	Understanding insurance needs such as health, life, car, homeowners, and renters insurance
14.0%	197	Reading credit card statements and interpreting the effects of interest rates
12.7%	179	Balancing a checkbook
12.3%	173	Developing a house hold budget
11.6%	164	Developing a plan to save for retirement
1.5%	21	Other

Comments/Notes:

- A general understanding of finance for today’s world (0000000133 Anonymous)
- All encompassing aspects of credit and credit history (0000000249 Anonymous)
- Anything to do with saving money (0000000210 Anonymous)
- Basic ways to save money by being a smart spender (0000000176 Anonymous)
- Better Social Skills (0000000312 Anonymous)
- Consumer ethics. (0000000268 Anonymous)
- Debt management (0000000259 Anonymous)
- Developing investments and stock purchases (0000000350 Anonymous)
- How to cook (0000000125 Anonymous)
- Learning to type, time management skills (0000000250 Anonymous)
- Measurement skills, quantitative analysis for business (0000000331 Anonymous)
- Parenting Skills (0000000248 Anonymous)
- Plan to save for future: child’s education, etc. (0000000310 Anonymous)
- Probability and how it affects choices. (0000000223 Anonymous)
- Setting up a personal budget and maintaining a healthy balanced account. (0000000160 Anonymous)
- Stock options (0000000156 Anonymous)
- Time management! (0000000120 Anonymous)
- Understanding how credit affects your future. (0000000197 Anonymous)
- Unless this is your major, it seems this is a silly thing to learn in college (0000000311 Anonymous)
- Using credit cards! (0000000114 Anonymous)
- Work Ethic. (0000000193 Anonymous)

4. What types of scholarly quantitative skills do you think are important for you to learn while you are in college (or before you graduate)?

14.4%	214	Using software (e.g., Excel, SPSS) to perform data analysis, create budgets, etc.
12.5%	185	Understanding graphs and charts in your class readings and/or assignments
12.3%	182	Using quantitative techniques to conduct research for a course or senior
11.6%	172	Understanding how organizations use quantitative information to make important decisions.
11.5%	171	Creating graphs and charts to display important data
11.3%	168	Interpreting the results of scientific research (e.g., the effects of exercise on rates of heart disease)
11.0%	163	Understanding statistical information required for scholarly research such as journal articles
9.8%	145	Understanding/Interpreting polling and other survey data (e.g., Presidential approval ratings).
4.9%	73	Learning to teach mathematics and science
0.8%	12	Other:

Comments/Notes:

- A great increase in vocabulary. (0000000268 Anonymous)
- Architecture, composition (0000000238 Anonymous)
- Extracurricular Research (stats, preparing solutions, etc.) (0000000217 Anonymous)
- I think everyone should at least complete pre-calculus, statistics , Basic Accounting, and environmental science (0000000146 Anonymous)
- Knowing how to read and understand basic economic data that you see in the news (0000000176 Anonymous)
- Learn how to deal with different types of people. e.g. foreign students (0000000207 Anonymous)

Learning about Health in food and Exercise (0000000242 Anonymous)
 Learning basic philosophical truths, and the modern philosophical debates. Learning how to make ethical judgments. (0000000193 Anonymous)
 Learning how to be critical of others' research and data (0000000309 Anonymous)
 Learning how to form your own opinions (0000000307 Anonymous)
 Real estate finance and relative real estate laws (0000000250 Anonymous)
 Understanding how math interconnects science and the arts (0000000223 Anonymous)

5. Where in your college experience have you struggled the most with quantitative reasoning?

32.1%	85	Financing college education
19.2%	51	Class
19.2%	51	Daily spending habits
19.2%	51	Understanding statistical information presented in class and/or required for scholarly research such as journal articles
4.2%	11	School organizations requiring budgeting skills such as Student Government, fundraising projects, etc.
3.0%	8	Other:
3.0%	8	Understanding graphs and charts in your class readings and/or assignments

Comments/Notes for "Other:"

College Financing and Spending Habits (0000000151 Anonymous)
 None (0000000281 Anonymous)
 Personal research in Mathematics (0000000223 Anonymous)
 Quantitative reasoning isn't an area where I've struggled. (0000000193 Anonymous)
 Taxes (0000000357 Anonymous)
 Test (0000000332 Anonymous)
 Time management (0000000250 Anonymous)
 Time Management and Finding time to eat healthy food (0000000312 Anonymous)

6. What do you think the college could do to deal with some of the issues you've described?

45.3%	120	Offer classes specific to "real world" finances.
20.0%	53	Offer workshops on personal finance issues (e.g., how to purchase insurance).
13.2%	35	Each Division/Department to offer a class specific to the quantitative needs of its students.
9.1%	24	Offer access to a Help Center in order to develop and enhance math and/or other quantitative skills in any type of class setting.
6.4%	17	Offer more lyceum events focusing on quantitative skills in a variety of settings.
4.5%	12	Other:
1.5%	4	Offer wider range of math classes.

Comments/Notes for "Other:"

A better schedule for classes and for food, a better choice of food (0000000312 Anonymous)
 All of the above. (0000000268 Anonymous)
 Have information available through the Powell Resource Center. (0000000344 Anonymous)
 I think that parents should help students understand taxes, money, and basic revenue. DO NOT, I repeat NOT make a required class about this. (0000000193 Anonymous)

Instead of the stupid, elementary-level computer-literacy requirement, require a course that would teach “real world” math using computer literacy (0000000191 Anonymous)

Math is based on logic; therefore, it might be beneficial to make basic logic part of the GNST 100 curricula (0000000223 Anonymous)

Offer different math classes that fulfill the college math requirement (instead of just college algebra, and foundations) that were real world type stuff (0000000278 Anonymous)

Offer workshops that give information about student loans: how they function, when to consolidate, etc (0000000267 Anonymous)

Offering workshops is OK, but I think it needs to be required in order to actually enhance education. (0000000146 Anonymous)

Require a different type of class that would cover the graphs and “real” world uses. (0000000180 Anonymous)

Test taking skills (0000000332 Anonymous)

The last three: Offer classes specific to “real world” finances, Each Division/Department to offer a class specific to the quantitative needs of its students, Offer workshops on personal finance issues (e.g., how to purchase insurance) are all good things the college should offer. (0000000300 Anonymous)

Section - During what year of your college experience would you prefer that these skills be offered?

7. Reading credit card statements and interpreting the effects of interest rates

65.8%	171	Freshman
18.1%	47	Sophomore
11.5%	30	Junior
4.6%	12	Senior

8. Balancing checkbook

89.2%	231	Freshman
5.8%	15	Sophomore
2.7%	7	Senior
2.3%	6	Junior

9. Understanding salary and tax information (net vs. gross pay, Medicare, SS, federal tax, state tax)

28.1%	73	Sophomore
26.5%	69	Junior
24.2%	63	Freshman
21.2%	55	Senior

10. Understanding loans and interest rates

51.2%	133	Freshman
18.8%	49	Sophomore
16.5%	43	Junior
13.5%	35	Senior

11. Developing a household budget

44.1%	113	Senior
-------	-----	--------

27.7%	71	Junior
19.9%	51	Freshman
8.2%	21	Sophomore

12. Developing a plan to save for retirement

67.2%	174	Senior
16.6%	43	Junior
10.0%	26	Freshman
6.2%	16	Sophomore

13. Understanding insurance needs such as health, life, car, homeowners, and renters insurance

32.6%	84	Senior
31.4%	81	Junior
20.2%	52	Freshman
15.9%	41	Sophomore

14. Understanding/Interpreting polling and other survey data (e.g., Presidential approval ratings).

56.6%	146	Freshman
27.1%	70	Sophomore
10.5%	27	Junior
5.8%	15	Senior

15. Understanding graphs and charts in your class readings and/or assignments

85.3%	221	Freshman
9.3%	24	Sophomore
3.1%	8	Junior
2.3%	6	Senior

16. Using quantitative techniques to conduct research for a course or senior projects.

45.7%	118	Junior
25.2%	65	Freshman
20.9%	54	Sophomore
8.1%	21	Senior

17. Understanding how organizations use quantitative information to make important decisions.

40.6%	104	Sophomore
35.2%	90	Freshman
16.0%	41	Junior
8.2%	21	Senior

18. Understanding statistical information required for scholarly research such as journal articles.

45.3%	117	Freshman
32.9%	85	Sophomore
16.3%	42	Junior
5.4%	14	Senior

19. Creating graphs and charts to display important data.

73.6%	190	Freshman
16.3%	42	Sophomore
7.4%	19	Junior
2.7%	7	Senior

20. Interpreting the results of scientific research (e.g., the effects of exercise on rates of heart disease).

50.0%	128	Freshman
30.9%	79	Sophomore
11.3%	29	Junior
7.8%	20	Senior

21. Using software (e.g., Excel, SPSS) to perform data analysis, create budgets, etc.

69.6%	179	Freshman
18.3%	47	Sophomore
6.6%	17	Junior
5.4%	14	Senior

22. Learning to teach mathematics and science

34.3%	83	Senior
27.7%	67	Freshman
25.6%	62	Junior
12.4%	30	Sophomore

23. Other

53.7%	72	Freshman
20.1%	27	Senior
15.7%	21	Sophomore
10.4%	14	Junior

Section - Demographics

24. What is your academic standing?

27.5%	73	Freshman
27.2%	72	Sophomore
25.3%	67	Junior
20.0%	53	Senior

25. What is your gender?

60.8%	161	Female
39.2%	104	Male

26. Indicate to which of the following states/regions you belong:

48.7%	129	Southwest VA
13.2%	35	TN

9.1%	24	Central VA
7.2%	19	NC
6.4%	17	Northern VA
4.2%	11	Eastern VA
3.8%	10	Other
1.5%	4	AL
1.1%	3	GA
1.1%	3	SC
1.1%	3	TX
0.8%	2	International
0.8%	2	PA
0.8%	2	WV
0.4%	1	FL

27. What is your major?

10.2%	27	Psychology
9.1%	24	Biology
8.7%	23	Education
6.8%	18	Business Administration
6.8%	18	Mass Communication
6.8%	18	Theatre
6.4%	17	Political Science
5.7%	15	English
5.3%	14	History
4.9%	13	Mathematics
4.5%	12	Chemistry
4.2%	11	PPCS
3.8%	10	Religion
2.6%	7	Art
2.6%	7	International Studies
2.3%	6	Environmental Studies
1.9%	5	Athletic Training
1.9%	5	Music
1.9%	5	Spanish
1.1%	3	Physical Education
0.8%	2	Geography
0.4%	1	Economics
0.4%	1	French
0.4%	1	Philosophy
0.4%	1	Physics
0.4%	1	Sociology and Anthropology

28. What is your ethnic origin?

90.9%	241	Caucasian
4.2%	11	African-American

2.6%	7	Asian/Pacific Islander
1.9%	5	Other:
0.4%	1	Hispanic/Latin

Appendix H. Proposed Five Year Budget for the QEP

	2007-8	2008-9	2009-10	2010-11	2011-12	TOTAL
Salaries/Fringe/Benefits						
Director salary	\$0	\$43,000	\$44,025	\$45,076	\$46,153	\$178,254
Director fringe benefits	\$0	\$10,250	\$10,506	\$10,769	\$11,038	\$42,563
Faculty stipends (10 mini-grants @ \$1,000 apiece each year for 3 years plus 10 workshop stipends at \$100/day for 2 days)	\$0	\$12,000	\$12,000	\$12,000	\$0	\$36,000
Workshop Instructor stipends	\$0	\$0	\$3,000	\$3,000	\$3000	\$9,000
Tutor stipends (approximately 4 tutors @ \$6/hr for 10 hrs/wk X 20 weeks)	\$0	\$4000	\$5,000	\$5,000	\$5,000	\$19,000
Administrative Assistant (50%)	\$0	\$11,000	\$11,262	\$11,530	\$11,805	\$45,597
Administrative Assistant fringe benefits	\$0	\$2,625	\$2,688	\$2,751	\$2,817	\$10,881
Quantitative Learning Center						
Director search	\$1,000	\$0	\$0	\$0	\$0	\$1,000
Software	\$1,000	\$5,000	\$3,000	\$3,000	\$3,000	\$15,000
Supplies	\$1,000	\$5,500	\$2,500	\$2,500	\$2,500	\$14,000
Computers	\$0	\$10,000	\$3,000	\$3,000	\$3,000	\$19,000
Space	\$0	\$17,000	\$500	\$0	\$0	\$17,500
Furniture	\$0	\$5,000	\$0	\$0	\$0	\$5,000
QL measurement/assessment tools	\$0	\$2,000	\$5,000	\$5,000	\$5,000	\$17,000
Evaluation	\$0	\$0	\$200	\$200	\$2,000	\$2,400
Conference travel and trainings						
(4 faculty @ \$1,500 and then 2 faculty thereafter)	\$6,000	\$3,000	\$3,000	\$3,000	\$15,000	@ \$1,500
Lyceum						
Presenters	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000
Travel	\$250	\$250	\$250	\$250	\$250	\$1,250
	\$4,250	\$134,625	\$106,931	\$108,076	\$99,563	\$453,445

Appendix G. Examples of QL Test Questions

Lynn Arthur Steen's *Achieving Quantitative Literacy: An Urgent Challenge for Higher Education* gives a selection of questions related to quantitative literacy on pp. 91-101. The subject matter includes numerical common sense, reading graphs, percentages, estimation, and the interpretation of statistical results in the media. These examples, quoted from Steen and using his headings, are somewhat representative.

Numerical Common Sense

2. How many people live in the US?
(a) 40 million (b) 300 million (c) six billion (d) 12 billion

Reading Graphs

3. The graph on the right [a smooth peaked graph rising from 0 at 0 degrees C to a maximum at 20 degrees C and falling to 0 again at 40 degrees C] shows enzyme activity as a function of temperature for a typical enzyme. At what two temperatures is the activity approximately 1/2 of the maximum?
(a) 0 and 40 (b) 20 and 30 (c) 10 and 20 (d) 10 and 30 (e) 20 and 40.

Calculation and Estimation

4. If it takes 5 cans of spray paint to cover a garden sculpture that stands 3 feet tall, how many cans would it take to cover an enlarged version of the same sculpture (with the same proportions) that stands 6 feet tall?
(a) 10 (b) 15 (c) 20 (d) 25

Understanding Percentages

The following table [not shown here] shows 1997 unemployment rates by race and educational background. Describe in words the meaning of the number 6.1 shown in the next to last column of the Black row. What is the significance of this number in the context of other entries in the table?

Reading a Newspaper

Excerpts of newspaper articles containing statistical information and conclusions are printed. Readers are asked to explain whether they believe the data and the conclusions reached, reasons for believing the article, and identify what other information would be useful for making a better assessment of the analysis in the excerpt. The first title is:

1. Only 7% Seek to Transfer to a Better School Despite U.S. Plan, Most City Pupils Not About to Move. [Article mentions that 29,000 students were offered the transfer, but only 1,900 accepted the offer.]