

Quantitative Reasoning Across the Curriculum

UNIVERSITY *of* MONTEVALLO

QEP PROPOSAL



OVERVIEW

The AAC&U defines *Quantitative Reasoning* (QR) as “a ‘habit of mind,’ competency, and comfort in working with numerical data” [1]. People with Quantitative Reasoning skills have “the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats” [1]. In the broadest terms, QR simply means *using data to make decisions*.

QR stands out as an area where UM needs renewed focus. ACT data presented at UM’s 2018 Faculty Convocation indicates that, on average, UM’s incoming freshmen lag behind their national peers in mathematics skills [2]. The CIRP Freshman Survey shows that a large number of our incoming freshmen report some lack of self-confidence in QR-related tasks, such as using technical science skills or explaining the results of a study [3]. In a recent analysis of student learning outcomes assessment reports from UM’s four colleges, QR emerged as a source of difficulty for many of our students [4]. Finally, NSSE data shows that our graduating seniors still tend to regard QR as an area of weakness [5]. Thus, a Quantitative Reasoning QEP would address a substantial gap in the skill sets of our current and future students.

In keeping with UM’s mission—emphasizing a “broad base of arts and sciences”—this QEP would underscore the role of *QR across the curriculum*. QR goes far beyond just mathematics or science courses: QR means interpreting data within one’s own discipline in order to make informed and rational decisions. QR is a skill that students will need not just in a particular UM course, and not just in college, but rather, to be successful in life. With this QEP, we seek to help students create the QR habit of mind they will need to achieve the goals set for them in UM’s mission, namely, “intellectual and personal growth in the pursuit of meaningful employment and responsible, informed citizenship.”

STUDENT LEARNING OUTCOMES (SLOs)

With this QEP, UM students will gain stronger Quantitative Reasoning skills, as specifically realized through the following two SLOs:

1. Students will be able to effectively interpret data in their discipline.
2. Students will be able to use data in their discipline appropriately in decision-making.

SUGGESTIONS FOR IMPLEMENTATION & ASSESSMENT

Institutional data has shown that UM's previous QEP for Information Literacy was a great success; therefore, it makes sense for the next QEP to adopt a similar framework. We propose the following outline for a *QR Across the Curriculum* QEP:

- 1. Each discipline will determine which (if any) of their courses—both at the entry level and at an advanced level—involve Quantitative Reasoning.** Such courses would receive a QR tag and would feature assignments, lessons, etc., that should help test and improve students' QR skills, with a focus on applying those skills within the given discipline. Possible examples of QR courses at UM include:

- A COMS or ENG course in which students use data to debunk fake news;
- An ART or THEA course featuring design elements involving mathematics;
- Business courses in areas such as Accounting or Finance;
- Education courses with a heavy QR component, such as Educational Psychology.

If they wish, programs would also be free to create a new course, or redesign an existing course, to address discipline-specific QR themes.

- 2. In each course with a QR tag, the instructor will assess students' QR proficiency at both the beginning and end of the course (e.g., on two different assignments) to determine improvement over time.** In addition, UM will track and compare data from entry-level and advanced QR courses—both within a single discipline, and across all disciplines—to measure students' improvement in QR and help determine any need for changes in instruction or curriculum.

- 3. Beyond the classroom, UM may leverage other forces on campus, such as Student Life, Business Affairs, the LEC, the Malone Center, etc., to promote QR in ways such as:**

- Faculty development, e.g., by offering workshops for instructors who wish to incorporate new QR elements into their courses;
- QR-related campus events, such as puzzle challenges or escape rooms hosted by GSD / the Montevallo Organization of Gaming;
- Offering tutoring with a QR focus;
- Hosting a Financial Literacy Week;
- Investing in other initiatives as needed.

STUDENT POPULATIONS INFLUENCED BY THIS QEP

Since most disciplines should have at least one course that would qualify as a QR course, this QEP could potentially influence every UM student. However, UM should make a concerted effort to target students who are most at risk where QR is concerned. (For example, with the help of the Falcon Success Center, incoming students with low mathematics ACT subscores should be tracked as they progress through MATH 131 and beyond.)

BENEFITS FOR UM

Recently, the university has faced challenges with student retention and graduation rates. Because of the gaps in our incoming students' QR skills, many students find QR-heavy courses to be stumbling blocks to the timely completion of their degrees. Therefore, in the long run, efforts to “close the gap” in QR may:

- **Increase student retention;**
- **Promote timely graduation;**
- **Improve overall student performance.**

In addition, because of the great demand for individuals with QR-related skills such as “analytical thinking” or “critical thinking and analysis” [6] in so many different professions, this QEP may also improve our students' career readiness.

AUXILIARY INITIATIVES ASSOCIATED WITH THIS QEP

In all likelihood, students receiving the appropriate mathematics foundation *at the start of their UM career* is vital for the success of this QEP. Thus, as part of its commitment to QR, UM should also:

- Make a concerted effort to advise each incoming UM student into the most appropriate mathematics course(s) for their major.
- Make a concerted effort to advise incoming UM students into their General Education mathematics course (or, if necessary, MATH 131 first) as early as possible—preferably within their first year at UM.

These auxiliary goals could be incorporated into TAA (Transforming Academic Advising) initiatives already underway at UM.

CITATIONS

1. Association of American Colleges & Universities' Quantitative Literacy Value Rubric. <https://www.aacu.org/value/rubrics/quantitative-literacy>
2. ACT Class Profile Report: University of Montevallo. p. 8; p. 26.
3. University of Montevallo CIRP Freshman Survey 2018 results, p. 30. Higher Education Research Institute, University of California at Los Angeles.
4. University of Montevallo QEP Selection Committee Meeting Minutes; March 7, 2019.
5. NSSE 2018 Snapshot: University of Montevallo, p. 4.
6. *The Future of Jobs Report 2018*, p. 12. World Economic Forum, Centre for the New Economy and Society.