



Learning by Doing: Inquiry-Based Experiential Education
The University of Tampa
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The theme of the University's QEP, *Learning by Doing*, is Inquiry-Based Experiential Education. The QEP will focus on educating students using inquiry-based approaches and outcomes to problem solving through focused experiences and activities in first year (FY) course programming; enhanced discipline-skill based courses; and problem- and project-based undergraduate research, capstones, and internships for juniors and seniors.

Program goals are to transform the institution through:

- Enhancing the awareness, importance, and visibility of scholarship and inquiry at UT by actively promoting and supporting both faculty mentoring and student engagement in these key learning processes;
- Increasing opportunities for student scholarship and creative works by developing more opportunities for faculty-student engagement for intensive mentoring and creative relationships;
- Engaging more students in quality internship experiences through changes in curricular requirements, strengthening of the rigor of internship outcomes and improved relations with community partners; and
- Enhancing the University organizational structure to support these experiential processes.

Student learning objectives related to these overarching goals are:

- Improving critical thinking skills as determined by changes in student approaches and problem solving as measured by external and internal assessment instruments;
- Improving communication abilities as determined by improvements in writing styles and abilities as measured by qualitative scoring rubrics and national normed tests;
- Improving communication abilities in public speaking/presentation skills as measured by qualitative scoring rubrics and national normed tests;
- Attaining practical skills related to the field of inquiry, including information/reference searching, quantitative literacy, creative thinking, and problem solving relative to projects and performance standards.

The QEP will examine student gains in these learning and project outcomes. Students will be involved and engaged in scaffolded, faculty-mentored activities in the following areas: 1) authentic undergraduate research, 2) creative works/artistic productions, and 3) high impact practice internship experiences. The process begins in FY classes, is built upon in the second and third years within majors, and culminates in mentored senior year project work. The QEP also provides a commitment to increase internship involvement by 25% per year and will impact nearly 1,000 students in total per year when fully implemented. Students will benefit from involvement in these high impact practice activities through greater learning and focused experiences for post-graduate careers.

February 2016



The Impact Report of the Quality Enhancement Plan

Section 1: Initial Goals and Intended Outcomes of the Quality Enhancement Plan

In February of 2016, SACSCOC approved The University of Tampa's Quality Enhancement Plan, entitled "Learning by Doing: Inquiry-based Experiential Education." The QEP aligns with the mission of the University, which emphasizes experiential education, and focuses on improving institutional support of and student involvement in two high-impact educational practices: undergraduate research, referred to here as inquiry, and internships. The programmatic goals of the QEP were to transform the institution through the following mechanisms:

1. Enhancing the awareness, importance, and visibility of student scholarship and inquiry at UT by actively promoting and supporting both faculty mentoring and student engagement in these key learning processes.
2. Increasing opportunities for student scholarship and creative works by developing more opportunities for faculty-student engagement for intensive mentoring and creative relationships.
3. Engaging more students in quality internship experiences through changes in curricular requirements, strengthening of the rigor of internship outcomes, and improved relations with community partners.

The student learning objectives for the QEP were the following:

1. Improving critical thinking skills by promoting changes in student approaches to problem solving as measured by external and internal assessment instruments;
2. Improving communication abilities by improving writing styles and abilities as measured by qualitative scoring rubrics and national normed tests;
3. Improving communication abilities in public speaking/presentation skills as measured by qualitative scoring rubrics and national normed tests;
4. Attaining practical skills related to the field of inquiry, including information/reference searching, quantitative literacy, creative thinking, and problem solving relative to projects and performance standards.

Section 2: Changes Made to the QEP and the Reasons for Making those Changes

We have made several changes to our original assessment plan as we implemented assessments and evaluated their results. The primary measure of communication skills were two rubrics adapted from the



VALUE rubrics from the American Association of Colleges and Universities (AAC&U). After development and initial classroom use, these rubrics were calibrated, validated, and examined for inter-rater reliability and construct validity. An explanatory principal axis analysis of these initial rubrics was also used to identify the underlying relationship between measured variables. The analysis revealed that, while having sufficient inter-rater reliability, they were uni-factorial with the grammatical execution being the only dominant factor. Therefore, these rubrics were revised and recalibrated, and principal axis analysis revealed at least a two-factor structure including grammatical skills and consistency and quality of thesis, allowing university-wide deployment to measure communication more precisely.

In addition, as the QEP was implemented, we found it necessary to refine learning objective 4. As initially written, there were too many distinct components contained in this one objective (information literacy, quantitative literacy, creative thinking, and problem solving). After discussing the assessment plan with the faculty Research and Inquiry Committee, we felt that attempting to assess thoroughly each of these four aspects would lead to survey fatigue which, in turn, might lead to a decrement in reliability and issues with faculty participation. We therefore refocused this objective on information literacy, which includes information/reference search as a component of a broader competency, and quantitative literacy, which are two important outcomes of student participation in inquiry-based courses and experiences.

We also found that successful implementation of the QEP required more administrative support than initially planned. This realization led to an increase in administrative support for the Office of Undergraduate Research and Inquiry (OURI), which was established at the start of the QEP, by appointing a full-time administrative assistant in spring of 2019 rather than a part-time assistant, as was originally outlined in the QEP document. We also increased the teaching offload for the new QEP director to support the transition into the role in the fall of 2018 after the first QEP director left the university. The stipend for the position was also increased to reflect the year-long commitment that is necessary to administer the QEP and facilitate Summer Undergraduate Research Fellowships (SURFs) during the summer months. Finally, the budget for the QEP was also increased to support a greater number of multidisciplinary team-based internships in 2019-2020 after a successful pilot program in the spring of 2019.

Apart from these changes, which were made to support the QEP and increase opportunities for student participation, we implemented the phased approach and assessment plan that was described in the initial proposal.

Section 3: QEP Impact on the Environment and Student Learning

We sought to increase faculty and student involvement in inquiry by embedding inquiry in the curriculum using a scaffolded approach. First, the QEP was introduced in a phased manner, starting with inquiry-

based First-Year Experience (FYE) courses in academic year (AY) 2016-17, in which faculty introduced students to the concepts of research and inquiry in their respective disciplines. Second, beginning in AY 2017-18, we encouraged faculty to create inquiry-based courses for their majors by offering a curriculum-grants program. Each course proposal was reviewed by a faculty committee before implementation, and faculty engaged in development seminars through the Office of Undergraduate Research and Inquiry (OURI), which was established in 2016 to support the QEP. Finally, in order to support student engagement in research and creative inquiry, we created the Undergraduate Research and Inquiry grant program, first piloted in AY 2017-18, to encourage and support student research during the academic year in addition to the Summer Undergraduate Research Fellowship program. The number of students impacted by these efforts is displayed in Table 1. Our initial goal was to reach 1,000 students per year when fully implemented. However, we exceeded this goal in AY 2017-18, far earlier than anticipated and continued to expand the QEP's reach in the two following years. As a result, 41% of graduating seniors in spring 2020 had participated in QEP courses or faculty-mentored research.

3.1 Enhancing the awareness, importance, and visibility of scholarship and inquiry at UT

The success of our students in faculty-mentored research has been remarkable and has become a frequent cause for public celebration. The Office of Public Information regularly writes articles about student scholarship and achievements, college-level newsletters feature student presentations, grants, and accomplishments, and OURI maintains an active social media presence (27,823 individuals reached with 4,271 engagements on Facebook in AY 2018-2019). OURI also created an annual publication that highlights collaborative faculty and student research and inquiry.

	Academic Year				All Years
	2016-2017	2017-2018	2018-2019	2019-2020	
Culminating Projects					
Faculty	-	10	41	44	95
Students	-	10	57	68	135
Majors Inquiry					
Courses	-	27	33	51	111
Faculty	-	23	25	35	83
Students	-	835	1,289	1,547	3,671
FYE Inquiry					
Courses	10	29	24	25	88
Faculty	9	20	17	13	59
Students	233	577	468	478	1,756
Total Students	233	1,422	1,814	2,093	5,562

Table 1: The number of student and faculty participants in the QEP.



Students have also been leaders in celebrating student research accomplishments and encouraging their peers to engage in research. A new student organization dedicated to expanding, improving, and providing information about undergraduate research opportunities on campus was established in 2018. This organization, called Discover, promotes research involvement by tabling at university events, speaking in classes upon invitation by faculty, and hosting faculty and student research seminars. OURI established an undergraduate research journal, called Q, in 2019. The journal publishes student scholarship from all disciplines resulting from inquiry-based courses established by the QEP. Manuscripts are reviewed by faculty, and a student editorial board publicizes the call for submissions, handles the review process, solicits submissions for cover art, and creates the layout. The student editorial board also organizes a journal-release party to celebrate the accomplishments of student authors.

3.2 Supporting faculty mentoring

In order to support faculty development, we became enhanced institutional members of the Council on Undergraduate Research (CUR) in 2018. This membership allowed all UT faculty, staff, and students to become personal members of CUR at no additional cost. This relationship with CUR offers faculty the privilege of participating in professional development workshops, webinars and provides a subscription to *Scholarship and Practice of Undergraduate Research* allowing faculty to stay current on best practices. This relationship with CUR will continue beyond the current QEP. In addition, OURI has held regular faculty workshops on mentoring and, since 2018, all new faculty have been offered a copy of the book *Excellence in Mentoring Undergraduate Research* during faculty orientation.

3.3 Enhancement of Internships

In order to expand the QEP goals for internships, the Internship Committee created a set of institution-wide policies and procedures for internships, codified in the *Internship Policies, Procedures, and Guidelines Manual* during the first year of the QEP. The manual was designed to enhance and improve internship experiences for students, faculty, and host sites while preserving important legal and ethical principles of transparency, equal opportunity, and institutional continuity. It established baseline requirements for credit-bearing internships and outlined expectations for learning outcomes and assessment. Furthermore, the manual defined the host site and university partnership to improve relationships with community partners.

The Internship Committee also recommended that the institution adopt a new software platform, Handshake, that enables faculty to approve, track, and manage internship opportunities, allows internships to be targeted to specific majors, archives student internship documents, such as internship learning objectives, the manner in which the student learned of the internship, evaluations, and host-site information, and allows analytics for internships completed by academic major, industry, or host site. The recommendation was accepted and the software implemented in 2017. Career Services held training for



the software for departmental internship coordinators. Handshake dramatically increased the number of internship opportunities available to our students, from 924 in fiscal year (FY) 2017 to just over 3,336 internships posted in FY 2018 (261% increase). This trend continued in FY 2019 with 5,359 internships (61% increase) and 7,640 in FY 2020 (43% increase). Overall, the number of internship opportunities available prior to implementation of Handshake to FY 2020 represents a 727% increase. The number of students that completed internships for credit increased initially, rising from 781 internships in 2017 to 815 in 2018, which represents a 4% increase. The number of internships for credit in 2019 decreased, however, to 744 (an 8.7% decrease).

In the spring of 2019, we also piloted a new multidisciplinary internship program that pairs teams of students from different majors with local companies to solve real-world problems. The teams are mentored by committees composed of faculty from each of the majors represented. Two teams of students participated in this program, which we named the Applied Learning Experience, in the spring of 2019, while seven teams participated in AY 2019-2020. These students presented a summary of their work at the end of each semester to the University. The program was qualitatively assessed and students, faculty mentors, and employers were all surveyed to ascertain the effectiveness of the program.

3.4 Student Learning Objective: Improve Critical Thinking

A survey of all full-time UT faculty conducted in the fall of 2018 revealed that the vast majority believe that the primary goal of liberal arts education is to equip students with critical thinking skills in order to become engaged citizens. Critical thinking is defined by AAC&U as a “habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts and events before accepting or formulating an opinion or conclusion.” This definition, which was frequently referenced during implementation of our QEP, indicates that critical thinking is a mindset reflecting epistemological development and a set of skills that enable comprehensive reasoning and analysis. Thorough analysis of critical thinking therefore requires tools that can evaluate both the intellectual development of students as well as their abilities to analyze information and arguments.

Assessment of the impact of inquiry-based courses on students’ epistemological or cognitive development was accomplished using the Scale of Intellectual Development IV (SID IV), which was developed by Dary Erwin at James Madison University and is based on William Perry’s theory of intellectual development. The SID consists of 115 Likert scale questions and yields a sub-score for each of four categories: Dualism, characterized by binary thinking and deference to authority as the source of knowledge, Relativism, a view of the world from a variety of perspectives but maintaining a reliance on authority for guidance, Commitment, in which the individual has developed a coherent belief system while acknowledging the validity of alternative views, and finally Empathy, where the world may be viewed as others view it and is keenly aware of the impact of individual beliefs on society and culture.

Faculty who developed inquiry-based courses were challenged to design assignments that would challenge Dualistic thinkers and encourage a more expansive view of the world. Faculty discussed their course content and assignments at workshops facilitated by OURI at the beginning of each semester. A key finding was the evidence that participation in inquiry-based courses enhances this transition from Dualism to Commitment; by segregating students based on the number of inquiry courses completed, we found a significant decline in Dualism scores, a decrease in Relativism scores, and an increase in scores for Commitment and Empathy. Highly significant differences were also observed for all SID categories when comparing students in first year courses to students in upper-division, inquiry-based courses.

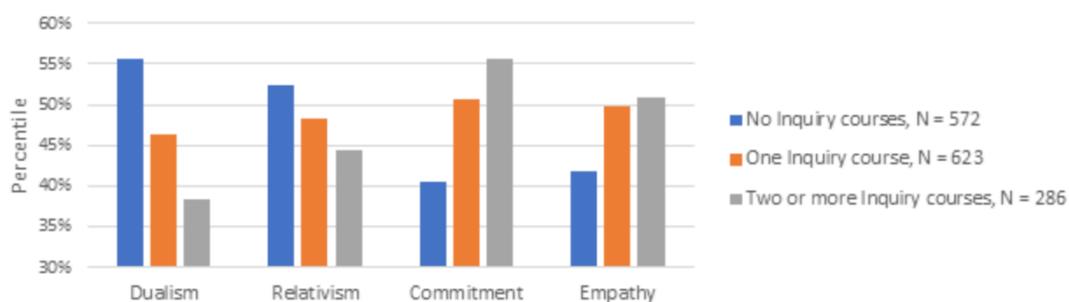


Figure 1: SID scores by the number of inquiry-based courses taken.

Students' grades in inquiry-based courses were negatively correlated with their Dualism score, while their Commitment score was positively correlated with course grades. Similarly, their Dualism score also showed a significant negative correlation with the number of credit hours earned by the end of their first year. These relationships demonstrate that academic success increases as students transition from "black and white" thinkers to those who have developed a coherent belief system and can appreciate alternative views. Together, these results suggest that our inquiry-based courses enhance a student's cognitive growth and ability to view the world from others' perspectives and may also enhance their academic success.

To explore further the connection between the Scale of Intellectual Development and a critical thinking test that directly measures induction, deduction, identification of assumptions and predictions in planning experiments, we compared the Cornell Critical Thinking (CCT) test with the SID results. This analysis revealed a highly significant correlation between Dualism and CCT test scores (Pearson Correlation = -0.452, $P < 0.001$), and nonsignificant but expected trends for other SID sub-scores. These data suggest that although the SID does not directly measure the same attributes of commonly used tests of critical thinking, the correlation between the CCT test and Dualism score suggests that the SID has utility for assessing critical thinking and epistemological development.

The impact of inquiry-based courses on critical thinking was also directly measured using the Proficiency Profile from the Educational Testing Service. The test is designed to measure students' abilities to recognize assumptions, distinguish rhetoric and argumentation in prose, identify the best hypothesis as it relates to information presented, infer relationships from and interpret data, and draw conclusions based on information. A cohort of 100 students with at least 90 credit hours were randomly recruited to complete the exam in the spring of 2019. Of these students, 54 were identified as having taken at least one inquiry-based, majors-level course, while 46 students had not taken an inquiry-based course. Neither GPA nor credit-hour completion were significantly different between these two groups.

The average total score¹ on the Proficiency Profile was significantly higher for inquiry students, with a mean score of 457, compared to non-inquiry students (mean score of 434, $P < 0.0001$). Furthermore, when examining the critical thinking component of the test, inquiry students performed better than their peers who had not taken inquiry courses (75th percentile vs. 44th percentile, $P < 0.0001$)². These data, shown in Figure 2, were explored further to examine a subset of students within the College of Business to determine whether these differences were evident in students pursuing similar majors. Critical thinking scores were also significantly higher for students within the College of Business that had taken inquiry courses compared to those students who had not. It is important to note that inquiry courses have not yet been identified to students through advising or course identifiers, so these differences are not likely to be explained by higher performing students having self-selected into inquiry courses.

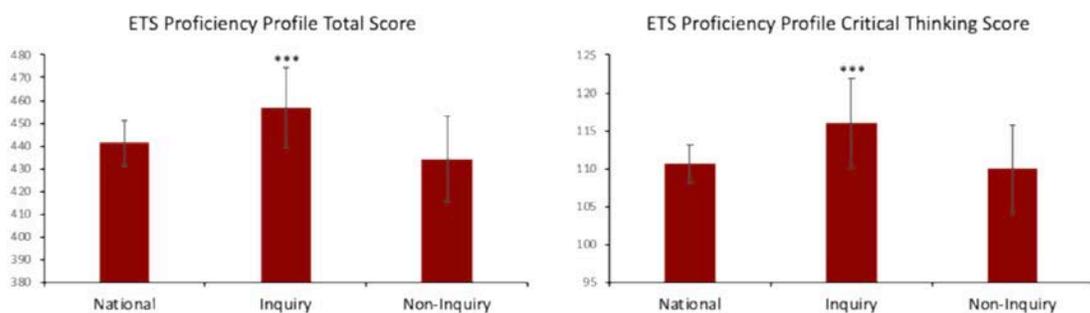


Figure 2: ETS Proficiency Profile test scores for students having taken inquiry-based courses (Inquiry), those not having taken inquiry-based courses (Non-Inquiry) and the national average (National). *** $P < 0.0001$

This assessment was repeated in the spring of 2020, although due to disruptions caused by COVID-19, a smaller cohort of students were available. However, similar results were obtained. The inquiry cohort ($N = 26$) scored significantly higher on the ETS proficiency profile ($P = 0.0016$) than student who had not taken inquiry-based courses ($N = 20$).



In addition, students funded by OURI to pursue faculty-mentored research were surveyed about their experience, and self-perceived gains in critical thinking were frequently reflected in their comments. An example from one student researcher is included below:

“Getting involved in research provides a student a component in education that the classroom cannot. . . this experience has really developed my critical thinking ability with regards to accepting or rejecting new ideas. There are so many benefits and I would recommend this to everyone.”

The variety of assessment instruments used to measure critical thinking together indicate that inquiry-based courses and faculty-mentored research experiences have been successful in expanding our students’ competency with this vital skill.

3.5 Student Learning Objective: Improve Written and Oral Communication Abilities

We also sought to measure the impact of inquiry-based courses and co-curricular research and internship experiences on students’ writing and presentation skills. Analysis of rubric scores from 2018 revealed that over 70% of students were exceeding expectations (score >3) for all categories for oral communication in inquiry-based FYE courses and majors-level inquiry-based courses. Similar results were found for writing, with greater than 65% of students exceeding or greatly exceeding expectations for all categories in each course. However, these data also showed that FYE students were receiving higher scores than upper-division students (average scores of 4.1 for FYE and 4.1 for upper division on the presentation rubric, 4.0 for FYE and 3.9 for Majors on the writing rubric). These data were discussed with the Undergraduate Research and Inquiry faculty committee which suggested that these results could reflect inappropriate rubric use by faculty, either by using them as grading rubrics (grades in FYE are typically very high) or applying relative expectations based on the students age or year at the institution. The QEP director communicated these results with faculty teaching inquiry-based courses and emphasized the committee’s suggestions that the rubrics not be used for grading but rather be applied equally regardless of the students experience level. Subsequently, rubric scores for FYE students decreased to an average score of 3.4 (54% of students exceeded expectations) for the presentation rubric compared to an average score of 4.0 for upper-division students (72% exceeding expectations). Scores for writing followed a similar trend and are shown in Figure 3 below.

We also evaluated the presentations of students who complete a faculty-mentored research project. These students received funding by OURI and were required to present their findings at the college research celebration events in the spring semester. Faculty from the Undergraduate Research and Inquiry committee used the communication rubric to evaluate these students. The scores reflect the outstanding presentations given by these students; 97.6% exceed or greatly exceeded expectations (average score of 4.8).

These data indicate that our students are progressing in their written and oral communication abilities and achieve a high level of mastery after having participated in a faculty-mentored research or creative inquiry project.

Written communication was also examined using the ETS Proficiency Profile, discussed above. The test evaluates writing in two ways, using multiple choice questions that evaluate the students' abilities to recognize correct syntax and grammar, and also a holistically graded essay. Those students who participated in inquiry-based courses scored significantly higher on the writing subtest (117 vs. 112, $P < 0.0001$) and also received higher scores on the written essay (4.5 vs. 3.8, $P = 0.0024$).

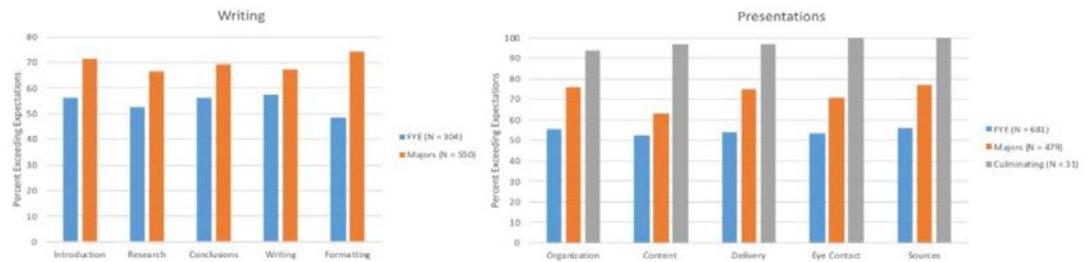


Figure 3: Written and Oral Communication Rubric Data. Data are combined for AYs 18-19 and 19-20.

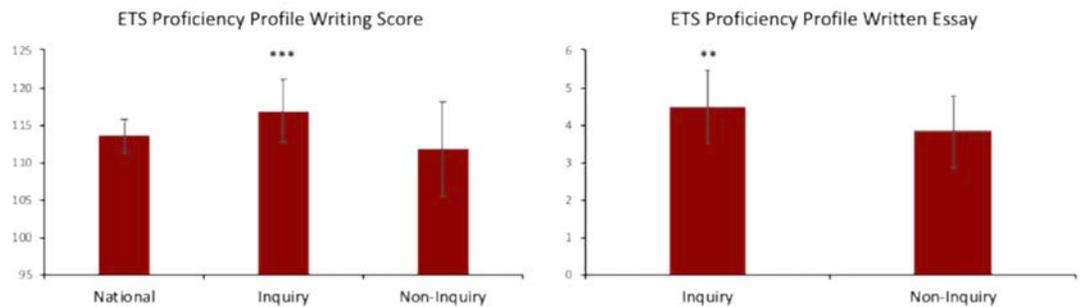


Figure 4: ETS Proficiency Profile Writing Sub-score and Essay Scores.

Taken together, these data show that our students are improving as communicators as they progress through inquiry-based FYE, upper-division courses and culminating experiences, including undergraduate research and inquiry-based internships. Furthermore, we see that students who take inquiry-based courses earn higher writing scores on the ETS Proficiency Profile. Although we cannot directly attribute this difference to the inquiry-based courses, students in inquiry-based courses routinely practice communicating their findings and are thus likely better prepared to do so effectively.

3.6 Student Learning Objective: Improve Information Literacy and Quantitative Literacy

Students in inquiry-based courses must gather information in order to answer their questions, which requires them to develop and refine their information literacy. The Association of College & Research Libraries (ACRL) Framework was used as a basis for faculty development workshops focused on

information literacy, and were delivered in collaboration between the library and OURI. To begin to assess information literacy in our students, an assessment instrument was adapted from the Information Literacy Assessment & Advocacy Project (ILAAP) and used as a pre-and post-test during the spring 2019 semester in inquiry-based courses. The average score on the pre-test was 84% and the average score on the post-test was 85%. Although the scores were not significantly different, the assessment provides a baseline and OURI continued collaboration with our Information Literacy Librarian to assist faculty in teaching information literacy in their inquiry-based courses. Online modules for faculty and student use were created in the summer of 2019 by our Information Literacy Librarian and shared as a resource for all faculty teaching inquiry-based courses. The information literacy assessment was administered in AY 2019-20 to students in FYE courses, students in majors inquiry-based courses, and students who were engaged in faculty-mentored research (Figure 5). These data show that information literacy improved as students progressed through the inquiry-based curriculum.

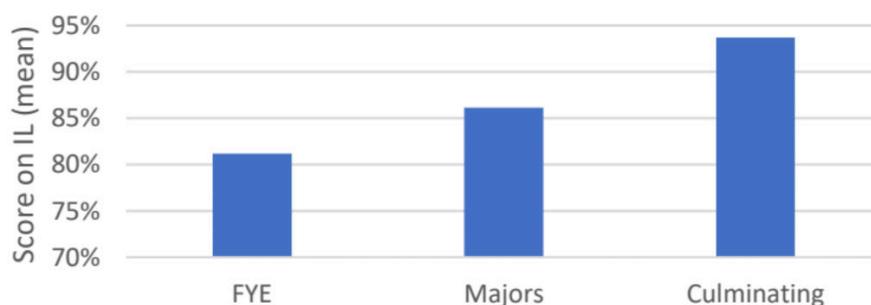


Figure 5: Mean scores (%) for students in the FYE ($N = 58$), Majors-level inquiry-based courses (Majors, $N = 88$), and faculty-mentored research (Culminating, $N = 28$). $P < 0.001$ by One-Way ANOVA.

Quantitative skills were also evaluated using the ETS Proficiency Profile. As seen with critical thinking, writing, and the overall score, students who had taken an inquiry-based course performed significantly better on the quantitative-skills score than students who had not taken an inquiry-based course (118 vs. 111, $P < 0.0001$).

3.7 Additional Impact of Co-curricular Research on our Students

In addition to the direct and indirect measures of these student learning outcomes as described above, we also sought to evaluate our students' undergraduate research experiences by distributing the ROLE (Research on Learning and Education) survey, which was developed by David Lopatto³ and used at other institutions of higher education. Students were asked what they considered to be the benefits derived from their research experiences. The following were the highest scoring gains reported by the students: developing a continuing relationship with a faculty member (4.61 out of 5), understanding of the research process (4.53), learning a topic in depth (4.52), learning to monitor your own behavior by making realistic



work schedules and correcting your own mistakes (4.47), enhancement of your professional or academic credentials (4.45), readiness for more demanding research (4.45), and learning to persevere at a task (4.44). Furthermore, 82% responded that they felt their mentor was an outstanding teacher and mentor while 15% reported that their mentor was above average as a teacher and mentor, indicating a culture of excellence in undergraduate research mentoring.

The ROLE survey also revealed many ways in which students benefitted from their research experiences. For example, one student commented that “the benefits of my experience [are] beyond valuable to me. My ability to speak in front of crowds, write, theorize, and innovate has drastically improved since I’ve started researching.” Students also remarked that the experiences have helped them develop their resiliency and problem solving in response to failure: “I think that the most valuable aspects of my research experience were learning how to problem solve and developing a close, working relationship with a distinguished professional in my field. Throughout the project I had difficulties obtaining the data I wished to use and so I gained experience problem solving and restructuring my research question. I was also able to develop a strong relationship with my faculty mentor as we frequently worked together directly.”

Section 4: Reflection on What the Institution has Learned

Implementation of the assessment portion of the QEP was not without its challenges. From a logistical standpoint, by moving from paper rubrics to distributed spreadsheets that were pre-populated with the course roster and rubric criteria, it became easier for faculty to complete the rubric in a timely manner. These changes facilitated both higher levels of assessment compliance and streamlined the analysis process.

Through implementation of the QEP, we learned as an institution about the importance of rubric validation and training for faculty on appropriate use of rubrics. We initiated workshops to train the faculty on specific rubrics to improve inter-rater reliability. The QEP Assessment Coordinator, Dr. Steve RiCharde, has been appointed to the role of Assistant Provost and now trains faculty from all departments in rubric design and implementation as part of UT’s overall assessment initiative.

4.1 Unanticipated Outcomes of the QEP

The QEP resulted in revision of the merit section of the Faculty Handbook through the Faculty Senate so that involvement with undergraduate research, internships, and other high-impact practices is recognized in tenure and promotion decisions as well as annual faculty evaluations. These changes touched all three areas of faculty evaluation: teaching, scholarship and service. Faculty are specifically rewarded for incorporating inquiry-based projects into their courses and for mentoring students in collaborative



research and creative inquiry endeavors. The section for merit in Service/Student involvement was expanded to encourage participation in departmental or college-wide events to showcase student scholarship. Merit as a Scholar was also revised to reward faculty for collaborating with students in research and for publications or presentations that include students as co-authors.

Faculty have also been individually recognized by the college deans for mentoring students in research or creative activity. Three annual college-level awards were established since the implementation of the QEP that recognize faculty for excellence in mentoring. These awards are presented at a University-wide ceremony in the spring semester along with awards that recognize excellence in teaching, scholarship and service to the University. The annual awards and revision of the Faculty Handbook have created a culture that both expects and rewards mentoring of undergraduate students in research and creative scholarship.

The institutional support for undergraduate research, including the year-long funding and summer research grants program, was foundational for establishing an Honors thesis within the Honors program for AY 2019-2020. The Honors program modeled the thesis application form on the OURI grant application form to streamline the process for students. For the first year of the thesis program, 50% of students selected to complete an Honors thesis have received research funding through OURI.

The assessment data to date show that inquiry-based courses enhance critical thinking skills, communication abilities, and that co-curricular research experiences have a transformative impact on our students. We will continue to encourage development and continuation of inquiry-based courses and support faculty mentored research through OURI. Furthermore, our institution is in the process of revising the general-education curriculum and we intend to use an inquiry-based curriculum in required courses for first- and second-year students.

¹ Footnote: We constructed average total score after conducting exploratory factor analysis of the ETS scores using principal component analysis. One factor emerged, with the g-factor (Total Score) accounting for 81.1% of the overall variance. The identity matrix could not invert resulting in a unitary factor. Diagnostics suggest the appropriateness of factor analysis (Kaiser-Meyer-Olkin = 0.657; Bartlett's Test of Sphericity = 0.000).

² Footnote: Results from a t-test. The choice of test is appropriate based on the following diagnostics—skewness: -0.093; kurtosis: -0.542; insignificant Levene's Test of Homogeneity of Variance (p value); Levene: -0.388

³ Footnote: Samuel R. and Marie-Louise Rosenthal Professor of Natural Science and Mathematics and Director of the Center for Teaching, Learning and Assessment, Grinnell College.