

CUR Focus

A Partnership for the Future: Undergraduate Research's Mutual Benefits for Students and Administrators

Over the past twenty-five years, numerous stakeholders have called for greater accountability in higher education, particularly for public institutions. As a result, assessment of educational outcomes has increased at both the departmental and institutional levels. Most recently, national disciplinary associations have taken an active role, assisting members with internal assessment by providing departments with more information and recommendations about various assessment metrics (Young and Crews 2012). Many of these disciplinary associations encourage departments to promote undergraduate research as a means of accomplishing two separate but intertwined goals: (1) pushing students to complete Bloom's Taxonomy, a foundational classification of learning objectives culminating in a student's ability to analyze and to evaluate information, by creating new knowledge and (2) creating feedback that faculty and administrators can use for internal assessment purposes (Young and Crews 2012). Thus, students can benefit from the experience of conducting independent research and from the direct feedback from mentors and other reviewers, while departments and institutions can utilize the students' performances as feedback for internal purposes, using undergraduates' research competency to revise programs to prepare the next wave of students to produce stronger independent work.

In this article, I propose the integration of undergraduate research into the broader undergraduate curriculum as a means of addressing some of the key lingering obstacles to meaningful assessment regimes, particularly within major research universities. After reviewing the relevant literature on assessment and the benefits of undergraduate research, I offer as support some data derived from the assessment program at Truman State University that show a promising link between students' participation in undergraduate research and achievement of key undergraduate learning outcomes.

Assessment and Undergraduate Research

The benefits of undergraduate research for student learning outcomes are well documented. In general, there is a broad consensus that undergraduate research achieves five important goals: (1) providing experience in the research process; (2) increasing disciplinary knowledge; (3) encouraging exploration of students' interests; (4) preparing students for academia/graduate school; and (5) forming relationships between students and faculty mentors (Ishiyama 2002, 372). There is empirical evidence showing a positive relationship between participation in undergraduate research and achievement of improved abilities in analysis and logical thinking, ability to synthesize information, and competency as an independent learner (371).

In spite of this literature, research from the National Institute for Learning Outcomes Assessment (NILOA) shows that undergraduate research is an under-utilized metric in departmental assessment programs. In 2010, NILOA conducted a survey in which individuals responsible for student learning outcomes assessment within their undergraduate departments or programs were asked about their assessment criteria. Roughly 45 percent of respondents indicated that all undergraduate students in their academic department's degree program complete a final research project as part of the degree program's assessment framework, and only about 55 percent reported that "most" students complete such projects (Ewell, Paulson, and Kinzie 2011, 9). At the same time, more than 40 percent of respondents reported that more faculty involvement in assessment would help the assessment program, while two-thirds of university chief academic officers reported that greater faculty involvement would aid assessment programs.

Assessment personnel have long sought greater faculty involvement in assessment. Within the past few years, leading authorities on assessment have tried to promote faculty involvement through a series of recommendations that include: building assessment around the regular, ongoing work of teaching and learning; reframing assessment as scholarship; and involving students in the process of assessment (Hutchings 2010, 13-16). Taken together with other information, it becomes clear that adding undergraduate research as one metric used in assessment programs measuring student outcomes presents an opportunity to facilitate the faculty involvement that proponents of assessment have desired for so long.

The Problem and the Solution

At this point, it is important to make sense of what the literature is saying about undergraduate research and its role in program assessment. A compelling body of research suggests that undergraduate research promotes learning. NILOA data indicate that the number of academic programs requiring final projects leaves substantial room for growth. Yet the number of programs requiring a capstone course is high (approximately 70 percent of undergraduate department program heads reported that “most” students complete a capstone, while roughly 60 percent reported that all students participate) (Ewell, Paulson, and Kinzie 2011, 9).

The problem is this: There is increasing demand for institutional accountability to various stakeholders that can be satisfied by a comprehensive assessment program, but some institutions, whether due to lack of resources or other factors, continue to resist the implementation of such programs. The solution, however, is quite simple—encourage those institutions to integrate a research project into the already-prevalent capstone requirements and use these projects as a means of improving student learning outcomes, then use student competency with these projects as a metric in the assessment program.

Recall that independent assessment experts recommend increasing faculty involvement in the process, in part, by building assessment around teaching and learning, reframing assessment as scholarship, and involving students in the process of assessment (Hutchings 2010, 13-16). Undergraduate research, as part of an assessment program, fulfills each

of these recommendations. By integrating undergraduate research into the normal curricular requirements, faculty members can use the classroom experience and regular office hours to accomplish academic objectives while gaining a deeper understanding of exactly what their students know about the research process and their discipline’s methodologies and paradigms. In suggesting that assessment ought to be reframed as scholarship, Hutchings intends that the collection and analysis of student data be viewed by faculty as part of their duty as scholars investigating the phenomena surrounding learning (15). This recommendation is rooted in the assumption that faculty have a firm commitment to the pursuit of knowledge and understanding.

Thus, it follows that this recommendation can be expanded to encompass faculty members’ working along with undergraduates on research projects. Such a unified research effort serves the purposes of internal assessment by giving insight into student learning, and it expands on the benefits of undergraduate research by creating the possibility that students can leave their undergraduate experiences having contributed to published work, having presented research at a major conference, or having developed a meaningful relationship with a faculty mentor. Indeed, this seems especially promising for major research institutions, where faculty members are expected to publish extensively but where undergraduate research programs have consistently lagged behind liberal arts institutions in terms of assessment.

Finally, using undergraduate research as one component of an assessment process fulfills the recommendation that faculties involve students in the assessment process. There is perhaps no better means of accomplishing this goal than by using an intensive student-initiated or student-assisted research project to help measure peers’ learning outcomes.

To sum up, the benefits of undergraduate research for university administrators and undergraduate academic department heads are clear. Major higher-education institutions need meaningful assessment regimes to fulfill stakeholders’ demands for accountability. Multiple disciplinary associations endorse the use of undergraduate research projects as a metric in assessment (Young and Crews 2012). Moreover, undergraduate research is a step toward increasing faculty engagement in the assessment process, an outcome that both chief academic officers and assessment directors desire

(Ewell, Paulson, and Kinzie 2011, 11-12). By incorporating undergraduate research into the curriculum, faculty gain a relatively easy method of assessing learning outcomes, and the information gained can easily be used to retool courses that emphasize methodologies and/or research processes. For departments or programs that lack the capacity to require full-scale independent research projects from all students, a comparable substitute (for assessment purposes) could be student research teams working together or simply requiring the submission of independent research designs sufficient to demonstrate a student's understanding of the research process and a conceptual mastery of methodologies. However the specifics work out in individual departments and programs, the key is that the faculty get a deeper understanding of how their students approach complex problem-solving and employ critical college-level skills.

New Support for the Benefits of Undergraduate Research

While the body of empirical data supporting the positive link between participation in undergraduate research and achievement of key learning outcomes is robust, there is always room to add a bit more support. I can do this by presenting some small-scale findings based on publicly available assessment data from Truman State University (Truman). In 2002, Ishiyama published findings based on survey data collected at Truman from the College Student Experiences Questionnaire (CSEQ) (Ishiyama 2002, 371). This research demonstrated a positive link between participation in undergraduate research and gains in students' abilities in analysis, synthesis of information, and independent learning (371). I have built on this research by updating the data to include assessment scores for several years following Ishiyama's research and by applying a modified statistical test.

Truman is a recognized leader in undergraduate academic assessment, having demonstrated a serious commitment to implementing a "culture of assessment" since the early days of calls for greater accountability (Magruder, McManis, and Young 1997, 17). The university makes substantial amounts of assessment data available for public viewing, including summarized reports from the College Student Experiences Questionnaire, which is administered at the end of each semester (fall, spring, and summer) to juniors enrolled in a

mandatory interdisciplinary seminar course. This questionnaire asks students to rank various educational experiences at their university on a scale of 1 to 4. Among the questions are some asking students to indicate the extent of their participation in undergraduate research and the extent of their perceived intellectual growth in several areas during their time in college.

Using the results of 15 questionnaires from Truman, I compiled a small data set of the university's mean scores in four areas: participation in undergraduate research, quantitative analytical ability, ability to synthesize information, and independent learning ability. In addition, I created an index score to capture the combined effects of these abilities. These indicators of learning outcomes also were used in the Ishiyama study upon which this research builds (Ishiyama 2002, 374), and these are fundamental college-level learning outcomes identified by several national disciplinary associations as elements of a strong academic program (Young and Crews 2012). Using the participation in undergraduate research score as my dependent variable, I ran a simple linear regression analysis for each of the remaining scores to assess the impact of undergraduate research on analytical, synthesis, and independent learning abilities. The results are displayed in Table 1.

Table 1

Variable	Beta	Significance	R square
Index Score	.177	.0001	.0885
Quantitative Analysis	.223	.0001	.0963
Synthesis	.196	.0001	.1219
Independent Learning	.112	.0001	.0249

It is important to acknowledge certain caveats to my findings. Due to limits on data availability, I was only able to construct a test using mean scores as opposed to the raw survey data. As a result, the number of participants used for this study is too low to support any sweeping conclusions. Moreover, the sample consists only of juniors attending a public liberal arts and sciences institution, and these participants are self-reporting their beliefs about their learning

gains. Thus, the survey population does not fully represent the characteristics of the national population of college students, and there is certainly room to question the validity of self-reported measures. However, with limited data available, self-reporting gives us at least some clues about students' intellectual growth. Moreover, when these results are taken together with the whole body of research reported in the literature, they warrant consideration. Finally, this research serves as a pilot test that can be expanded in the future as more data become available, preferably including data derived from faculty-driven assessment, such as reviews of student academic portfolios, a common assessment metric (Young and Crews 2012).

The data, on the whole, show promise. There is a statistically significant positive relationship between the dependent variable and each independent variable. While the R-square values are low across the board, this is not unexpected, as learning outcomes are surely shaped by far more than just one element of an undergraduate experience, such as participation in research. The beta scores, while low, are promising when one considers their ramifications. If universities or undergraduate academic departments adopt a policy requiring all students to have at least some exposure to undergraduate research, the mean scores for the dependent variable will increase dramatically and, as a result, so will mean scores in the key learning areas involved in this test. Overall, however, this data supports what scholars and proponents of undergraduate research have long known: The link between research participation and key learning outcomes is solid.

Conclusion

As the need for meaningful undergraduate assessment grows, major research universities, particularly those publicly funded, will need to find effective ways to satisfy stakeholders' demands for accountability. The consistent link between undergraduate research participation and achievement of key learning outcomes for students—together with undergraduate research as a means of facilitating faculty involvement in assessing students' learning outcomes—indicate that undergraduate research can serve the interests of both students and administrators. Through research participation, students gain both tangible and intangible intellectual and professional growth. At the same time, undergraduate

research can provide faculty members, chief academic officers, and other administrators with insights into the strengths and weaknesses of their undergraduate academic programs, allowing for meaningful revisions of curricula that will better prepare each subsequent wave of students.

References

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