



Evaluating Undergraduate Research Experiences: Student and Faculty Mentor Perceptions

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Students and faculty mentors from a variety of disciplines including psychology completed surveys assessing learning outcomes from undergraduate research experiences. While some of the results supported widely held hypotheses about undergraduate research experiences, other findings provide empirical evidence counter to widely held beliefs about undergraduate research experiences.

• Background

- Several authors have identified potential benefits of undergraduate research experiences in psychology (Kierniesky, 2005; Landrum, & Nelsen, 2002; Ware et al., 2002) and other disciplines (Chandra et al., 1998; Chang, 2005; Hakim, 2000; Kardash, 2000; Mabrouk, & Peters, 2000; McIntosh, 2001; Rodrick, & Dickmeyer, 2002; Schowen, 1998; Seymour et al., 2004; Wood, & Gentile, 2003).
- Although undergraduate research experiences are now common on many college campuses and continue to grow in prevalence (Kierniesky, 2005), faculty and administrators still struggle with evaluating such experiences (Seymour et al., 2004).
- Identifying learning outcomes is key to improving undergraduate research experiences, finding external funding for undergraduate research, maintaining university support for undergraduate research programs, and reporting to accrediting bodies.
- This study makes a unique contribution to the literature by including student researchers in non-science disciplines, a deficit in the literature identified by Seymour et al. (2004).

• Learning Outcomes Rated on a 5-Point Scale:

- From Kardash (2000): Understand contemporary concepts; Use primary literature; Identify specific literature-based question; Formulate literature-based hypothesis; Design test of the hypothesis; Understand importance of controls in research; Understand ethics; Analyze and interpret data; Relate data to hypothesis; Reformulate hypothesis, as appropriate; Relate results to literature;
- From University Learning Goals: Communicate research orally and in writing; Think critically; Think independently; Develop reasoning abilities; Develop leadership; Develop values that guide decision making; Develop intercultural competencies

• Hypotheses

- Faculty mentor ratings would be higher than student ratings
- For empirical research, the highest ratings would be given to: *collecting data, understanding the importance of controls, interpreting data, orally communicating results, and thinking independently*
- Highest ratings for projects based on the student's interest followed by projects based on student understanding of the literature, projects in which the faculty mentor gave the student choices for topics, and projects in which the faculty mentor provided the topic
- Higher ratings for projects in which the student and faculty mentor met more frequently
- Higher ratings for projects that were not related to a course, followed by projects that were an extension of a course and lowest ratings for projects that were a course requirement
- Higher ratings for longer projects as compared to shorter projects

- Surveys were completed by 115 student researchers and 22 faculty mentors.

• Results and Conclusions

- Consistent with Kardash (2000) results indicated that for most learning outcomes from empirical projects, faculty mentor ratings of the outcomes were higher than student ratings.
 - Help students understand the learning goals for research projects, as is done for regular courses.
- We found a difference between projects that were empirical research as compared to projects that were not empirical research for ratings for several learning outcomes.
 - There are different learning goals for empirical and non-empirical research; thus, this is not surprising.
- Although many advocates of undergraduate research experiences claim that student projects should be based on the student's own interests, with regard to student learning outcomes, our results do not support this assertion.
 - Higher ratings for project topics based on understanding the literature or choices that the faculty mentor gave them as compared to projects based on student interests or faculty mentor dictate, indicating that mentors should provide some guidance, although not too much guidance, in determining topics for research.
- The hypothesis that ratings of student learning outcomes would be higher for projects in which the student met more frequently with the faculty mentor received weak support.
 - Future research should determine whether faculty are able to accurately tailor the level of supervision that they provide to the student's needs.
- There was no support for the hypothesis that student learning outcomes would be higher for projects that were not related to a course, followed by projects that were an extension of a course and then projects that were a course requirement.
 - The only significant result was opposite to the prediction predicted. For *ability to understand controls in research*, ratings were highest for projects that were part of a course. Perhaps faculty mentors target this learning outcome as part of the course goals and thus devote more time to it relative to discussing other aspects of the project. This would make understanding the use of controls in research more salient for students whose projects were part of a course than for students whose projects went beyond required course work.
- Results indicate moderate support for the hypothesis that ratings for student learning outcomes would be higher for longer projects as compared to shorter projects.
 - Projects that last longer allow students to gain greater mastery of the material and to go into greater depth for the subject matter. In addition, the degree to which an individual invests in a project influences how the individual perceives the project, with the perception of greater value for the project accruing the longer the project lasts. Future research could determine the extent to which this perception of greater learning outcomes for longer projects is accurate.