The Place of Research in Undergraduate Education

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Background and Purpose
High-impact practices in higher education aim to maximize student engagement in learning and to improve student persistence to degree. The Association of American Colleges and Universities has identified ten high-impact educational practices that include research as undergraduate learning is enhanced by conducting empirical studies, applying new technologies, and linking tangible findings to concepts and questions at the core of the discipline.¹ Undergraduate research brings students into the world of the scholar by introducing them to the complex questions and problems that prevail in a given subject and increase the contact time between teachers and students. When research is applied to community matters, it also has the potential to strengthen the relationship between the community and campus and to help students recognize the relevance of work in the field.²

While undergraduate research is most commonly facilitated in the sciences, undergraduate research in the humanities and social studies have a profound impact on student learning. Investigations in the humanities and social studies can illuminate the complexity of historiography, civic virtue, poverty, and democracy; they can shed light on the human condition and the implications of what students believe about their place in the world.³ Research may be used to introduce new concepts, review students’ understanding of statistics, deepen students’ understanding of ideas, issues, and procedures, and to provide students with formative assessments of their progress in advance of summative evaluations.

The purpose of this tutorial is to:

- Define undergraduate research
- Explore the benefits of undergraduate research
- Review some examples of undergraduate research projects
- Address key considerations of undergraduate research related to course design

What is undergraduate Research?
The modern university generates new knowledge through faculty’s research, which often include projects that involve graduate students as co-researchers. Typically, undergraduates do not participate in these activities; so what is meant by “undergraduate research?”

In general, undergraduate research refers to projects that prompt students to investigate, analyze, and articulate findings in ways that help them understand the methods used in the field to generate new knowledge and creative thinking. To administer undergraduate research, one must make many decisions before integrating it into the curriculum; Table 1 illustrates the difference between two sets of criteria often used to define undergraduate research; note one is more student-centered than the other.4

Table 1: Criteria of Undergraduate Research

<table>
<thead>
<tr>
<th>Criteria Emphasizing Autonomy</th>
<th>Criteria Emphasizing Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student, process-centered</td>
<td>Outcome, product-centered</td>
</tr>
<tr>
<td>Student initiated</td>
<td>Instructor initiated</td>
</tr>
<tr>
<td>All students may participate</td>
<td>Restricted to honors or advanced students</td>
</tr>
<tr>
<td>Curriculum-based; not obligated to grant</td>
<td>Co-curricular, fellowships/grant-driven</td>
</tr>
<tr>
<td>Collaborative</td>
<td>Individual</td>
</tr>
<tr>
<td>Original to the student</td>
<td>Original to the discipline</td>
</tr>
<tr>
<td>Multi-disciplinary or interdisciplinary</td>
<td>Discipline-based</td>
</tr>
<tr>
<td>Campus and community audience</td>
<td>Professional audience</td>
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This tutorial advocates student research emphasizing autonomy and focuses on curriculum-based projects in which all students may participate and in which students are given a great deal of freedom to construct and conduct their own inquiries with appropriate guidance.

What are the Benefits of Undergraduate Research?

For the Student

- Enhances students’ understanding and appreciation of scholarly methods of knowing5
- Improves students’ sense of and confidence in their own scholarship6
- Improves analytical and communication skills7
- Improves ability to work in groups, generate new ideas, and test ideas8 9

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For the Instructor

- Undergraduate research provides a means of conducting formative assessment of student understanding and mastery of skills\(^8\)
- Undergraduate research contributes to the body of scholarship on teaching and learning\(^9\)

Examples of Undergraduate Research

1. **History 378: The Cold War**
   a. **Purpose:** To identify the diversity of perspectives on Cold War origins and to improve understanding of the importance of literature review from historian’s perspective
   b. **Students conduct a review of the literature to identify various perspectives**
   c. **Students report their findings with specific references to historians and their views**
   d. **Students organize authors into schools of thought such as orthodox, revisionist, etc.**
   e. **Supported by Reflection:** Short essay on the value of a literature review from the historian’s view and on the impact of historical perspective on social thinking

2. **Management 233: Training and Supervising**
   a. **Purpose:** To understand what kinds of formats are most effective in training employees, to rehearse interview skills, and gain an appreciation for the complexities of interviewing
   b. **Students develop a three-question interview and administer it to three people who have experienced some form of on-the-job training**
   c. **Students report findings and what they learned relative to the challenges presented by interviewing as a research method in a two-page summary**
   d. **Students discuss findings in class**
   e. **Supported by Reflection:** Two-page essay on what they learned about interviewing as a research method, what the role the research plays, and what precautions ought to be taken when using interviews for research or reading research based on interviews

3. **Biology 315: Worms and Germs**
   a. **Purpose:** To improve students’ understanding of the microbiological world and the hazards it presents and to rehearse data gathering and analysis techniques in the field
   b. **Students swab samples of various surfaces on campus, including cutting boards in kitchens, cafeteria tables, bathroom sinks, park benches, desktops, door handles, etc., analyze the substances, and create a chart that illustrates their findings**
   c. **Students report and discuss their findings in class; they explore the implications of findings**
   d. **Supported by Reflection:** Short essay describing what students learned about collecting data, what precautions are required, and what role research plays in public health and safety

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\(^10\) Baptista, et. al.(2011)

Key Considerations for Designing Undergraduate Research

Exemplary teaching and learning experiences happen by design, not by accident. The following steps are critical to a successful integration of research into undergraduate course work.

I. Identify the Purpose of the Research
   a. Is the purpose concerned with introducing new research skills?
   b. Is the purpose to improve students understanding of data and/or statistics?
   c. Is the purpose to explore new information about a particular idea or subject?
   d. Is the purpose to improve students’ ability to reflect upon their own experiences?
   e. Is the purpose to improve student articulation in oral and written format?
   f. Is the purpose all of the above?

II. What Activities are most likely to Facilitate Student Learning?
   a. Should students design the research project?
   b. Should the students work in groups, pairs or independently?
   c. Should the students gather empirical data or work with literature or media?
   d. Should students work with external agencies or members of the community?
   e. Should students organize and articulate their findings in a particular way?
   f. Should students learn something about research methods in the field before they begin their work?
   g. To what extent should students reflect upon their experiences?

III. What are the Logistics?
   a. How much time is necessary to sufficiently introduce the project?
   b. How much time is necessary to fulfill the project requirements?
   c. Should directions and resources be posted on line?
   d. Should students have frequent class time to develop their work?
   e. Do students need to obtain institutional permission for this project?
   f. How will the instructor be available to assist students?

IV. Assessment
   a. What criteria will be used to assess student work?
   b. What standards shall distinguish excellent, good, mediocre, and poor work?
   c. Will students have a grading rubric to guide their work?
   d. How often will formative assessments (such as check-ins, evaluations without grades, etc.) be conducted?
   e. What will the summative assessment include and how will it be weighted?

It is important to remember that the instructor’s work does not take place in a vacuum and as such, the benefits of integrating research into undergraduate curriculum and instruction may be compounded when other instructors in the program reinforce these skills and scaffold their lessons in order to review and extrapolate these skills.