Teaching Strategies Showcase

Indiana University’s Teaching for Student Success

Module 6: High-Impact Practices

Title: Integrating basic research methods into introductory courses as “High Impact Practices” to enhance student learning, engagement, and retention

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# Context for this strategy

In the past decade, the numerous positive effects of undergraduate research experiences have been documented. Data show that having an undergraduate research experience has a significant impact on student learning, engagement, and retention as well as future career choices. Thus, introducing students to research early in their college career can be considered as a high impact educational practice (Kuh, 2008). Participating in conducting research can be beneficial to all students, not just those intending to pursue research careers, as it teaches them necessary practical skills and imparts excitement as they learn facts through the process of discovery. An undergraduate research experience allows students to process learning through all six levels of cognitive skills (Bloom,1956) such as knowledge, comprehension, application, analysis, synthesis, and evaluation.

The University of Michigan developed one of the pioneering Undergraduate Research Opportunity Programs in 1988 in an effort to increase student retention. Results from this program demonstrated that engaging students early in conducting research has a significant impact on retention as well as enhanced student performance (Hathaway, Nagda, & Gregerman, 2002).

IU Southeast houses an impressive zoological collection that is a result of several surveys conducted on fish and freshwater mussels on the Indiana Blue River and its tributaries by students under supervision of faculty members, Dr. Claude D. Baker and Dr. Bill J. Forsyth, between the years 1973-1997. This impressive collection has not been used or explored in the past 25 years during which it was housed in closed cabinets.  After I was hired, I was introduced to this collection for the first time. With my strong Zoology background, I believed I could make a positive use of this collection by using it in the classroom in some form. In 2018, I received a grant from the American Association of State College and Universities (AASCU) and the Bill and Melinda Gates Foundation to fund development and implementation of High Impact Practices (HIPs) in first year courses. With this grant, I was able to utilize this collection to develop a collaborative laboratory research project for two sections of my Introductory Biological Science course, which introduces first year students into research. They did a presentation on their findings and submitted a project report at the end of the semester. I used these live specimens within a collaborative project designed to engage students. This project gave them a hands-on experience in learning some of the key concepts covered in this course.  This collaborative assignment was designed to align with all of my learning outcomes.

# Materials needed to implement this strategy

I utilized an existing zoological collection, housed in the department of Biology at IU Southeast and not used for the past 25 years. Any existing resources can similarly be utilized to enhance student learning. For example. faculty can create a small research module from an existing ongoing research project and integrate it as part of an introductory course to engage students. If students have this experience early in their undergraduate career, it will not only enrich their learning experience but will also help them stay on track for graduating in a timely manner.

# Step-by-step implementation

1. Design a research project assignment to be integrated into an introductory course.
   1. The assignment should preferably be a collaborative assignment to promote student interaction and engagement.
   2. Students can be assigned into groups of three for this assignment.
   3. Project goals should be designed to align with multiple learning outcomes of the course.
   4. Project goals should also align with Gen Ed learning outcomes since they are integrated in introductory courses.
2. Students should be given clear instruction about how to implement the project.
   1. Students should be given an activity for each laboratory period they will be working on this collaborative assignment. For example, one lab activity might focus on the formation of hypotheses; a second lab activity might focus on experimental design; a third lab activity might focus on data collection.
   2. Students should have clear instructions about what resources to use such as peer reviewed articles, databases, etc. for their research.
   3. Students should be given clear instructions on the research methods.
   4. Students should have a clear understanding of the assessment process. Students were expected to submit a detailed report and present their findings in a group presentation.
   5. Students should have a clear understanding of how each of the goals in their project align with the course learning outcomes.
3. Students may be assessed using various methods:
   1. Project report.
   2. Presentation.
   3. Pre and post tests on the key concepts.
   4. Student survey.

# Student response to this strategy

Students thoroughly enjoyed the research project and were excited being part of something other than just mere information taught in the form of lectures.  Students have reported (on my end of the semester evaluations) that this hands on experience has helped them understand some very key concepts taught during this course and that it had a significant effect on their overall success in my course. Most students mentioned that it was a very fun way of learning difficult facts and concepts which helped them make a decision to pursue a Biology Major. Many students reported that working in a collaborative research assignment of this kind had helped them strengthen the bonds with their peers which in turn helped them form study groups. Many students had very favorable comments about the group presentations as they felt it helped them overcome their fear of public speaking. These are all valuable skills they were able to learn through this project which will help them succeed in any field.

# Additional resources

* Caruth, G. D. (2018). Student engagement, retention, and motivation: Assessing academic success in today’s college students. *Participatory Educational Research (PER), 5*(1), 17-30.
* Kuh, G. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter.* Washington, DC: Association of American Colleges and Universities.
* Lopatto, D. (2006). Undergraduate research as a catalyst for liberal learning. *Peer Review,* *8*(1), 22–25.
* Hathaway, R. S, Nagda, B. A., & Gregerman, S.R. (2002). The relationship of undergraduate research participation to graduate and professional educational pursuit: an empirical study. *Journal of College Student Development, 43*, 614-631.
* Nagda, B. A., Gregerman, S. R., Jonides, J., von Hippel, W., & Lerner, J. S. (1988). Undergraduate Student Research Partnerships Affect Student Retention*. The Review of Higher Education*, 22, 55-72.