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Assessing In-Course Projects and Students' Interest in Science

Heather Kasper  
*Western Michigan University*, heather.m.kasper@wmich.edu

Mary Anne Sydlik  
*Western Michigan University*, maryanne.sydlik@wmich.edu

Susan R. Stapleton  
*Western Michigan University*, susan.stapleton@wmich.edu

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An important question in higher education is "How do we best support students so that they stay at Western Michigan and remain or become interested in careers in one of the sciences?" One way seems to be to have students participate in research activities, which studies have shown can spark and maintain their continued interest in STEM fields.

Traditional laboratory activities often involve repeating classical experiments to reproduce known results rather than engaging students in experiments with the possibility of true discovery. Instead, we need to actively engage students to interest them in STEM and to keep them in the field.

We used data collected from students enrolled in BIOS 1610, where students spend the last third of their laboratory sessions engaged in a group-based independent research project that they present at a public poster symposium. Students were asked to complete pre/post attitude surveys that rated their confidence in performing science-related tasks and their interest in STEM careers. Additional course-related data (poster grades, course grades, etc.) were collected but not included in this part of the study.

We assumed there might be a relationship between the students pre/post responses to the following questions (see next column) and their experiences with the independent projects and poster presentation activities embedded in BIOS 1610.

Please Rate your confidence in your ability to perform each of the following tasks on a five point scale, with 1=low confidence and 5=high confidence.

- Talk about science
- Write about science
- Design an experiment
- Analyze data
- Generate a hypothesis
- Formulate a scientific argument from evidence
- Pursue science as a career

Data were collected at the beginning and the end of the Spring 2017 semester. There were 117 students who completed both the pre and post survey. Wilcoxon signed ranks test was used to analyze the data.

In the following figure, a star represents a significant difference (P = 0.05) between pre and post mean scores.

Early indications are that something about student experiences in BIOS 1610, perhaps engaging in the group research projects and poster presentations, may have had a positive impact on students' confidence in developing a hypothesis, designing an experiment, analyzing data, writing about science, and formulating a scientific argument from evidence, but not on a student's interest in a career in STEM or their confidence in talking about science.

• The current study was based on a single semester's data. Future work will include data from Spring 2018 pre/post survey results.

• Data that more directly connect students' experiences with the independent projects and poster symposium and potential changes in their confidence and attitudes toward STEM are also needed. It would be possible to conduct a limited sample of interviews or focus groups with students after the end of the semester to further probe this idea.