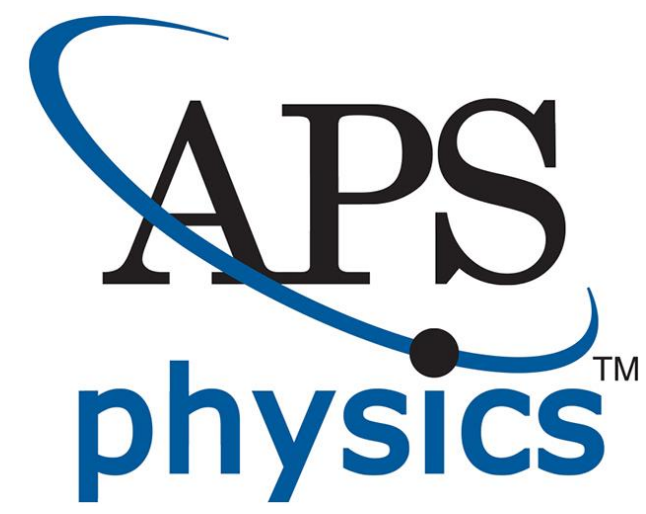


Science Interest and Confidence in Middle School Aged Students



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Abstract

In the middle school science classroom, students begin to decide whether they like science or not. This decision has long term impacts on their interests, future studies, and ultimately career goals. Further, the impact of this decision can be felt by the STEM field when fewer and fewer students are interested in pursuing jobs within the field. To explore the attitudes and confidence of these students towards science and math, the CURE survey and Math Anxiety Scale were adapted to gather data from a group of middle school students after attending a Middle School Science Day event. Through the research, we wanted to get a look at why some students lose interest in science around the time they are in middle school. At the event, students worked in groups to complete an engineering challenge and had the opportunity to see various science demonstrations. After the day's activities, students were asked to complete the surveys. Surprisingly, our surveys displayed a lack of connection between math anxiety and science interest at the middle school level. This research will be useful to teachers at the middle school level as well as above and below, as they work to engage students in science class and make the content interesting and relevant, in addition to encouraging their students to be curious about science. Further, the research has laid groundwork for using an adapted form of the CURE survey at the middle school level.

Introduction

The middle school science classroom should be a place of engaging and exploratory learning that pulls students into the content and encourages them to want to learn more. However, it seems middle school is the time when some students decide they are no longer interested in science. Why is this? There are many potential factors affecting this trend, such as:

- Subject matter difficulty
- An increased application of math in science
- Teachers projecting their own fear or disinterest
- Student confidence
- Misrepresentation of science

Specifically, a lack of confidence in one's science ability is crippling to young scientists. How science is presented and explored in the classroom can have dramatic effects on student's science interest and confidence. The middle school classroom is the place science begins to get challenging for many students, and in many cases, this is due to an increase in math integrated into the science curriculum. This leads to a variety of questions we looked to answer with our research:

- How do middle school aged students perceive their own science interest and abilities?
- Are these perceptions connected?
- What factors affect these beliefs?
- Does separating math from science result in an increased confidence in science ability?

It is hypothesized students who feel they are successful in science enjoy the subject more in school and are interested in pursuing careers in a STEM field. Middle school students are at a critical stage of life full of transition. How they perceive themselves and their abilities and how they develop these perceptions, has lasting impacts on their future. The purpose of our research was to measure students' self-perceptions of science and their own science abilities

Methods

To answer these questions, we developed and implemented an experience to engage middle school aged students in science and survey them on their interest and confidence levels in science. The purpose of this research is to measure how middle school students feel towards the subject of science and how they feel about their own science abilities. This research consisted of two parts: an in-person experiment and a post experiment survey. Each student that participated in the in-person experiment was asked to fill out the survey before they left the experiment event, in order to allow the researchers to better understand the participant's thought process during and after the experiment. Participants for the study were invited from Orange City and surrounding communities. A total of thirteen students were recruited to participate in the Middle School Science Day event, a three-hour event on a Saturday morning in November.

On the day of the event:

- Students checked-in and signed informed consent
- As a group, students were introduced to the concept of a Rube Goldberg Machine and given directions for their project
- Students were broken into groups and started working on their projects, supplies were provided
- Students planned, built, and tested their machines
- After about an hour and a half, students took a break from their projects to view several science demonstrations
- Following the demonstrations, students filled out the modified CURE and Math Anxiety Scale surveys
- Once everyone finished their surveys, students presented their projects

Each group came up with fun and unique ideas for their Rube Goldberg Machines, and they were able to spend time with a hands-on science activity in the process! It seemed all students enjoyed their time at Middle School Science Day and thus a positive science experience.

Results

Due to the number of students that participated in our event, statistical significance could not be found in our specific data. There did not appear to be a connection between math anxiety and science interest based on our population of students, however, that could be due to the small sample size or underlying variables that were not accounted for. It is also likely there is a self-selection bias present in our data, as our event would be more appealing to students who already enjoy science.

Even though our data was not statistically significant, it is still useful in laying a foundation for future research. Specifically, our method and data collection demonstrates that the CURE survey and Math Anxiety Scale can be used on middle school students. These scales were modified to contain vocabulary appropriate to middle school students but were otherwise used in their original form and worked well. When checked for reliability, both scales scored very well, with values of 0.88 and 0.94.

Student Projects



Conclusion

- Successful implementation and running of Middle School Science Day event and data collection
- We know this method works and modified versions of the CURE survey and Math Anxiety Scale can be used with middle school students
- We have developed a data driven approach to Middle School Science outreach
- Laying the groundwork for future research in this area

Sources & Acknowledgements

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