

Improving Students' Confidence in Mathematics and Problem-Solving Skills

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Many students have negative attitudes toward mathematics. In the courses that I have taught, I frequently hear “I’m just not a math person” or “I’m bad at math.” It has been proven in many different studies that attitude and achievement are highly correlated. Not only does attitude affect achievement, but achievement affects attitude. In fact, this correlation is bidirectional (Goodykoontz 5).

According to research, there are five factors that influence students’ attitudes toward mathematics. Specifically, these five factors are teacher characteristics, teaching characteristics, classroom characteristics, assessments and achievement, and individual perceptions and characteristics (Goodykoontz 76). There are multiple types of student confidence: overall confidence in mathematics, topic confidence, and applications confidence (Parsons 55). My project investigated the first four external factors to determine if a single semester in a positive math classroom could increase students’ attitudes and confidence in mathematics.

In Spring 2023, I was the instructor of record for MATH1005: College Algebra at the University of Iowa. The students in this course were mostly non-math majors who needed this class for their degree. On the first day of class, I handed out Survey 1. This survey asked students about their attitude, confidence, and motivation toward mathematics. Throughout the semester, I implemented the four external factors discussed above to attempt to increase student’s confidence and attitude toward mathematics. For example, to implement teaching characteristics, I always wrote out every step carefully, tried to show multiple ways to approach each problem, and gave real-life examples to emphasize important concepts.

At the end of the semester, I gave the students Survey 2. This survey was nearly identical to the first survey. Survey 1 had 5 responses, which was a 21% response rate, and Survey 2 had 6 responses, which was a 25% response rate. I analyzed the data and created multiple bar graphs comparing the results from Survey 1 and Survey 2. First, I asked the students to rate their confidence for specific mathematical concepts taught in College Algebra. The data showed that students felt a higher confidence level in their abilities after learning the new concepts.

Next, I asked students to rate their level of agreement/disagreement on various statements relating to confidence and motivation. The statements with the largest amount of positive change from Survey 1 to Survey 2 were “I am good at math,” “I have a mathematical mind,” and “I enjoy solving challenging math problems. The statement with the largest amount of negative change was “Even if I work hard, I still struggle with math.” The results show that the students had higher confidence in their mathematical abilities and a more positive attitude toward mathematics in general.

Lastly, I asked the students to identify which specific aspect of the course had the greatest impact on their feelings about math in the course. The top two answers were the instructor’s personality/enthusiasm for the course and seeing each step written out carefully for problem solving. Some students also selected feedback on quizzes and exams, seeing multiple ways to approach a problem, and opportunity for one-on-one help. This shows that the teaching characteristics and teacher characteristics were the most influential factors for students’ confidence.

References

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