

The Effects of Student Choice on Achievement in the High School Science Classroom

Andrew Larsen | Genoa Area High School | Genoa, Ohio



Background

This research project was conducted in a sophomore Honors Biology class at Genoa Area High School, a rural public school district in northwest Ohio. Recognizing that students are more engaged in the content when they have a personal interest in what they are learning, I developed this project as a way to positively impact student achievement in science class. To give students the opportunity to learn based off their interests, I developed a choice board, a matrix with a variety of activities, labs, and assignments. From the choice board, students were able to complete those items that they wanted to do rather than items they were required to do.

Methodology

- The research was conducted on 26 students ($N=26$) in a high school Honors Biology class.
- There were two research cycles consisting of a unit taught using traditional methods alternated with a unit using the student choice method.
- Traditional teaching methods included prescribed lecture, note-taking, reading, and laboratory activities.
- Student choice methods included some traditional methods plus video, online interactive activities and simulations, and modeling.

Research Questions

Q1 How does student choice affect student achievement in science class?

Q2 How do student attitudes towards learning science change when given choice?

Q3 How does providing students with choice affect my own teaching?

Data & Analysis

- Achievement gains were higher after the first treatment but showed no difference after the second treatment (Fig.1).
- The range of scores after both treatment units was smaller compared to non-treatment units. The achievement gains are therefore more valid and reliable (Fig.1).
- The Wilcoxon Rank Sum Test verified that there was no statistical difference in achievement gains between the second treatment and non-treatment units.
- Students had more positive attitudes towards learning science when given a choice in how they learned (Fig.2).

Distribution of Normalized Gains

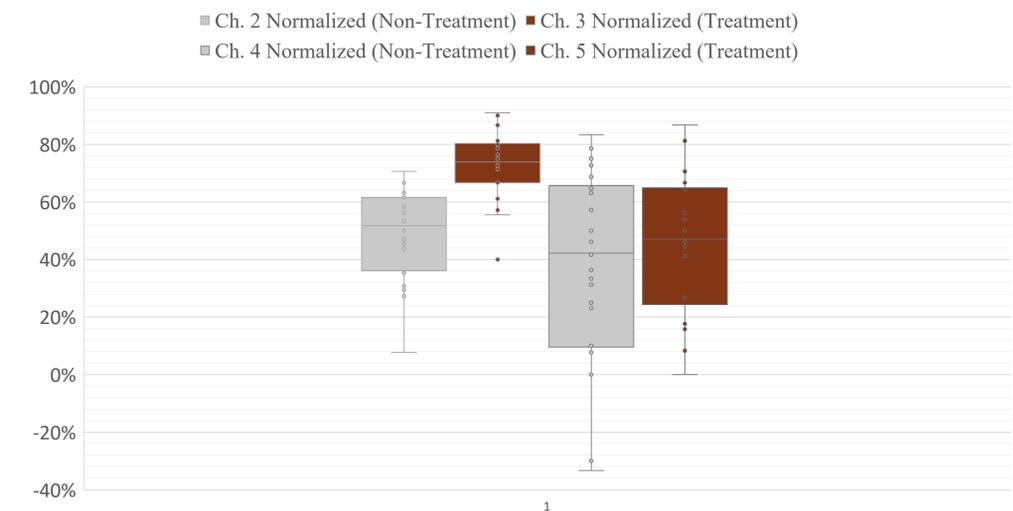


Fig. 1. Difference between pre- and post-test scores, normalized to show achievement gains, ($N=26$).

Attitudes Towards Learning Science

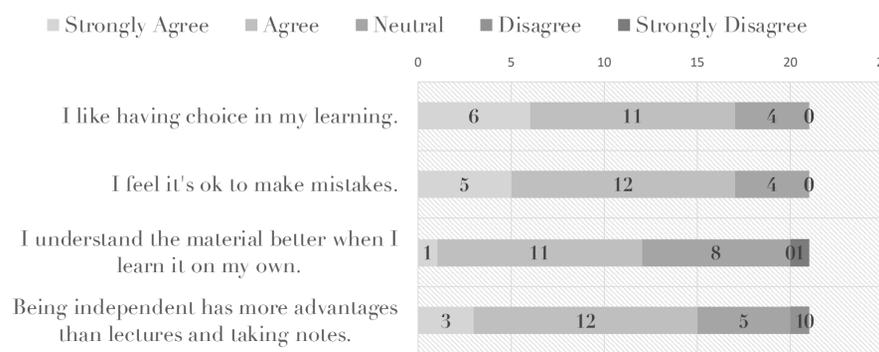


Fig. 2. Student survey responses to questions about learning when given choice, ($N=21$).

Wilcoxon Rank Sum Test

	Ch. 2 Non-Treatment	Ch. 4 Non-Treatment
Ch. 3 Treatment	p-value = 0.0000001 Significance: Yes	p-value = 0.00001 Significance: Yes
Ch. 5 Treatment	p-value = 0.6926 Significance: No	p-value = 0.2321 Significance: No

Conclusion & Value

This research project supports the idea that, when given a choice, students will have better attitudes towards learning science. While this may not necessarily lead to greater achievement gains, it does help promote a positive classroom culture where students feel supported and can learn to the best of their ability. The project also confirms that differentiating instruction is worthwhile so that every student has an opportunity to demonstrate understanding of the content. By giving students choice, the results of assessment are more valid and reliable. Next school year, I plan to give students a choice in assessment rather than in learning. A standards-based education still requires specific material to be taught, but demonstrating understanding of that material can be done in a variety of ways.