THE IMPACT OF TECHNOLOGY ON ENGAGEMENT AND CONTENT MASTERY IN HIGH SCHOOL BIOLOGY

Jennifer Livesay
Ector County Independent School District, Odessa, TX
2022

Master of Science in Science Education

BACKGROUND

- This project was implemented in a high school biology classroom to determine areas where technology can aid engagement and content mastery, and where it may be a hindrance or have no impact. Specific areas of focus were notetaking and simulations.

- This study focus was developed as a result of the rapid implementation of technology into curriculum as a result of COVID remote learning protocols. To more effectively merge new methods and technologies with established best practices, I focused on two areas that would be potentially high impact for the science classroom, notetaking and simulations.

FOCUS QUESTIONS

Does the use of digital simulations increase students' understanding compared to a paper-based manipulative simulation in science?	Will student mastery increase with a mixture of digital response systems and paper notetaking during the introductory phases of science units compared to fully digital notes?	Do the students report a higher level of engagement, satisfaction, and learning with the integration of technology into the science curriculum?

ACKNOWLEDGEMENT

I would like to thank Dr. Jessi Anderson for her guidance and support through this process.

TREATMENT

Students were given a pretest based on the state standardized exam. In addition to the standardized multiple-choice questions, students also reported their confidence in their responses. Groups were formed based on similarity of results and t-tests were conducted to ensure similarity. The experimental group was given digital notes and the control used standard paper notes. Both groups were then given a post-test to determine gains. This process was repeated to study the impact of computer-based simulations versus paper-based manipulative simulations. After the quantitative data was collected, all students in the experimental groups were able to complete an open-ended survey about their experiences. All open-ended responses were grouped by theme and analyzed.

ANALYSIS AND CONCLUSION

The goal of this study was to determine where technology can improve or hinder engagement and mastery. The results show students have decreased gains in content mastery scores using computer-based notetaking methods compared to traditional paper-based methods. The group utilizing digital notetaking also did not show as large of an increase in their response confidence as the paper-based group.

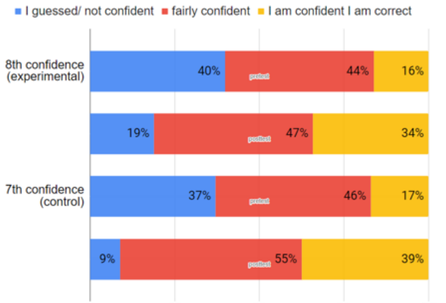
However, when looking at digital simulation usage, students showed higher mastery and confidence gains than the paper-based group. Students also reported that technology aids in facilitating communication between themselves and peers as well as with teachers. It also aids in research and collaboration.

The largest concern with technology integration reported was a lack of stable connectivity and issues with the device itself. Cheating was also a concern. These are identified as areas of focus for future study and solution development to further technology mediated engagement and mastery.

RESULTS

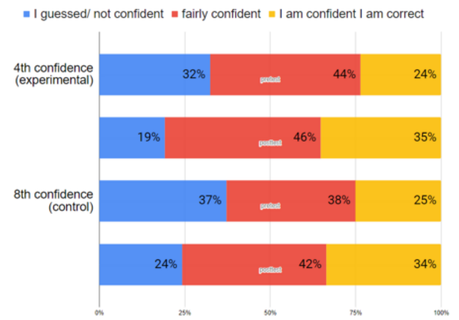
Student scores and self-reported response confidence for digital notetaking

	Pretest	Posttest
8th period (experimental)	45.8%	62.7%
7th period (control)	45.5%	69.1%



Student scores and self-reported response confidence for digital simulations

	Pretest	Posttest
4th period (experimental)	48.0%	68.9%
8th period (control)	47.4%	63.2%



Open-response technology use survey results themes