

Effect of Lesson Delivery Media on Student Learning Outcome and Information Retention

Does the Way Lessons are Delivered Affect the Performance of Students?

By: Yafee Khan and Hudson Shi

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Highschool Team

Abstract

The recent COVID-19 pandemic has caused many students and teachers to experience learning in a virtual environment. Previous studies studying the difference between classroom and virtual learning have generally supported that usage of electronics in a learning environment decreased the overall performance of the students/participants involved. The goal of this experiment was to determine if the nature of the learning itself caused the discrepancy between the affected students' performance comparing before and during the pandemic. The hypothesis was that the effectiveness of learning through purely electronic media would be less or equal to that of learning through non-electronic media. We attempted to recruit many students, and eleven students chose to participate and the groups were split randomly. One of the two groups, the electronic learning group, viewed a slideshow through individual devices (through Peardeck) and played a Kahoot, whereas non-electronic groups used mediums such as the blackboard and paper handouts. In separate settings, the same lesson material was taught to the two groups. The only change was the delivery medium. We found the average score of the electronic group to be 8.2/12.0, and the non electronic group to be 8.0/12.0, showing a difference of 0.2. Because this discrepancy is so small in a smaller sample group, the data was found to be close enough to determine both methods as equal. It was concluded that learning medium (or at least electronic vs non-electronic delivery media) made no difference in students' performance.

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Materials and Methods

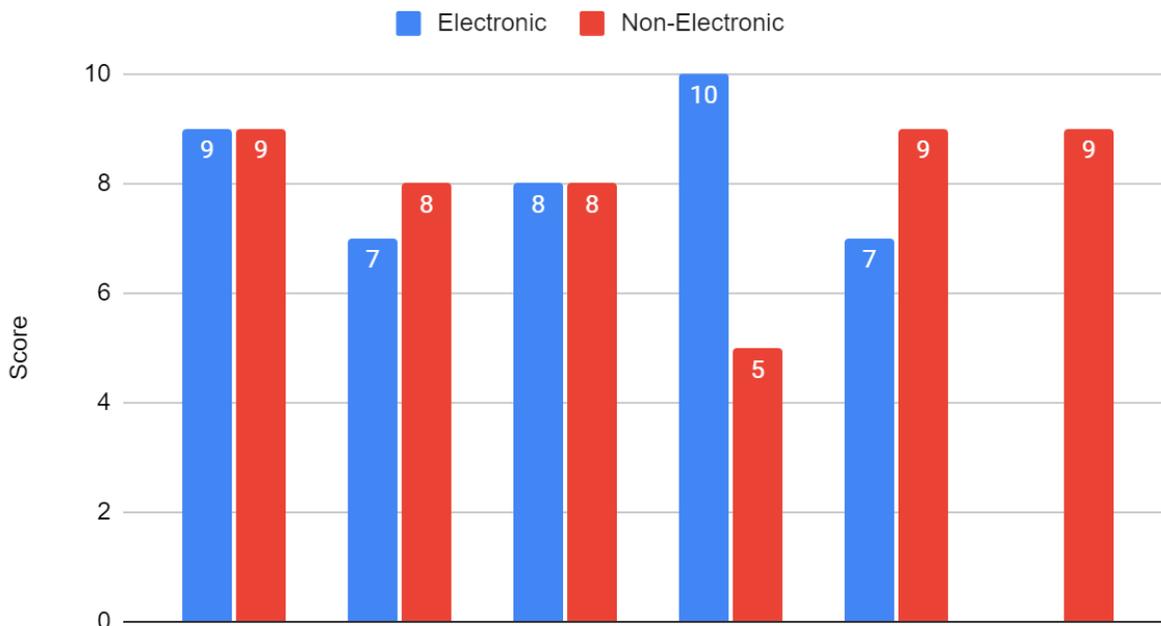
Two groups of students - one in middle school and one in high school - were recruited to participate in this learning experiment. 8 people were in the high school group and 3 were in the middle school group. The topic that these participants would be taught about was the harmonica (musical instrument). The reason for choosing this topic was that it was completely nonfictional, but had little chance of any one of the participants having any prior knowledge about. Because the topic was so narrow and uncommonly mentioned in public education or daily life, all subjects were expected to start out with the same background knowledge. After research was done from a Wikipedia article about the harmonica, a questionnaire was prepared on a Google form. The validity of the article was insignificant as the goal was to see how the subjects retained the knowledge from the lesson, rather than actually educating them about the harmonica (of course, the goal was still to mislead as little as possible). For deciding the content of the questions on the form, two sections were made - one relating to the components and one relating to the history. Each section had six questions - three intended to test the subject's pure information retention ("memory" questions), and three intended to test the ability of the subject to use the obtained information for related applications ("applied" questions). The subjective difficulty of the

questions was attempted to be made varied across each section. The answers that the questions were based on were not chosen in any particular manner from the source, but usually they could be easily grasped and did not require much digging to find for the team members/researchers. After creating the questionnaire, the lesson material was collected from the same Wikipedia source. The material was made sure to include enough viable information to answer all the questions on the questionnaire, as well as some extra information that wouldn't be needed for the quiz. This material was then packed into two different presentations - one for the in-person taught group and one for the group taught virtually. The presentation directed at the in-person group consisted of a script for a lecture meant to be read out in a classroom. Certain sections of the script were highlighted, indicating that the information is important ("essential" background information or information required on the quiz). The instructor took note of these highlighted sections on the whiteboard to guide the subjects' own notes. As for the virtual presentation, a Peardeck-converted Google slideshow was used as an interactive presentation that could be viewed from each subject's own personal device. The high school group was divided into groups of 4 and 4, and the middle school group was divided into groups of 2 and 1. One of these half-groups for each age group would receive the in-person lecture, while the other would receive the online presentation. After the presentation was completed, the participants had a few minutes to look over any notes that they took. Finally, the questionnaire would be given promptly with no time limit. Even the means by which the subjects took the quiz was different depending on the learning type group. The in-person group was given the quiz on a printed version of the Google form, while the online group simply filled the form itself on their personal devices.

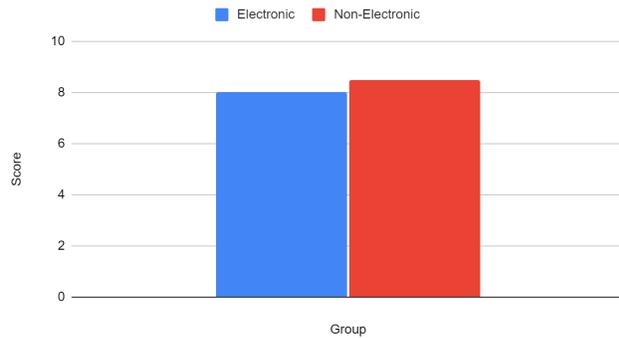
Results

The two groups' overall scores were similar. The non-electronic group's score ranged from 5 to 9 showing a deviation of 4. The average score was 8.0 and the median score was 8.5. Comparatively, the electronic group's scores were ranging from 7 to 10, with an average of 8.2 and a median of 8. These scores were all out of 12. These data points show very little difference in scores indicating that the two different methods yield a negligible difference on students. This suggests that remote learning had little effect on students' grades during the pandemic, indicating that other issues such as mental health, students' and teachers' attitudes, and social wellness were likely more to blame for the change in score. This also suggests other aspects of the teaching methods could have been to blame, and an experiment with more control and depth (difficult to obtain) could be valuable in better understanding how learning in a pandemic affected students and how it may affect them in the future in the case of another pandemic.

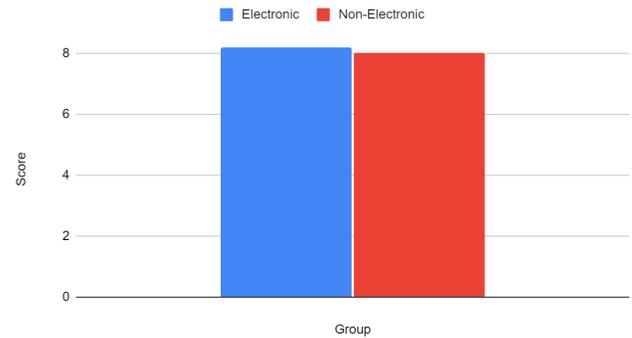
Electronic VS. Non-Electronic



Median Score



Average Group Score



Discussion

According to students and parents around us and articles on the internet, it seems to be a common belief that remote learning was ineffective and inferior to older, traditional, non-electronic methods of learning. Our data seems to suggest otherwise, begging the question, “What made remote learning feel more inferior than it statistically seems?” To answer this question we looked at other changes children and teens experienced during the pandemic. One factor we researched was mental illnesses during the pandemic. Pre-pandemic, the rates for depression and anxiety among children were found to be approximately 8% and 13%, respectively. According to *The University of Minnesota* in an article published August 9th, 2021, the rates were found to be 25% and 21%, for depression and anxiety. This increase indicates that students were a lot less healthy during that time and this may be attributed to some of the academic performance changes seen during COVID-19.

Credits

We would like to thank Dr. Cheryl Granger, our advisor, for all of her help with organizing our project. We would like to thank Mrs. Annie Perkins, our previous teacher at Mansfield Middle School, who helped us arrange the meeting with the middle schoolers as well

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