Effects of Different Mediums on Memory Recall

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Abstract

Laptops and other gadgets have become an increasingly popular form of learning. Many universities are shifting their entire curriculum from paper to online-based learning programs which requires access to computers, laptops, tablets, and others. In our experiment, we examine if memory recall is affected by the medium used to present information. Undergraduate psychology students took part in this experiment. The participants in the experiment split up in two groups, one who were shown words on paper, and the other were shown words on a laptop. The results reveal no significant difference found on the number of words recalled between both the groups. Instead, the results showed the opposite of what was initially proposed.

Effects of Different Mediums on Memory Recall

The use of computers, tablets, and other gadgets have increasingly grown in the past few years as courses shift from paper learning to online learning materials. The views on this have been very divided. Some teachers believe that using laptops limits the retention of material and adds to an overall decrease in academic performance and recall. Some students prefer learning through hard copy/paper as opposed to those who prefer using computers to study class material. To investigate this phenomenon, we experimented to see the effects of different mediums on memory recall amongst students.

Research literature has leaned on one side and illustrated that using computers is disadvantageous to academic performance and memory recall. Some other studies have found no difference between the usage of both computer and paper in learning. One experiment researched the benefits of learning through digital or paper flashcards. (Sage, Krebs, and Grove, 2017) Participants in their study memorized information from flashcards on paper, computers, and tablets. The flashcards were either made previously or made by the students. The students then went through a memory recall test and were then asked to self-report on different variables. Results indicate that subjects recalled more when learning from tablet and paper flashcards compared to computer flashcards. However, both tablet and paper flashcard groups recalled the words evenly. They found positive correlations between recall, satisfaction, and control and found negative correlations between mental effort and difficulty. This study also asked about students' opinions on using paper or electronic-based flashcards and found that more people firmly preferred studying through paper medium compared to an electronic medium. Therefore, it raises the question if using a specific medium has a significant impact on learning or not? With this question in mind, another study looked at learning text and numerical data through different

methods. (Green, Perera, Dance & Myers, 2010) In experiment 1, participants were randomly divided into two groups: one who read the article given to them on paper, and the other read it on the computer. A control condition existed which were instructed to play a game on a computer. Each group was instructed to do a distractor task for 5 mins and then tested on memory recall. In experiment 2, participants were presented with numerical data through graphs, tables, and paragraph form. Results showed that participants in paper condition had a moderately higher score compared to the ones in the electronic condition. Both paper and computer condition had an overall higher score compared to the control condition. However, the researchers concluded that this difference was not meaningful and that it should not matter what medium one uses to study materials.

Drawing upon these contrasting conclusions by various researchers, we planned to conduct our experiment and find out what our results demonstrate and add to the existing research. We used a method similar to the one used by Green et al. (2017), where the mediums consisted of paper and computer, and participants were instructed to memorize words off them. A distractor task was necessary to add to this process and then a recall task was administered.. We hypothesized that people learning words off paper would have a higher score of recall compared to those learning through a computer.

Methods

Participants

Twelve undergraduate students voluntarily participated in this experiment. The participants were all undergraduate psychology students, part of the course 217 in which this research is being

carried out as a lab project. No other demographic information was collected about the participants.

Procedure

The study was carried out in a bright-lit classroom where the course 217 is held. The experiment consisted of two groups – the experimental group and the control group. A code was randomly assigned to a participant and was printed out beforehand to keep the identity of the subjects anonymous. The numbers were kept for the experimental group and letters for the control group. The first and second round of participants went through the control condition, and the last two rounds of participants went through the experimental condition A list of 20 words at random were formerly compiled to use in the experiment. The words were chosen at random and were from easy to moderate level of difficulty. The words were put in the very center of the page/screen in a 60-point Calibri black font. Words were shown on paper to the control group, each word shown for only 3 seconds. The experimental group was shown the words on the laptop through a timed presentation mode for 3 seconds each, for a total of 1 minute. After being shown the words that were to be memorized, all the participants completed a distractor task, which comprised of math problems found online and then printed on paper. They were given one minute and a half to complete as many math problems as they could. As soon as the time was up for the distractor task, for the memory test, they were then instructed to turn over the page and write down as many words they could remember. One minute was designated for the recall task. There was no debriefing session necessary in this experiment. Various controls are employed in this research design. The words were kept the same for all the subjects in the same order. The same amount of time and the font, the size of the words presented, were kept the same. All

participants were given the same math distractor task, and the time limit for both the math task and the memory recall task was kept consistent between both groups.

Results

The results collected were tallied and put into an Excel sheet where each word was looked at separately to see if the participant recalled it or not. With the use of ratio measurement scale, a score of 1 was appointed if the person recalled the word correctly and a score of 0 appointed to words that were not recalled. The total number of words recalled by each participant was counted and then used to calculate the mean and standard deviation through Excel for every condition: experimental or control condition. The control group, paper condition, had a mean of 6.80 (SD = 2.77) compared to the experimental group, computer condition, who had a mean of 7.86 (SD = 2.03). The results appear to show no significant difference in numbers of words recalled between the conditions (refer to Figure 1).

Discussion

This experiment studied the usefulness of using one medium over the other concerning the retention of materials learned. Our results demonstrate little to no difference on average in memory recall scores between both the paper and computer conditions. The results found in this experiment is inconsistent with our initial hypothesis proposed where we believed paper condition would have higher scores compared to the electronic condition. As can be seen in the figure, the experimental group, i.e., computer condition, had a slightly higher mean than those of the control group, which was the paper condition. However, overall, the findings are consistent with ones from previous research, where it concluded that using different mediums for learning should not be a considerable concern. However, our experiment had several limitations. While the memorizing of words for both the conditions were different – one through paper and the

other through computer – the distracter task and memory recall task were both administered through an only paper form for both the groups. This might be sighted as a potential confound occurring specifically for subjects in the experimental group, which was the computer condition. The usage of doing the math task and recalling words by hand might have created an unknown effect on the subjects learning the words through the laptop. Furthermore, the total sample size was found to be very small as it only consisted of 12 psychology students and is also restricted to only students who are part of the same course in which this experiment is being conducted. Thus, the generalizability potential of the findings in this experiment is limited. The minimal sample size can also be regarded as problematic, where the results demonstrate no significant differences between group scores.

In the future, this experiment can be conducted again using a larger sample of students at large across from different courses rather than just having a restricted range of psychology students from a specific course. Thus, it can be predicted that a more prominent effect size could be observed between both groups. The research design can be reorganized in a way to avoid various confounds that might be considered as explanations for the results. Future experiments can have a set of pre-screening questions for subjects. For example, if they have normal or corrected to normal vision, if they can speak English well, or if they have any memory impairments, which can help rule out many other possible alternative explanations. The findings of our experiment add to the existing literature on this topic that various mediums for studying do not, in fact, matter for retention of information and that specific studying practices carried out by each individual might be more of a concern.

References

Green, T. D., Perera, R. A., Dance, L. A., & Myers, E. A. (2010). Impact of Presentation Mode on Recall of Written Text and Numerical Information: Hard Copy Versus Electronic. *North American Journal of Psychology, 12(2).*

Sage, K., Krebs, B., & Grove, R. (2019). Flip, slide, or swipe? Learning outcomes from paper, computer, and tablet flashcards. *Technology, Knowledge and Learning*, *24*(3), 461-482.

1. Eraser	2. Cake
3. Persistent	4. Dinosaur
5. Sudoku	6. October
7. Existence	8. Random
9. Antarctica	10. Xylophone
11. Rhythm	12. Ceremony
13. Puzzle	14. Apple
15. Bicycle	16. Stopwatch
17. Exchange	18. Knife
19. Construction	20. Painting

Table 1: List of words used in the study that the participants had to memorize.

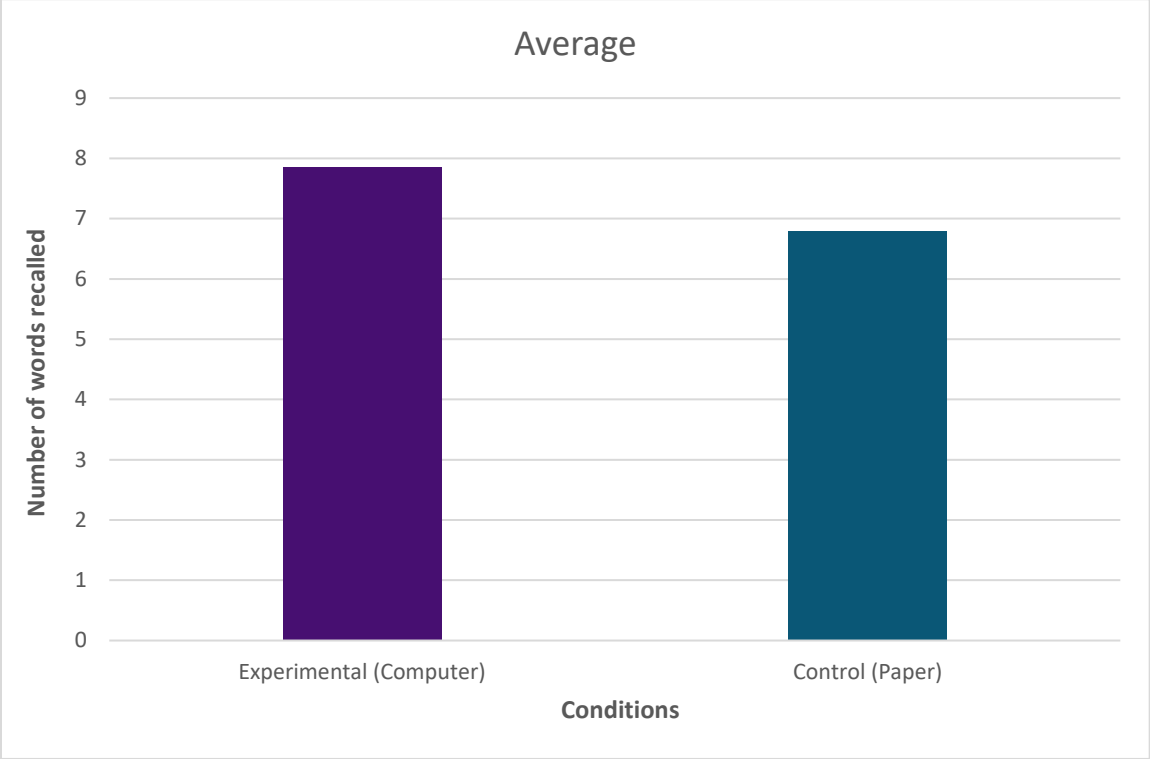

Figure 1: The mean scores of participants in both the conditions (computer and paper) on the number of words recalled. The control group, paper condition, had a mean of 6.80 (SD = 2.77) compared to the experimental group, computer condition, who had a mean of 7.86 (SD = 2.03).