Should Teenagers Use Cell Phones Between Classes?

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My study is about the effect of cell phone usage on learning performance. Previous research has mostly investigated college students and cell phone use during learning. My study uses a quasi-experimental design to explore if cell phone use before a learning activity impacts secondary school students' math test performance. I collected data from 8 students from grades 8 and 9. The participants were asked to complete two similar math tests before and after using a phone for 15 minutes. I discovered that mean math test performance measured in terms of time spent on a test and accuracy/correctness of the results had decreased after phone use. To test the difference in the population I ran a paired samples t-test. The significant p-values confirmed that cell phone use increases the test completion time and decreases the accuracy of test results. This finding suggests that students should not use a phone during breaks.

INTRODUCTION AND HYPOTHESIS

In 2014, a survey conducted by non-profit organization MediaSmarts among 5,400 Canadian youth in grades 4-11 showed that nearly 25% of the younger children and 90% of the older children owned a mobile device (Steeves, 2014). While recent statistics on Canadian teens is not available, comparable data on American youth shows that teenagers spend an average of seven hours a day on their phones and tweens (ages 8-12) spend around five hours (Rideout & Robb, 2019).

Many studies have shown a negative effect of cellphone usage on learning (Junco & Cotten, 2012; Murphy & Manzannares, 2008; Rosen, Carrier & Cheever, 2013; Wood et al., 2012). These studies focused on (1) college students, (2) phone use during a learning activity, and (3) self-reported data on the variables. The unknowns included the effect of phone use (1) before an activity, (2) on secondary school students, and (3) if variables were objectively measured. The limitations of the previous studies included their focus on easily available college students, on the use of phones during an educational activity (note-taking, homework, teamwork) and their reliance on self-reported data (Felisoni and Godoi, 2018).

The purpose of this study was to understand how cell phone use before an educational activity affects secondary school students' learning in the context of a quasi-experiment using objectively measured data.

The research question of the study was: How does cell phone usage affect secondary school students' math test performance? My hypothesis was that mobile phone use would increase the time spent on and decrease the accuracy of the answers provided on the test.

The primary target audience, who could benefit from my project, are researchers who study the impact of technology on schoolwork. The study also targets users, such as school psychologists, counselors, principals, teachers, students, and parents.

METHODS AND MATERIALS

To answer the research question, I conducted a quasi-experiment. My target population was teenagers in Grades 8-9 in Ontario. I recruited a sample of eight participants (three grade 8 students and five grade 9 students) with equal representation of girls and boys by sending an email to twenty of my schoolmates in the corresponding grades. The invitation stated the study's purpose and the participants' risks/benefits and rights. The participants consented to participate by sending me their data.

The participants were asked to complete a math test before and after phone use for 15 minutes.

The assignments were similar in difficulty and time required for completion without phone use. To ensure this I piloted the tests on three classmates not included in the study. Each test consisted of 25 3-digit number addition/subtraction operations. The participants were asked to refrain from using digital devices for 15 minutes prior to the first test and to use a timer to keep track of time spent on each test and on the use of the phone during the break. The average score for the pilot participants was 25 for the first test and 23 for the second test.

The hypothesis was tested with two variables. The dependent variable was test performance measured as (a) time spent on tests in seconds and (b) accuracy of task completion in number of correct answers. The independent variable was the use of cell phones during the break. The data was analyzed in Excel using descriptive statistics (mean time, mean accuracy) and dependent samples t-test.

RESULTS

The results of my analysis showed that on average students took more time to complete the second test (Figure 1). Mean time for the first test was 301 seconds (Standard Deviation = 112) compared to the mean time for the second test, which was 362 seconds (Standard Deviation = 182).
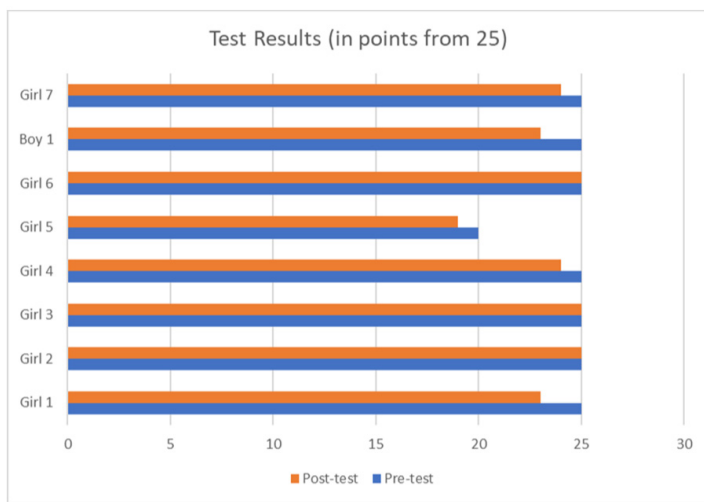
To test the difference in the population a one-tailed dependant samples t-test was applied in Excel. I used a one-tailed test because I predicted that the mean for the second test should be
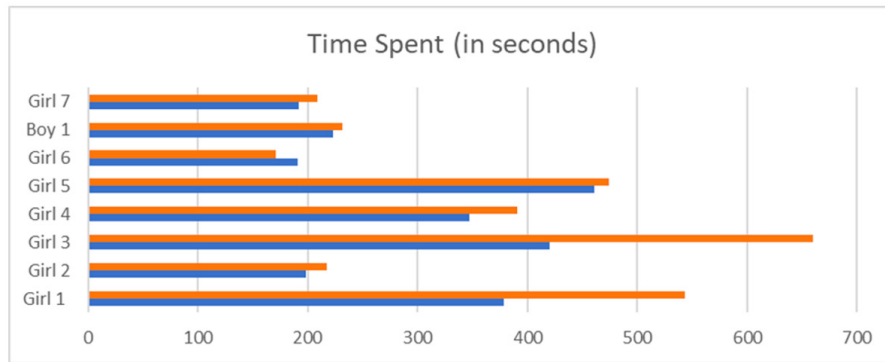
This figure shows the time spent on the math test by each student before and after cell phone usage.

The figure shows the students' accuracy on the math tests before and after cellphone usage.

greater than for the first test. I used a paired samples t-test because I tested the same people twice. My results showed a p-value of 0.05 which was significant at the significance value of 0.05.

The results of my analysis also showed that on average students had fewer correct answers on the second test (Figure 2). Mean of the correct answers for the first test was 24 (Standard Deviation= 2). Mean of the correct answers for the second test was 23 (Standard Deviation= 2).

As in the previous case, I used a one-tailed dependent samples t-test to compare the mean of the correct test answers. The results a p-value of 0.01 which was significant at the significance value of 0.05.

DISCUSSION

The purpose of this study was to understand how cell phone use affects secondary school students' learning with the use of a quasi-experiment. The hypothesis tested during this experiment was that mobile phone use would negatively affect math performance,

i.e. increase the time spent on and decrease the accuracy of the answers provided on the test. My hypothesis was confirmed when math performance was measured both in terms of time and the number of correct answers. Therefore, the answer to my research question is that cell phone usage does affect secondary students' math test performance.

My study had several limitations. First, my sampling was small, so it is difficult to generalize the results to the population. Second, I only examined people in Ontario so I cannot generalize these results to students in other Canadian provinces or territories. Third, I only had one male participant, so my findings were mostly about girls. Lastly, I used a quasi-experiment that didn't include randomization.

The findings mean that future research should investigate secondary school students and the effect of cell phone use before a learning activity. They should include a greater number of participants from around Canada, with equal representation of all genders.

My findings also imply that students should spend less time on their phones between classes. Parents and teachers should control the phone usage of the students. School psychologists should conduct trainings on healthy phone usage and should advise students to use their digital technology less. School principals should develop policies that limit cell phone use at school for better student performance.

FUTURE STEPS

One of the things I could have done differently was to include a greater number of participants for more accurate and representative results. In addition, my findings pertain to girls mostly as I had only one boy in the sample. Next time, I will try to recruit more boys. My project was based on data from Ontario only. In future research, I want to expand this to Canada. Lastly, I used a quasi-experiment that didn't include randomization and control and experiment groups. In the future, I would try to create a true experiment with random assignment to two groups.

CONCLUSION

The results of my study showed that not only do phones negatively affect college students' academic performance as previous studies showed, but they also leave a negative impact on secondary school students' learning. In addition, previous research focused exclusively on digital technology usage during learning activities, whereas my study showed that phones affect students' performance even if used before class. My results are more accurate because, unlike previous studies, I asked students to measure the time spent on phones and the learning activity, while previous studies only used students' self-reports.

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REFERENCES

Felisoni, D. D., & Godoi, A. S. (2018). Cell phone usage and academic performance: An experiment. Computers & Education, 117, 175-187.

Junco, R., & Cotten, S. R. (2012). No A 4 U: The relationship between multitasking and academic performance. Computers & Education, 59(2), 505-514.

Murphy, E., & Manzanares, M. A. R. (2008). Contradictions between the virtual and physical high school classroom: A third-generation Activity Theory perspective. British Journal of Educational Technology, 39(6), 1061-1072.

Rideout, V., & Robb, M. B. (2019). The common sense census: Media use by tweens and teens. Common Sense.

Rosen, L. D., Carrier, L. M., & Cheever, N. A. (2013). Facebook and texting made me do it: Media-induced task-switching while studying. Computers in Human Behavior, 29(3), 948-958.

Steeves, V. (2014). Online Privacy Online Publicity: Young Canadians in a Wired World Phase III: Ottawa. Media Smarts.

Wood, E., Zivcakova, L., Gentile, P., Archer, K., De Pasquale, D., & Nosko, A. (2012). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. Computers & Education, 58(1), 365-374.

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