Internet access in EES101 Workshops – Is it Helpful or Harmful?
M. Grotke, K. Karpenko, H. Zal – University of Rochester

Introduction

In this experiment, we wanted to determine whether or not internet access in workshop would be helpful or harmful to student performance and retention of the workshop material. Previous studies suggest that laptop use in classroom settings pose a distraction to students thereby causing them to not pay attention in class. For example, a study by Hembrooke and Gay found that students using laptops during a lecture did worse than those without laptops on a quiz administered after class (2003). Their findings were corroborated by another study conducted in 2008 by Fried. Another study, by Barkhuus in 2005, seemed to find that students, when given additional instruction relating to laptop use, preferred not to use their laptops in class. Furthermore, there was one study which found no difference in grade performance between laptop users and non-laptop users (Granberg & Witte, 2005).

Before we conducted this study, we noticed very few students using laptops in workshops. We believe the reason for this is because in such a small, collaborative setting, they would feel pressured to stay on task and work cohesively rather than surf the internet and get distracted. In addition, because they were never told they could use their laptops for assistance, some students may assume (falsely) that using their laptops to help them complete the workshop material would be considered cheating. Furthermore, some students may not be able to afford laptops or other portable devices with Internet access and therefore would not have the option. As workshop leaders, our goal is to improve the students’ knowledge of the workshop material and we try to cater to all learning styles to meet that goal. With that in mind, we set out to study the effects of laptops in a workshop setting to determine whether or not they can be used as a tool to help students better grasp the material.
Hypothesis

We argue that the group with access to the internet would have contact to a larger variety of ways to present the information, and therefore have better retention. Unlike a large lecture hall where students might become bored and surf the web, we hypothesized that in a small workshop setting, students would feel pressured to only use the Internet to help complete the workshop material. In our experiment, we allowed the students to use their laptops the way they desired and only gave them slight direction for what they should be searching.

Method

We used two groups in this experiment: one group was used as a control, with no internet access, and the other was an experimental group, in which we asked the students to bring in their personal laptops as internet access points. We developed a short, 13 point quiz relating to the igneous rocks lab. We gave this to the students three times total: once directly before the igneous workshop (for a baseline reading), once directly after the workshop (to test their knowledge gained from the workshop itself), and once a week later (to test their retention). We then graded the quizzes according to a standardized rubric that we created.

Results

According to the graph on the next page, both groups’ quiz scores improved drastically after taking the quiz the second time (as seen by the red columns) and did worse after taking the quiz the third time (as seen by the green columns). Furthermore, the quiz scores of the “With Laptops” group decreased by a greater percentage than the “Without Laptops” group after one
week passed. In addition, the mean quiz scores after one week are very close to one another, differing by only a few percentage points.

The mean quiz scores overall, however, are higher for the “With Laptops” group than the “Without Laptops” group.

**Conclusion**

The fact that both groups improved drastically the second time they took the quiz indicates that the students are grasping the material. This is expected because this is exactly what the workshop model is intended to do. However, the fact that the “With Laptops” group decreased by a greater percentage than the “Without Laptops” group after one week indicates that the “Without Laptops” group retained the workshop material better than the “With Laptops” group. Although the “With Laptops” group may have scored higher, on average, than the “Without Laptops” group, the less dramatic decrease in performance of the “Without Laptops” group indicates that the students *forgot less* of the material or, in other words, *retained more* of
the material. The “With Laptops” group may have performed better than the “Without Laptops” group overall, but this is not the only thing we were trying to ascertain.

While the data suggest that not having laptops in workshop improves retention (albeit only slightly), this is not the case. The “With Laptops” group consisted of four students total, all of which were given the quiz all three times, yet the “Without Laptops” group consisted of four students total, two of which were given the quiz all three times (two of the students were absent for a couple weeks). Since our sample size was small to begin with (8 students) and only 6 students took the quiz all three times, we cannot say for sure whether or not laptops in a small environment have a positive or negative impact on performance or retention. In order to know for sure, we would need to increase our sample dramatically. Furthermore, it is impossible to determine why some students improved on quiz scores or did worse, based on our data. Some may have studied the material on their own which would have improved their retention from the first week to the second week dramatically whereas others may have already known the material really well because of independent interest. Either way, our study did not control for these variables so we do not know for sure whether or not laptops were helpful or harmful.

**Discussion**

From this experiment, our results appear to be inconclusive. While the students with laptops performed better overall, the group without laptops had the most progress, defined as the average final test scores minus the average initial test scores. These differences could be caused by a variety of different factors not controlled by this experiment. For example, the higher initial test score in the “With Laptops” group could be because the students in that group came into workshop with a better grasp of the information. This, among other reasons, is why we gave the
students a quiz at the beginning of workshop. Since laptops in workshop would have nothing to do with their performance on the initial quiz, we used their performance on the initial quiz as a baseline of the students’ knowledge entering workshop. With an established baseline of knowledge, we were then able to see how the laptops affected the uptake of the material as opposed to the net knowledge gained by the students. The main problem with this baseline of knowledge, however, is that we do not know how accurate it is. There is no way to know for sure how much knowledge of the week’s workshop each student has coming into workshop. Thus, in order to accurately ascertain whether or not student improvement is due to laptop use, all the students would need to have a uniform baseline of knowledge entering workshop.

It is interesting to note the data in students D and G, with the possibility of C almost falling into this category. Each of these students actually did worse on the last administration of the quiz. We attribute this to a type of fatigue. The final quiz was the third time they had seen the exact same quiz, and they may have rushed through it to get it over with and move on to the next lab's material. Furthermore, we administered the final quiz to the students at the end of lab and so some students may have rushed through it to ensure they headed home early. This could have affected many of the other student's data, but they did not actually do worse than the first administration of the test. Besides fatigue, other factors that could possibly affect the accuracy of our results include differences in workshop environment, the actual workshop leaders, presence of friends in the workshop, exposure to the material outside of workshop, whether lecture covered the material before their workshop, and other outside influences happening in the student's lives such as tests or personal issues. Since our sample size was so small, any one of these factors could greatly influence our data.
Another interesting observation is that students in the laptop group were reluctant to use their personal computers to help them in workshop. The students would often only use one laptop in between pairs, and the other student's laptop would sometimes sit open and to the side, unused. In addition, a study at UC San Diego found similar results. In this study, students were asked to use an in-class lecture “rating” system called ActiveClass and they were allowed to have their laptops open in class. Only 14-22 students had their devices with Internet access out during lecture out of a class of almost 140 students. While this finding was not the main goal of the study, it does nevertheless support the notion that most students would prefer not to use their laptops or other Internet-accessible devices during class (Barkhuus, 2005). As for our study, although we did not police the students’ use of the laptops strictly during the lab, we did not observe them going off task at all during the workshop. This could be because the groups were so small or possibly because they wanted to get through the lab faster. Moreover, the pressure from their peers to stay on task may also have contributed. This is actually very different than that discussed in Hembrooke and Gay's study which explored the use of laptops in a lecture setting rather than a workshop setting (2003). Moreover, Fried's study corroborated their findings about lecture halls- Students with laptops generally performed more poorly than those with laptops (2008). However, the main difference between these studies and ours is that our study took place in a workshop environment whereas their studies took place in lecture-based environments. In a collaborative workshop environment, pressure from peers and the interactive setting itself may outweigh some of the negative effects of laptop use on the workshop. A more detailed study of this would need to take place to be conclusive, but our study does seem to reject the idea that laptop use across the board is harmful and that certain environments may actually benefit from it. Moreover, Granberg and Witte did a study which had similar results to ours.
Their study found no difference between groups of students using laptops in class and those who were not using laptops in class. Granberg and Witte had a similar setup to our experiment, with control groups and a test administered to each group (2005). While our results may indicate that laptop use hinders retention, a much larger and more controlled follow-up study is necessary to be able to say conclusively whether or not laptops are helpful or harmful in workshop.
References

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