

AC 2010-563: STUDENT USE OF TECHNOLOGY IN A LARGE LECTURE

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Student Use of Technology in a Large Lecture

Abstract

In the spring of 2009 a large lecture class, CEE 2814 Measurements, was observed to determine student laptop usage during lecture. This 185 student section met three times per week in a large lecture hall for 43 total classes in the semester. All students were required to own a laptop. For 26 of these lectures a graduate student sat in various locations throughout the room, on different days of the week, and recorded the student's participation levels during the class. The delivery of the material was somewhat unusual in that a tablet computer screen was projected and served as the "blackboard". The lectures were recorded and attendance was not required. There were no unannounced quizzes or other mechanisms to encourage attendance. At the start of the semester the instructor asked that computers be used only for appropriate purposes and that phones not be used at all. There was one reminder of this request halfway through the semester.

The purpose of this study was to observe how students interact with the lecture during class and what distractions were presented with the use of laptops. Among other conclusions, it was found that computers caused more distractions than all other distractions combined. The 34% of the students that did bring a computer to class, 86% used them for purposes other than class related. It was further found that 89% of all technological distractions were computer related, with 8% from phones and 3% from iPods or similar devices. Results suggest that laptop computers are not an overall effective tool for note taking in a large classroom environment.

Laptop use during the class distracted students from lecture more often than it assisted with note taking. Other research indicates that instructors have had difficulty with students becoming distracted by laptops in large lecture halls. Unless these instructors find a way to incorporate laptops within their curriculum or provide students with an incentive to use their laptops properly, they will continue to struggle with the negative effects of laptops in the classroom.

Introduction

Observing any college campus today, a person can easily determine the impact of laptops on students' study habits. Many students take their laptops with them to all their classes and are encouraged to use them for note taking. It is safe to assume that utilization of personal computers has been fully integrated into college academia during the past fifteen years. In the mid-1990s, college universities began requiring all students to purchase laptops recognizing the potential personal computers had to increase the efficiency of an individual student's study time. Initially, it appeared that there were positive responses to the use of laptops in the classroom. According to L.D. Fink, R.L. Kolar, and D.A. Sabatini, an experiment conducted at Oklahoma University in 1998 and 1999 for a junior level water resources course yielded favorable results for laptop usage as an aid to class participation. As described in the article, the students enrolled in this course were split into two sections, one that required the use of laptops and one that did not. The authors found that "class dynamics were consistently better in the laptop section, which is reflected in the much higher class participation score"¹. Perhaps the most important conclusion

was in the abstract of the article which states “Evaluations do clearly show that, when the technology is used properly and when class time is not spent resolving technical problems, the laptop students had a more positive learning experience.”¹

However, David Cole of Georgetown University had a different point of view concerning the use of laptops in his lecture class. Cole asked his law students to answer an anonymous survey asking whether or not they believe laptops were a useful tool in the classroom. As stated in his article “[a]bout 80 percent reported that they are more engaged in classroom discussion when they are laptop free.”² Additionally, “95 percent admitted that they use their laptops in class for “purposes other than taking notes, such as surfing the web, checking e-mail, instant messaging and the like.”² Cole also made reference to an article written by Carrie Fried. According to Fried, the results she obtained from observing a General Psychology course taught at Winona State University, “the more students used their laptops in class, the lower their class performance.”³ Additionally, a survey answered by the students for this class “indicate that laptop use by fellow students was the single most reported distraction [...] accounting for 64% of all responses.”³

Due to the different opinions concerning the effects of laptops in the classroom, a study was conducted in order to determine how students were using personal computers in the Spring 2009 CEE 2814 Measurements course at Virginia Tech. For a number of years Virginia Tech has required that all incoming freshman engineers purchase a tablet and many students bring their laptops to class in order to take notes electronically. The study’s primary objective was to observe and record whether or not students utilized their laptops for classroom purposes and to consider possible solutions to remedy the problem.

Methods and Results

Before coming to the lecture, the date and which day of the week (Monday, Wednesday, or Friday) was recorded. At 11:15 a.m., the beginning of class, a head count of all students was conducted from the back of the room. Next, ten random students were observed throughout the class. On one day, ten students sitting in the front of the room would be observed by a graduate assistant, while ten students in the back of the room were observed during the next class. Immediately, upon sitting at either the front or back of the classroom, the ten selected students were observed and their activity recorded, roughly at 11:20 a.m. A second and third observation of the same ten students was performed during the middle of class at about 11:35 a.m. and near the end of class at 11:50 a.m. This concluded the data collection procedure for a single class period. The same procedure would be followed during the next class. Table 1 is a sample from the data collected during the class period. The table shows the observation taken for two students; however, the observation for ten students was actually recorded in the data collection table for each lecture.

Table 1. Sample Data Collection Table

Date: 25-Feb-09
Head Count: 156
Room Area: Back

Student #:	1	2
Beginning:	Taking notes on laptop	Listening to lecture
Middle:	Surfing web on laptop	Taking notes in notebook
End:	Playing game on laptop	Listening to lecture

After the data was recorded, it was summarized.. First, it had to be determined whether or not the student was engaged in class. As earlier stated, for any given class session, each student was observed three times, once in the beginning of class, once in the middle, and once in the end. Assumptions had to be made about what constituted a student participating in class. It was decided if a student paid attention in class for two of the observations and was distracted for one, then he or she would be counted as participating in class. Likewise, if the student was distracted for two of the observations, he or she would be noted as distracted. After each subject was classified as either paying attention or being distracted the results were organized into a pie chart which can be seen in Figure 1.

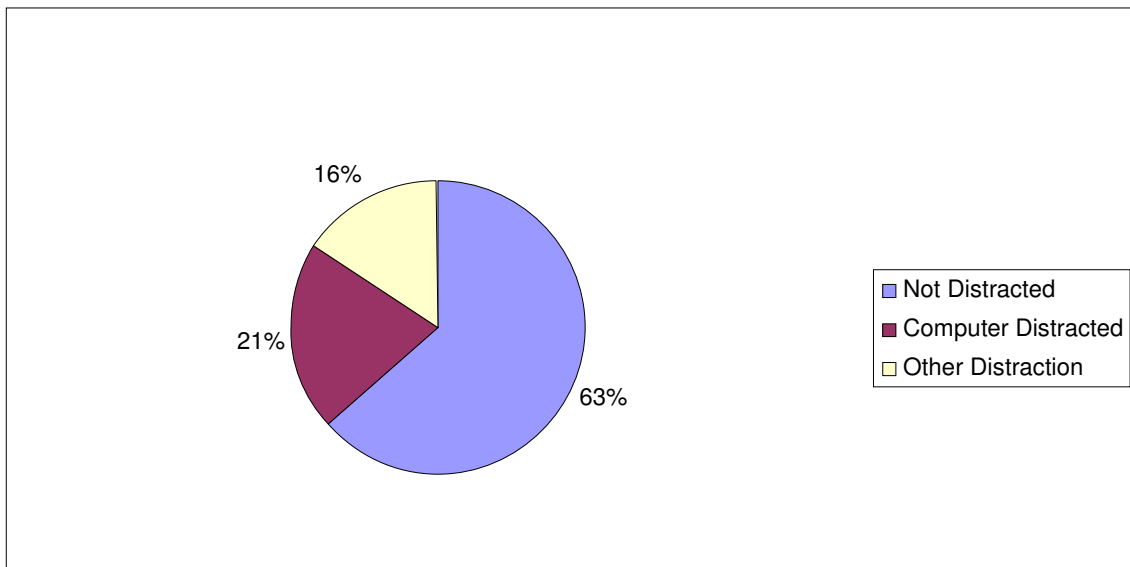


Figure 1. Class Participation

The next task was to create figures that display student activity during the lecture, whether it was computer related or not. However, each of the three observations per student was recorded individually instead of being averaged to reflect a single value for each student as done

previously for the class participation data in Figure 1. For example, if a student was observed taking notes in a notebook at the beginning and middle of class and was surfing the web or playing a game on the computer at the end, then two instances of taking notes and one instance of computer distraction would be recorded. After analyzing the data, multiple categories for participation and distraction were developed. For participation, there were three: taking notes in notebook; taking notes on computer; or simply paying attention. For distraction there were eight; computer; phone; iPod; friends; doing homework; daydreaming; sleeping; or playing word games. Figure 2 displays the percentage breakdown of computer use in the classroom while Figure 3 illustrates the entire activity breakdown of the classroom.

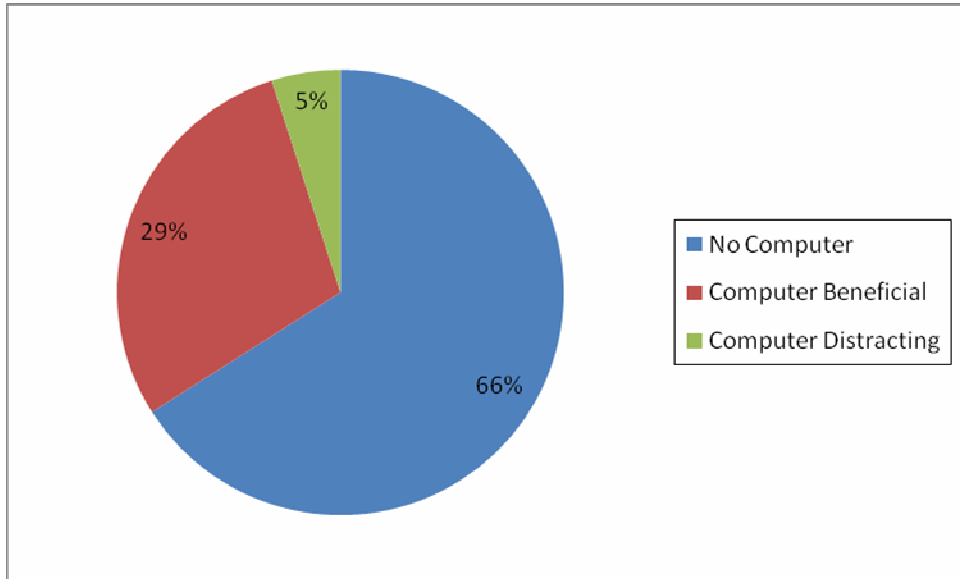


Figure 2. Computer Use

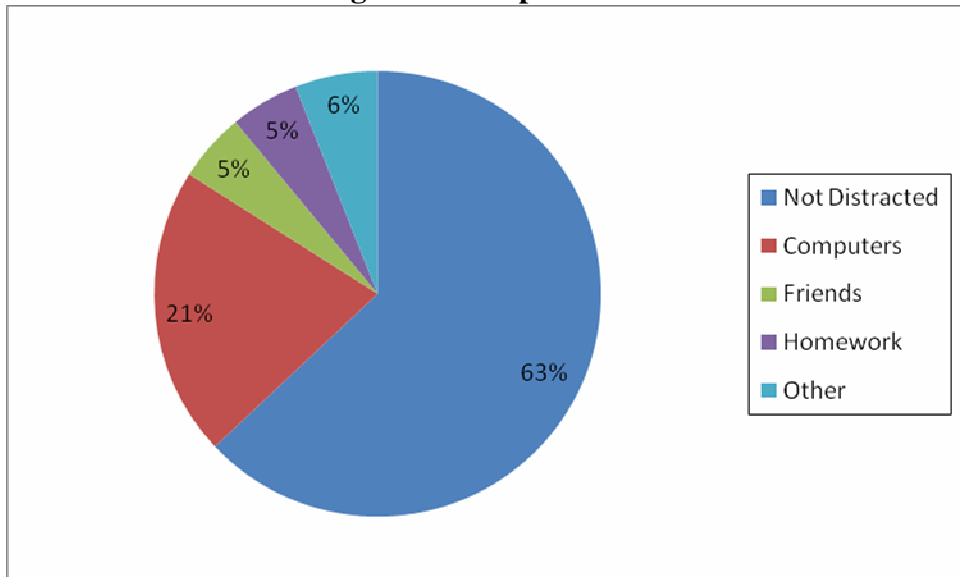


Figure 3. Activity Breakdown

Lastly, the total head count was used in order to determine class attendance throughout the semester. The head counts were averaged in order to reflect a weekly average. Figure 4

below illustrates the head count data collected. The average class attendance percentage was 75%. The results from Figure 1 show only 63% of the class were participating on average. Factoring in those distracted in attendance, only 47% of the class is actually participating during the lecture.

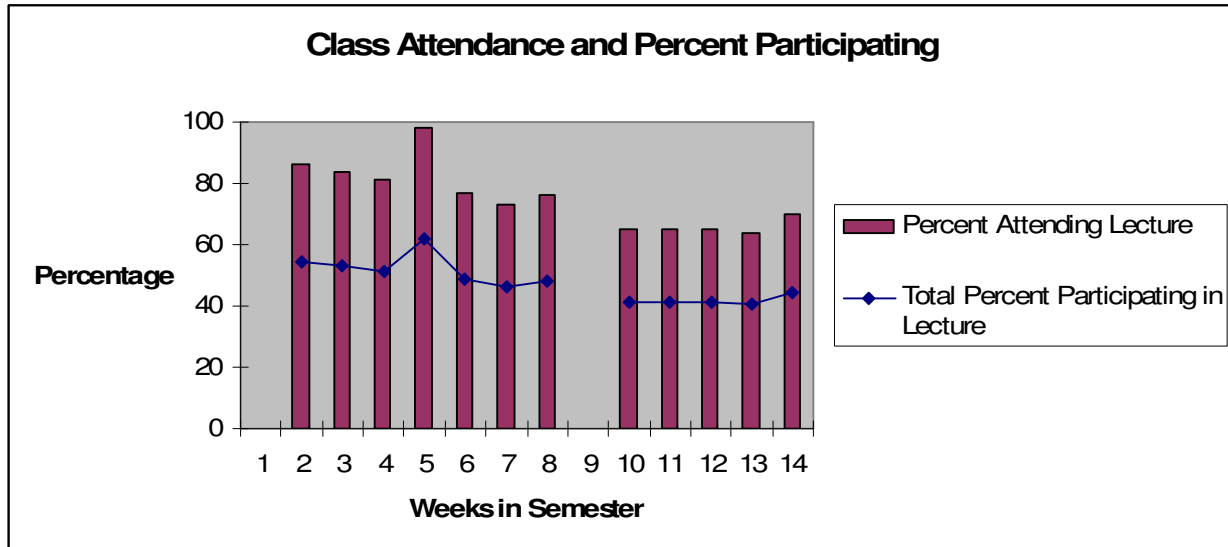


Figure 4. Class Attendance and Participation Percentage

In retrospect, there are improvements that could be implemented in order to enhance the quality of the data. For instance, the middle of the room did not receive great scrutiny in these observations and has the potential to yield interesting data. Additionally, while collecting the data that produced the figures attached, a few subjects were observed multiple times. To increase the accuracy of the data, a wider range of subjects should be considered.

Conclusion

From the results, laptop use during the class distracted students from lecture more often than it assisted with note taking. In order to prevent laptops from disrupting the class participation one option would be to disable the wireless transmitter. However, professors have attempted this option in the past only to re-instate wireless connectivity due to student complaints³. As a result, most instructors may have to cope with the negative effects. Larger lectures appear to experience more problems with this issue than smaller classes. The CEE Measurements class studied had a total student count of 185 students while the General Psychology course observed in Carrie Fried’s article had 137 students³. In both cases, results showed laptops hindered student participation. However, the first article reviewed had a total student count of 11 and 12 students and yielded positive responses for laptop use¹. These figures show that it is indeed easier to monitor how students use their laptops in smaller classrooms as opposed to larger lectures.

Additionally, the small classroom observed in the “Laptops in the Classroom: Do they make a difference?” article was a design course which used software during the class period¹. Performing classroom exercises with the software would prevent students from using the laptop

for non-classroom activities. In large lectures taught in a traditional matter, which do not include software training in their curriculum, laptops are not being used for an in class computer exercise thus allowing the students to more easily use their laptops for other purposes.

The dilemma for instructors is to develop a solution that prevents laptops from distracting students from the classroom material in large lecture halls without banning laptops all together. One solution would be to integrate laptops within the curriculum similar to the smaller, design classrooms. However, incorporating computer activities within a class that deals primarily with theoretical material can be a challenge. Another solution to keep students in a large lecture hall from using their laptops for non-classroom related purposes would be to inform the class that an in-class quiz would be given at the conclusion of each class. The material on the quiz would be based on the current lecture and the students would have the opportunity to use their notes, whether they take notes on paper or on their laptops. Unfortunately the class time needed to provide the quiz would take away from the time needed to cover the class curriculum. Until this endeavor can be overcome, educators will continue to struggle with the negative effects of laptops in the classroom.

[1]Fink, L.D., R.L. Kolar, & D.A. Sabatini. "Laptops in the Classroom: Do They Make a Difference?" *J. Engineering* (October 2002): 397-401.Print

[2]Cole, David. "Laptops vs. Learning." *Washington Post*. 6 April 2007.Print

[3]Fried, Carrie B. "In-class laptop use and its effects on student learning." *J. Science Direct: Computer & Education* 50 (2008): 906-914.Print