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Unregulated use of laptops over time in large lecture classes

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ABSTRACT

Students often have their own individual laptop computers in university classes, and researchers debate the potential benefits and drawbacks of laptop use. In the presented research, we used a combination of surveys and in-class observations to study how students use their laptops in an unmonitored and unrestricted class setting—a large lecture-based university class with nearly 3000 enrolled students. By analyzing computer use over the duration of long (165 min) classes, we demonstrate how computer use changes over time. The observations and student-reports provided similar descriptions of laptop activities. Note taking was the most common use for the computers, followed by the use of social media web sites. Overall, the data show that students engaged in off-task computer activities for nearly two-thirds of the time. An analysis of the frequency of the various laptop activities over time showed that engagement in individual activities varied significantly over the duration of the class.

1. Introduction

In today's university classrooms, students often have their own individual laptop computers. Many programs even require that students have laptops in the classroom (Brown, Burg, & Dominick, 1998; Campbell & Pargas, 2003; Weaver & Nilson, 2005). It has been suggested that access to online resources and computer-based tools can help students supplement their learning during class through increased engagement and the promotion of active learning (e.g., Brown, et al., 1998; Weaver & Nilson, 2005; Wurst, Smarkola, & Gaffney, 2008). From a constructivist perspective, classroom laptop use provides students the opportunity to take ownership of their learning experiences (Wurst et al., 2008). This ownership carries with it a critical responsibility of remaining on task through use of the laptop for course/topic specific activities, such as note taking, fact checking, information seeking, or additional studying. By this rationale, even without specialized activities and software designed to take advantage of the technology and integrate them into lessons, laptops can be seen as valuable tools with just as much right for a place in students' hands as pens, notepads, and textbooks. Of course, this is assuming that the laptops are used appropriately to supplement learning.

But do university students really use their laptops to aid their educational experiences? From our observations, many students do not even bother using their laptops in class when given the option. And when they are used, it is not uncommon for educators to see laptops as sources of distraction. With computers and wireless Internet connections, students are free to surf the web, keep up with the latest social media, or even play online games. Educators are left with the decision of what to do with laptops, and whether students should have access to Internet-capable devices. Many educators have considered simply banning the use of laptops in the classroom (e.g., Maxwell, 2007; Yamamoto, 2007). Others have argued for disabling or limiting Internet access (e.g., Adams, 2006), and yet another proposed solution has been to separate lecture halls into laptop-approved and laptop-free zones (e.g., Aguilar-Roca, Williams, & O'Dowd, 2012; McCreary, 2009). To better understand the issue, numerous researchers have collected data on how university students use their laptops (e.g.,

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Barak, Lipson, & Lerman, 2006; Demb, Erickson, & Hawkins-Wilding, 2004; Gay, Stefanone, Grace-Martin, & Hembrooke, 2001). Using approaches such as observations (e.g., Barak et al., 2006), surveys (e.g., DeGagne & Wolk, 2007; Demb et al., 2004), and the use of logging software (e.g., Gay, et al., 2001), researchers are learning more about how students use technology in a variety of different class settings.

In this paper, we present the results of a study that contributes additional data on how student use laptops in an unregulated large-lecture class setting, in which the class is too large for the professor to monitor laptop use. In very large university classes, interactions between individual students and the instructor are minimized (Mayer et al., 2009). Consequently, students may easily use computers for distracting or non-educational activities with virtually no risk of being reprimanded. On the other hand, students could also take advantage of wireless Internet technology to actively seek additional information—possibly making up for the lack of personal instructor–students interactions. Additionally, our study investigated laptop use during long class periods (2 h and 50 min), allowing us to collect data on how computer use changes over time.

1.1. Students' use of computers in lecture classes

Several prior studies have investigated how university students use computers in the classroom. For instance, DeGagne and Wolk (2007) surveyed approximately 10,000 students at an undergraduate university. The researchers found that many (nearly half of the sample) students owning laptops reported that they never brought them to classes. Of those that did, many students (48.7%) reported always using laptops for note taking during class, while 27.3% reporting sometimes using their computers to take notes. Students also reported a large amount of off-task activities in class, including communicating with friends, reading and writing emails, and doing school work for other classes. These results demonstrate how laptops are commonly used both as course tools and distracters. However, the data consisted of only student-reported responses and only describes general use tendencies, rather than providing specific data about certain types of courses.

In a similar study, Gay et al. (2001) studied laptop use through a combination of surveys and the use of software tools to track how students used their computers. The researchers studied computer use in a communications course and in a computer science course, finding general class differences in how students found and shared information. Additionally, students in the communications class made significantly more use of communications tools and applications than those in the computer science class. This study demonstrates the importance of considering class specifics when studying computer use.

In another study using the survey approach, Lauricella and Kay (2010) found that students commonly use laptops for a mix of on-task and off-task purposes during class. While many students reported using laptops for academic purposes for large percentages of class time, results also included other non-academic uses, such as communication, movie watching, and game playing. Students in this study reported off-task uses to be unhelpful or distracting during class.

1.2. Effects of computer use in lecture classes

In addition to studying how students use laptops, researchers have investigated whether laptop use affects education. Despite the potential benefits and widespread adoption of laptops in university classes, many educators believe that laptop use can have negative effects on learning (e.g., Adams, 2006; Maxwell, 2007). Unrestricted computer access provides students with an unlimited source of distractions, including activities such as web browsing, game-playing, and text-messaging. Several studies have provided evidence backing these concerns, showing that students often use computers for purposes unrelated to the class lessons (e.g., Fried, 2008; Gay et al., 2001; Wurst et al., 2008). Grace-Martin and Gay (2001) tracked Internet usage through a semester (not just during class time) for computer science and communications courses. They found a significant correlation between the length of Internet browsing sessions and class performance. That is, longer browsing sessions were related to lower performance scores. In a university psychology course, Fried (2008) found a similar result. In this study, students completed weekly surveys that included questions about laptop use and class attendance. Results indicated a significant negative correlation between class performance and laptop use, showing that students who used their laptops more in class demonstrated inferior academic performance. Further, Fried's results show laptop use by other students as the most commonly reported in-class distractor.

A study by Kraushaar and Novak (2010) collected data about in-class laptop use and class performance in an information systems course through surveys and spyware monitoring software for volunteers. The study found more off-task than course-relevant computer use, and showed a negative correlation between class performance measures and the amount of off-task computer use. Additionally, Burak (2012) surveyed university students from a variety of disciplines and found a significant relationship between multitasking with laptops or phones during classes. Survey results about class behaviors showed that student GPAs suffered with increased in-class laptop multitasking. This collection of findings provides knowledge of the general relationship between laptop use and academic performance.

In addition to laptop use being detrimental to personal performance, a study by Sana, Weston, and Cepeda (2013) found that students performed worse on tests after sitting near students using laptops during an introductory psychology class. This finding suggests that the laptop use can be distracting even for those in the class who are not themselves using the technology.

Researchers have also investigated the effects of laptop use on factors besides academic performance. For example, Wurst et al. (2008) compared student satisfaction and the general level of activity level among different business honors courses with or without laptops. Based on the results of student reports, students expressed significantly less satisfaction with their education with laptops as compared to those without computer access during class. This study found no differences in academic performance or level of overall class activity due to laptop use. The results did, however, show that students with laptops were significantly more likely to find answers to an instructor's questions. Of course, honors courses generally are relatively small in size—especially when compared to a large, lecture-type course.

1.3. Computer use in large lecture classes

Few researchers have explicitly targeted large classrooms for investigation. Barak et al. (2006) examined the use of wireless laptops for promoting active learning in large lecture halls, basing their investigation within an introductory undergraduate computer engineering class with 374 students. Course sessions mixed short lectures, lab assignments, and specialized laptop activities. Using an online survey, the