Internet Usage During Class Associated With Lower Course Grades

NORTHWESTERN UNIVERSITY

Sara C. Broaders, PhD
Department of Psychology
Northwestern University

Michael Smutko, PhD
Department of Physics & Astronomy
Northwestern University

Abstract

A growing body of literature and cultural discourse expresses concern about student technology use in the classroom and whether technology is helping or hindering student learning. Many discussions of the impact of student technology use have been based on anecdotal reports, and most experimental investigations have focused on the effects of technology usage on learning from a single lecture. This project is a quasi experimental study of the effects of students' use of laptops and other electronic devices on final course grades during the full term of an actual course. Students in two different lecture-based courses were allowed to use technology at will during class meetings over the course of an academic quarter. Student self-reports and wifi access logs tracked electronics usage. Students who accessed the Internet during lectures obtained significantly lower course grades, even when taking notes via computer, compared to students taking notes by hand. Students who only used computers to take notes during lectures obtained slightly lower course grades than non-technology-using students, but the difference was not significant.

Introduction

▪For a number of years, interest in the potential costs and benefits of student laptop use during classes has been increasing. While many educators tout the benefits of integrating student technology use into course design, a growing number of instructors and institutions are limiting students' use of laptops and other electronic devices during class meetings due to concerns about negative effects of technology use on classroom engagement and students' processing of information. The *actual* impact of student technology use during lectures has only recently begun to receive serious empirical attention.

▪A number of experimental studies have examined effects on learning of students' use of laptop computers during a single lecture:

➢Broaders and Smutko (2013) found that students who took paper-and-pen notes scored better on a quiz of lecture material than those who were using Facebook during the lecture. In addition, students performed better on the quiz when they had listened to a live lecture rather than a video recording of the exact same lecture.

➢Sana, Weston, and Cepeda (2013) found that students multitasking on a computer during a lecture scored lower on a test of the material, and that students who were able to see the computer screen of a multitasking peer also scored lower.

➢Mueller and Oppenheimer (2014) examined the effects of paper-and-pen notes versus computer notes on student comprehension of factual and conceptual information, finding that the computer note takers did significantly worse on the conceptual information than those taking notes by hand.

▪In all of the aforementioned studies, the students were listening to a lecture and completing assessments on the material only as research participants. The scores they received on the quizzes did not affect their grades in actual courses that would appear on their transcripts.

▪The current study builds on this body of research by assessing the impact of student technology use in a more realistic setting – one of their actual courses.

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Method

Participants

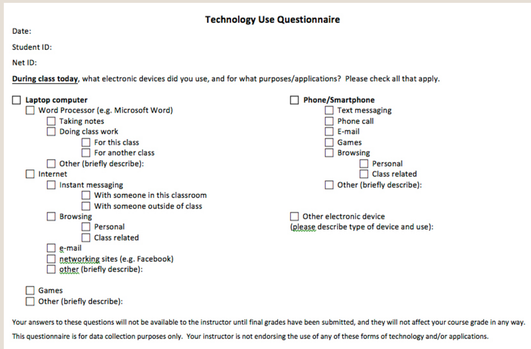
▪ Participants were 240 (124 male, 116 female) undergraduate students at a large Midwestern university enrolled in either *Developmental Psychology* (n=49, 18 male) or *Modern Cosmology* (n=191, 106 male).

Procedure

▪Throughout and academic quarter, students in the two courses were allowed to use laptop computers and other electronic devices during lectures as they normally would during class meetings.

▪Internet usage was tracked with wireless router access logs from the University's IT department.

▪Students also completed self-report questionnaires at the end of each class meeting indicating what, if any, electronic devices they had used during the lecture and how they had used those devices. The questionnaire asked specifically about note taking, email, use of networking sites such as Facebook, and Internet browsing, as well as a number of other functions.



Technology Use Questionnaire

Date:

Student ID:

Net ID:

During class today, what electronic devices did you use, and for what purposes/applications? Please check all that apply.

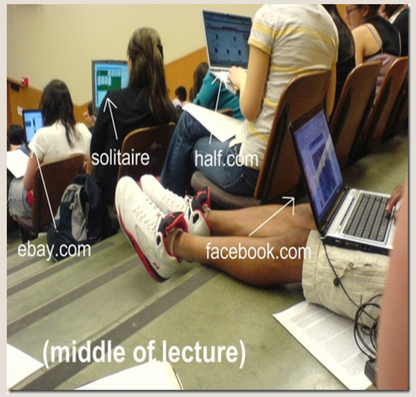
- ☐ **Laptop computer**
  - ☐ Word Processor (e.g. Microsoft Word)
    - ☐ Taking notes
    - ☐ Doing class work
      - ☐ For this class
      - ☐ For another class
    - ☐ Other (briefly describe):
  - ☐ Internet
    - ☐ Instant messaging
      - ☐ With someone in this classroom
      - ☐ With someone outside of class
    - ☐ Browsing
      - ☐ Personal
      - ☐ Class related
    - ☐ e-mail
    - ☐ networking sites (e.g. Facebook)
    - ☐ other (briefly describe):
  - ☐ Games
  - ☐ Other (briefly describe):
- ☐ **Phone/Smartphone**
  - ☐ Text messaging
  - ☐ Phone call
  - ☐ E-mail
  - ☐ Games
  - ☐ Browsing
    - ☐ Personal
    - ☐ Class related
  - ☐ Other (briefly describe):
- ☐ Other electronic device (please describe type of device and use):

Your answers to these questions will not be available to the instructor until final grades have been submitted, and they will not affect your course grade in any way.

This questionnaire is for data collection purposes only. Your instructor is not endorsing the use of any of these forms of technology and/or applications.

▪Based on the self-report questionnaires, students were divided into four groups:

- used no electronics, taking only paper-and-pen notes (n=83)
- used computer only for taking notes (n=35)
- entirely off-task with electronics usage (n=45)
- multi-taskers taking computer notes and also using the Internet (n=77)



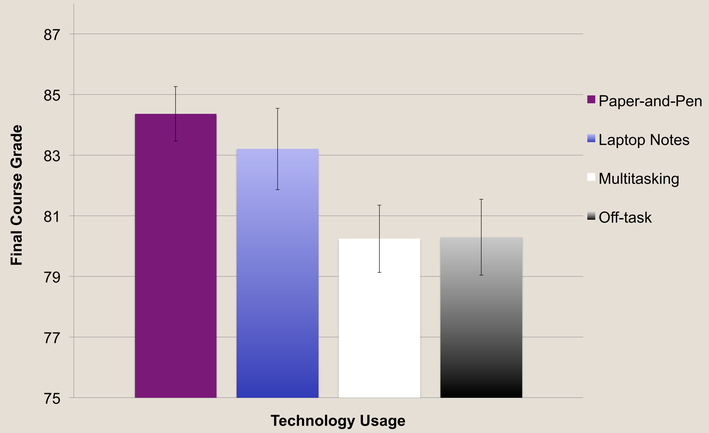
http://lawactually.blogspot.com/2009/02/laptops-in-lectures.html

Results

▪ Final course grades were negatively correlated with Internet usage during class meetings as measured in MB of data transferred (r = -0.142, p = 0.028). Students who were the heaviest Internet users had the lowest grades.

▪A one-way ANOVA showed that students' grades were significantly different depending on whether/how they used electronics during class, $F(3, 236)=3.84$, $p=.010$.

- ▪The paper-and-pencil notes group ($M=84.36$, $SD=8.23$) earned significantly higher grades than both the off-task ($M=80.29$, $SD=8.39$, $p=.013$) and the multitasking students ($M=80.24$, $SD=9.78$, $p=.003$).
- ▪While students who used their computers only for note-taking ($M=83.20$, $SD=7.91$) earned slightly lower grades than the paper-and-pencil group and better grades than the students in either of the Internet-using groups, these differences were not significant (all $p>.05$).



Conclusions

▪Students who take notes by hand achieve the highest course grades. When students stay entirely on-task with their use of technology, it neither helps nor hinders their grades.

▪When students' attention is divided by any off-task use of the Internet, their performance in the course suffers. Installing Internet "off" switches in lecture halls might be one approach to help students succeed, so that they could still use laptops for note-taking while not falling prey to the constant distractions afforded by the Internet.

▪These results are consistent with the considerable research literatures on both depth of processing and multitasking. In terms of depth of processing, most students can type much more quickly than they write, so paper-and-pencil notes require them to summarize key points rather than essentially transcribing the lecture at a more superficial level of processing. We also provide additional support for the challenges of multitasking, since students trying to manage attending to a lecture while attending to something on the Internet obtained the lowest course grades.

References

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