

USE OF LAPTOPS IN THE CLASSROOM: RESEARCH AND BEST PRACTICES

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Introduction

Across campus, laptops and other mobile devices, such as iPads and smartphones, are appearing in greater numbers in the classroom. In a CTools survey of 1,415 U-M students conducted in Winter 2010, over 50% of respondents reported bringing their laptops to class at least once per week (USE Lab, Digital Media Commons, 2010). Many faculty see this trend as an opportunity for more innovative teaching, and they are exploring ways to leverage this technology to increase student engagement during lecture. However, other faculty worry about potential distractions that mobile devices could introduce into their classrooms. In this Occasional Paper, we present the results of a CRLT research study that examined student perceptions of how laptops affect attentiveness, engagement, and learning, and we suggest guidelines for using laptops and other mobile devices effectively in the classroom. As we discuss below, laptops can be an effective tool for promoting student learning if faculty plan carefully for how and when they will ask students to use their laptops, rather than simply allowing students to bring them to class.

CRLT Study of In-Class Laptop Use at U-M

While research on the effects of laptop usage on student learning and engagement is limited, there is some evidence for both positive and negative impacts. On the positive side, when students can pose questions via their laptops, the number of questions is higher than in traditional classes (Anderson et al., 2003; Caron & Gely, 2004; Samson, 2010). Studies that correlate final grades with student use of laptops have been mixed, with some finding that students with laptops received slightly higher grades (Wurst, Smarkola, & Gaffney, 2008), and others finding a negative correlation between the use of laptops and grades (Grace-Martin & Gay, 2001; Fried, 2008). On the negative side, students have reported that laptops, both their own (Barak, Lipson, & Lerman, 2006; Maxwell,

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2007) and those of their classmates (Fried, 2008; Mazzie, 2008), are a distraction. It is important to note that studies showing a positive association between laptop usage and student learning or grades involved courses in which the integration of technology had received significant attention from faculty.

To investigate the views of U-M students and faculty about this issue and the possible impact laptops may have on learning and teaching, CRLT conducted a study of student perceptions of how laptops affect their attentiveness, engagement, and learning. We surveyed undergraduate and graduate students from sixteen courses that allowed laptops in the classroom. In eight of the classrooms, the faculty planned to have students use LectureTools on their laptops. Developed by U-M engineering professor Perry Samson, LectureTools is an interactive suite of web-based tools designed to allow questioning practices in lecture that actively engage students and go beyond the multiple choice format typically supported by classroom response systems (clickers). Additional functions include the ability for students to take notes and make drawings on PowerPoint slides, rate their understanding of each slide, pose questions anonymously during the lecture, and review the recorded lecture after class (see <http://www.lecturetools.com>).

In our study, classes using LectureTools were matched to a control group of similar classes that allowed laptops, but did not use LectureTools or have a specific strategy

for integrating laptops into the course. The control group classes matched the LectureTools classes in size, level, and discipline (see Table 1). A total of 595 students (35% of the classroom population) responded to our surveys. Of the total number, 259 students were in classes that used LectureTools, and 336 students were in the control group. Response rates for both groups were very similar, 33% for the group using LectureTools and 37% for the control group. The participating classes varied in enrollment size and level, and represented various disciplines (e.g., political science, nursing, education, biology, and interdisciplinary courses).

What do U-M students say about their attentiveness, engagement, and learning when using laptops?

Students were asked to rate their agreement or disagreement with three statements: “My attentiveness has increased due to laptop use,” “My laptop helped me to be engaged during lecture,” and “I learned more due to the use of a laptop than I would have without it.” Overall, students in courses with professors who used LectureTools reported higher levels of attentiveness, engagement, and learning than students in the control group (see Table 2).

The difference between the two groups was greatest for the question of engagement, with about 60% of the LectureTools students strongly agreeing or agreeing that laptops increased their engagement versus only 39% of the

Table 1: Laptop Survey Demographics

Courses Using Laptops With LectureTools			Matched Courses Allowing Laptops		
Course	# of Respondents	Response Rate	Course	# of Respondents	Response Rate
AOSS 105/CHEM 105/ ENSCEN 105/ ENVIRON 105	54	32%	ENVIRON 201	85	38%
BIO 100	11	23%	BIO 101	34	31%
EDUC 601	5	63%	EDUC 604	2	33%
EDUC 737	5	50%	EDUC 665	6	40%
ENVIRON 110/ AOSS 171/BIOLOGY 110/ ENSCEN 171/ GEOSCI 171	32	26%	ENVIRON 119/ GEOSCI 119	42	37%
NURS 357	57	42%	NURS 354	26	43%
NURS 454	22	37%	NURS 458	30	59%
POLSCI 101	73	31%	POLSCI 160	111	34%
Total	259	33%	Total	336	37%

Table 2: Comparison of Student Perceptions of Impact of Laptops

	Increased Attentiveness		Helped with Engagement		Learned More	
	LectureTools N=232	Control N=234	LectureTools N=232	Control N=234	LectureTools N=232	Control N=234
% Strongly Agree	8.2%	3.4%	12.6%	7.3%	14.2%	8.1%
% Agree	28.9%	21.4%	47.6%	31.3%	38.4%	31.6%
% Neutral	29.3%	30.3%	21.2%	23.2%	25.4%	26.1%
% Disagree	23.3%	33.8%	12.6%	29.6%	16.4%	26.9%
% Strongly Disagree	10.3%	11.1%	6.4%	8.6%	5.6%	7.3%
Mean Rating	3.01*	2.72	3.48**	2.99	3.39*	3.06

*p<.01, **p<.001

control group. Differences in responses to other questions were less pronounced but still statistically significant. More than half (53%) of respondents from LectureTools classes strongly agreed or agreed that they learned more due to the use of a laptop than they would have without it, compared to only 40% of students from the control group. A larger percentage of students using LectureTools (37%) than students in the control group (25%) strongly agreed or agreed that their attentiveness increased due to laptop use.

Open-ended comments helped to explain these differences. Students reported that easy interaction between the professor and students via laptops during lecture was an important factor affecting their attentiveness, engagement, and learning. For example, some students in the LectureTools group felt that the questions posed by the instructor in LectureTools helped them better understand and learn lecture material. Others highlighted interactive components, such as chatting with graduate student instructors (GSIs) during lecture or rating their own understanding of concepts, which they said engaged them more in class and made them feel more connected to what was being taught. As one student commented, "LectureTools is a great way to take notes and stay alert in class. It helped me learn a great deal more."

What do U-M students say about potential distraction when using laptops in class?

While students see laptops, especially when used with LectureTools, as helpful tools for learning, they also clearly recognize that laptops can become a distraction for themselves and others during class. Three-quarters of the students from both groups reported that using a laptop during class increased the amount of time they spent on non-course tasks. In addition, approximately 35% of the respondents

in both the LectureTools and control groups spent more than ten minutes per class using social networking sites and email. When asked how they are affected when other students seated near them use their laptops, a higher percentage of students in the control group (46%) than in the LectureTools group (40%) reported feeling somewhat or significantly distracted, although this difference was not statistically significant.

Open-ended comments reveal that many students appear to weigh the options of using or not using laptops during class and make decisions based on what may be most helpful for their own learning. The following comments represent student views on laptop distraction and how they deal with it.

"I can type so much more efficiently than write, and my notes are so much more organized when typed with word processing software. If I had a course that didn't allow laptops, I would consider dropping it, simply because of the difference it would make relating to my own personal learning style."

"Laptops do help with taking notes a lot and with being able to look at powerpoints on the computer and add your own notes [in LectureTools]. However, they are also distracting because you end up on Facebook when you think the lecture is at a point you don't need to pay attention."

"I didn't use a laptop during this lecture and never use my laptop during other lectures either. For students who take notes on their laptops I can see how typing would allow for quicker note-taking, but for students who sit and go online or do other unrelated activities, I find it distracting to sit in the same lecture as them."

Logistical and Instructional Practices to Support Laptop Use in Class

The results of our study confirm findings from other research. When laptops are used for specific pedagogical purposes, they can have real benefits for student learning. At the same time, they are also a potential distraction in the classroom. Given that the number of students who own laptops and other mobile devices is increasing steadily, faculty will need to think carefully about their approach to student laptop use and how they can maximize the benefits while minimizing the distraction. Options for faculty to consider range from banning laptops (Foster, 2008; Glenn, 2010), to adopting an intensive approach such as LectureTools, or using a variety of intermediate solutions. In this section, we review logistical issues faculty should address in order to manage laptop use proactively in their classrooms. We also suggest practices for using laptops to increase student engagement.

Policies and Logistics

Set a laptop policy and communicate it to students

Whether you decide to encourage or discourage student laptops, it is often helpful to have a clear policy statement in the course syllabus about expectations for how and when laptops are permitted. Such a statement will help manage the use of laptops in class, and it will act as a guideline to students regarding your expectations. These days, with laptops as ubiquitous as pen and paper, not having a policy is a tacit affirmation that you allow laptops in class. Following are samples of statements that faculty use to set boundaries for laptops in their classrooms:

“Students are not encouraged to bring laptops to class. A closed laptop rule during lecture will be enforced and other communication devices will need to be on ‘silent’ during lecture.” (U-M Syllabus)

“When you use laptops during class, do not use laptops for entertainment during class and do not display any material on the laptop which may be distracting or offensive to your fellow students.” (Northern Michigan University, 2010)

“Laptops may be used only for legitimate classroom purposes, such as taking notes, downloading class information from TWEN, or working on an in-class exercise. E-mail, instant messaging, surfing the Internet, reading the news, or playing games are not considered legitimate classroom purposes; such inappropriate laptop use is distracting to those seated around you and is unprofessional.” (Mazzie, 2008)

Such policies need not entail all-or-nothing approaches. Faculty can identify in the syllabus days when laptops will be permitted in class (e.g., for specific activities, notetaking, or research), as well as times when students will not be able to use laptops because their distracting presence would create problems. Similarly, during a single class session you might plan out times when laptops can and cannot be used and clearly communicate this to students. A simple phrase, such as “Screens closed, please, for this discussion so I have everyone’s full attention” conveys both your policy on laptop use for the activity and a rationale for why you want their screens closed.

Identify a laptop-free zone in class

Instructors can implement a laptop-free zone, reserving the first or first few rows of the classroom for students who do not use laptops. This creates an area where students who are distracted by neighboring screens and nearby typing are free from those distractions (McCreary, 2009).

Determine how well the classroom infrastructure supports active laptop use

Before telling students to bring laptops to class, check to see that the classroom infrastructure will support their use. For example, when planning an activity that requires laptops for the entire class, make sure that the classroom has enough power outlets, or plan to remind students to charge their batteries in advance. If students need to work in groups doing classroom research, make sure the furniture allows them enough space for typing (without having to balance their computers on their laps). If students are expected to present their work to peers for review, make sure they have the right video adaptor cable to connect their laptop to the projector. When asking students to view media or download files, find out if there are bandwidth limitations that might prevent all students from going online simultaneously. The instructional technology department of the school or college in charge of a classroom building will usually be able to answer these questions.

In addition, faculty should consider how they will accommodate students who do not own laptops so that they are not excluded from important learning activities. One option is to have students work with partners or in teams so that they can participate even if they do not have a laptop.

Instructional Practices for Active Engagement

Full integration of laptops into the classroom structure using LectureTools

With specialized programs like LectureTools, instructors can fully integrate laptops into lecture. For example, when instructors post slides in LectureTools, students can take notes and make drawings that will be synchronized with the presentation and saved for later review. When instructors present concepts during lecture that students may have problems understanding, they can ask students to rank the difficulty level of the concepts using LectureTools. To help students apply the concepts learned during lecture, the instructor may ask a range of text-based or image-based questions. Students respond to the questions and then receive immediate feedback on their understanding of course material. With LectureTools on their laptops, any student can pose a clarifying question during lecture, which GSIs can then answer during or after class. Of course, it is also possible for instructors to initiate many of these classroom activities without using LectureTools.

Other ways laptops support communicative interactions

Instructors can take advantage of laptops and other devices that students already have to encourage active participation and engagement in classes, especially large lectures. For example, students in U-M education professor Barry Fishman's classes participate in class polls and answer questions using either a web browser on their laptop or their cell phone's text messaging capability via web-based polling software (e.g., Poll Everywhere). Student answers and opinions then help the professor pace the lecture and shape the class discussion. During lecture, students can also access programs such as Google Moderator or Live Question Tool to post questions and vote on them. Students can even post questions while they are doing the readings (both inside and outside of class). Once a question is posted, other students can vote on the question to indicate that there is more than one person interested in it. Laptops can also allow students to engage in low-stakes (i.e., non-graded) writing assignments. Danielle LaVaque-Manty, a lecturer at the Sweetland Center for Writing, often asks her students to respond to questions about course readings on CTools at the beginning of class to prime them for discussion. The next day, she posts her comments for each student online. The same activity can easily be carried out using pencil and paper, but CTools allows for faster instructor response (no need to wait for the next class session to hand back hard copies) and a convenient way to maintain a permanent electronic record of students' in-class writing.

Laptops as tools for reflection and idea generation

Faculty may choose to turn some part of their course into a "studio," a time during which students, with their laptops, engage in experiential learning, participating in reflective activities and problem-solving sessions or even designing projects as part of larger course assignments (e.g., research projects, presentations, papers). It is important to create such activities so that they can be completed during class or to state explicitly that students will need to finish part of a task outside of class. Ideally, tasks build on ideas presented earlier in that class session, so that students are applying, practicing, or reflecting on important topics from material introduced that day. By completing such tasks in class, students can benefit from the presence of faculty and GSIs who can actively diagnose problems or push students to think about ideas differently. To avoid having laptops used for non-class activities, clear laptop policies should be communicated, and studio time should be devoted to assignments of sufficient difficulty that students require peer and instructor input.

Conclusion

The issues raised by the presence of laptops in the classroom will no doubt increase along with the number and ubiquity of portable devices (e.g., smart phones, tablets). Research conducted at U-M and elsewhere confirms that laptops and other portable devices are like any classroom tool; they function best when they fulfill a clear instructional goal and when they are used in specific ways that support student learning. And while some faculty may decide either to ban such devices or to adopt programs such as LectureTools, there are intermediate steps that can take advantage of the potential power of laptops while minimizing their distracting effects. The careful use of laptops can enrich opportunities for interaction with peers and instructors, as well as with course materials, increasing student engagement and learning. CRLT instructional consultants are available to discuss ways to incorporate laptops into classes, including the use of LectureTools.

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