Using Laptops in the Classroom:
The University of Michigan

SEI Case Study December 2012

Snapshot

Institution: The University of Michigan, a public, four-year research university with approximately 42,000 students

Timetable: August 2009 to August 2010

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URLs: http://www.crlt.umich.edu/publinks/CRLT_no30.pdf

Across the University of Michigan (U-M)—as at most other colleges and universities—laptops and other mobile devices are appearing in the classroom in greater numbers. In a survey of 1,707 university students conducted during the winter of 2010, for example, more than 50% of respondents reported bringing their laptops to class at least once per week. Many faculty see this trend as an opportunity for more innovative teaching and are exploring ways to leverage this technology to increase student engagement during lectures. At the same time, some faculty worry about the potential distractions that mobile devices could introduce into their classrooms.

To help assess the efficacy of laptops for student learning—and to gain insights into how laptop technology can contribute to instructional goals and support student learning—the university’s Center for Research on Learning and Teaching (CRLT) undertook a study to examine how laptops affect student attentiveness, engagement, and learning.

1. Project Overview

1.1. Project Goals, Context, and Design

We sought to examine student perceptions of how laptops affect their attentiveness, engagement, and learning and to suggest guidelines for using laptops and other mobile devices effectively in the classroom. Toward those goals, we structured a study to compare laptop use under two different conditions in classrooms:

• Classes where laptops were integrated into course structure (treatment group)
• Classes where laptops were allowed but were not integrated into the course (control group)

For the purposes of our study, we treated faculty use of a web-based lecture support tool called LectureTools as a proxy for the comprehensive integration of laptops into teaching. (Developed by a U-M faculty member, the product is now available commercially.) In contrast to classes that use a presentation
tool like PowerPoint, which does not require students to have a laptop to view the faculty slides, classes that use LectureTools create an environment that strongly encourages students to sign in to the tool via laptop to interact with class slides during a lecture. LectureTools allows faculty to supplement lectures with interactive questions in various formats, including multiple choice, matching concepts to definitions, and manipulating data on maps or images. During lectures, students were expected to respond to these interactive questions, take notes or draw on slides, rate their understanding of each main topic, and pose questions anonymously about difficult topics. Integration was defined as comprehensive because student laptop use was a regular part of classroom instruction, as opposed to laptop use being allowed for individual note-taking or for a one-time use to help complete a project.

In fall 2009, researchers recruited faculty to participate in the study by contacting department chairs and members of the university’s LectureTools support group. Eight faculty members who used LectureTools in the fall semester voluntarily participated in the research project. For a control group, we recruited an equal number of faculty who were teaching classes that were similar in size, level, and discipline but did not use a specific strategy or tool for integrating laptops into the course. Participating classes represented various disciplines, including political science, nursing, education, biology, and interdisciplinary courses.

1.2. Data-Collection Methods

The research team created a survey instrument in conjunction with the faculty member who originally developed LectureTools. Survey questions were designed with input from several additional sources, including data collected previously by the developer of LectureTools regarding the use of laptops and LectureTools in his own classes; previous CRLT surveys of university faculty about their concerns and practices regarding the use of laptops in their classes; and surveys developed by the university’s Information Technology Services to poll students about their technology use on campus. Researchers piloted the survey in eight LectureTools classes in the middle of the fall 2009 semester and revised survey items slightly for use in the final survey.

The registrar’s office provided e-mail addresses for students in the classes participating in the study. Students received surveys by e-mail after their final exams in fall 2009 (see Appendix A). SurveyMonkey was used to administer the survey and manage students’ anonymity. Students had to complete a consent form in order to begin answering survey items. The estimated time for completing the survey was 5 minutes for the control group students and 10 minutes for the treatment group, whose survey included 10 questions about the LectureTools software that were not applicable to the control group. An incentive to take the survey was the chance to win one $50 gift certificate to an online bookstore. SurveyMonkey sent up to three automatic e-mail reminders to students during the survey’s open period of approximately three weeks.

Survey invitations were sent to more than 1,700 undergraduate and graduate students from the 16 courses (eight treatment group courses and eight control group courses) that allowed laptops in the classroom. A total of 595 students (35% of the classes’ population) responded. The respondents included 259 students from the treatment group and 336 students from the control group. Overall response rates for both groups were similar: 33% for the treatment group and 37% for the control group. Table 1 summarizes the demographics. No student focus groups were conducted at the end of the semester.

The treatment group faculty were asked about their use and impressions of LectureTools via e-mail surveys in early November 2009 (see Appendix B); six faculty members responded. All were interviewed subsequently in November or December. Faculty in the control group were not surveyed or interviewed. The faculty interview questions (Appendix C) were developed by the research team based on previous
instructional consultations regarding faculty use of technology for instruction. Faculty interview protocols used faculty responses to the e-mail survey as a starting point for questioning, where the goal of the interviews was for respondents to elaborate on the practices and experiences they mentioned in the e-mail survey. The interviewers used open-ended questions to probe for instructors' beliefs related to the use of laptops, as well as for differences in faculty instructional practices for integrating laptops into their teaching. These probing questions helped us define and identify faculty beliefs about the impact of laptops on student attentiveness, engagement, and learning.

**Table 1. Laptop Survey Demographics**

<table>
<thead>
<tr>
<th>Courses Using Laptops with LectureTools</th>
<th>Courses Allowing Laptops but Not Using LectureTools*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses</td>
<td>Number of Respondents</td>
</tr>
<tr>
<td>AOSS 105</td>
<td>54</td>
</tr>
<tr>
<td>CHEM 105</td>
<td></td>
</tr>
<tr>
<td>ENSCEN 105</td>
<td></td>
</tr>
<tr>
<td>ENVIRON 105</td>
<td></td>
</tr>
<tr>
<td>EDUC 737</td>
<td></td>
</tr>
<tr>
<td>ENVIRON 110</td>
<td>32</td>
</tr>
<tr>
<td>A0SS 171</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY 110</td>
<td></td>
</tr>
<tr>
<td>ENSCEN 171</td>
<td></td>
</tr>
<tr>
<td>GEOSCI 171</td>
<td></td>
</tr>
<tr>
<td>NURS 357</td>
<td>57</td>
</tr>
<tr>
<td>NURS 454</td>
<td>22</td>
</tr>
<tr>
<td>POLSCI 101</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

* Students were asked, “How often did you use your laptop in this class?” In the treatment group, 83% of the students used laptops in “every class” or “most classes,” with about 8% reporting use in “a few classes” and 7% reporting they “never” used laptops in class. Students in the control groups reported much less frequent laptop use: 44% used laptops in “every class” or “most classes”; about 28% used laptops in “a few classes”; and a little over 25% “never” used laptops in class.

### 1.3. Data-Analysis Methods

Excel and SPSS were used to manage and analyze survey data. The researchers generated descriptive statistics to characterize student responses to the surveys. Mean scores on items associated with laptop use, software use, and perceptions of attentiveness, engagement, and learning were calculated for descriptions of use and comparison across items and between the treatment and control groups. T-tests were conducted to identify statistically significant differences in mean ratings between the groups. To analyze students’ responses to open-ended questions, researchers conducted a thematic analysis to identify themes emerging from the comments. In addition, the researchers reviewed student comments to identify those that helped clarify students’ perceptions of attentiveness, engagement, and learning. Faculty interview data were analyzed using a simplified inductive thematic analysis. This method involves multiple inductive processes of reviewing, coding, and focusing on both patterns in the data and interpreting meanings of comments in the qualitative data. Researchers reviewed the qualitative data to identify codes that could be applied to the data based on how the faculty made use of the different
features of LectureTools. For example, did the faculty only use LectureTools to present slides and ask students to take notes on the slides, or did they use most features of the tool in each class? During the coding stages, individual comments were sorted and coded to identify patterns of tool use, and themes were developed to describe patterns for how faculty integrated the use of laptops in lectures. Finally, the identified themes and patterns were compared to previous research on in-class laptop uses and technology integration for teaching and learning to help validate the identified themes.

1.4. Findings
Overall, students in courses with professors who integrated laptops into teaching reported higher levels of attentiveness, engagement, and learning than students in the control group. Interaction was demonstrated in various formats, including note-taking on the slides, responding to polling questions and interacting with diagrams, raising questions, and sharing reflective thoughts on discussion topics and students’ own learning processes.

The difference between the two groups was greatest for the question of engagement, with about 60% of students in the treatment group strongly agreeing or agreeing that laptops increased their engagement, versus only 39% of the control group. Differences in response to the questions of attentiveness and learning were less pronounced but still statistically significant (see Table 2).

Open-ended comments helped us clarify students’ interpretation of engagement, attentiveness, and learning. Students felt engaged when they could “follow along with the instructor,” “take notes on the slides,” and “ask questions without raising their hands.” Some students felt that questions posed by the instructor via LectureTools helped them better understand and learn lecture material. The interactive components enabled by laptop integration, such as chatting with graduate student instructors, made students feel more connected to what was being taught. The ease of interaction between the professor and students via laptops during lecture was reported as an important factor affecting student attentiveness, engagement, and learning.

<table>
<thead>
<tr>
<th></th>
<th>Increases Attentiveness</th>
<th>Helped with Engagement</th>
<th>Learned More</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LectureTools: N = 232</td>
<td>Control: N = 234</td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>8.2%</td>
<td>3.4%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Agree</td>
<td>28.9%</td>
<td>21.4%</td>
<td>47.6%</td>
</tr>
<tr>
<td>Neutral</td>
<td>29.3%</td>
<td>30.3%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Disagree</td>
<td>23.3%</td>
<td>33.8%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>10.3%</td>
<td>11.1%</td>
<td>6.4%</td>
</tr>
</tbody>
</table>

|                  | LectureTools: N = 234  | Control: N = 234       |              |
| Strongly Agree   | 8.1%                   | 14.2%                  |              |
| Agree            | 31.6%                  | 38.4%                  |              |
| Neutral          | 26.1%                  | 25.4%                  |              |
| Disagree         | 26.9%                  | 16.4%                  |              |
| Strongly Disagree| 7.3%                   | 5.6%                   |              |

| Mean Rating      | 3.01*                  | 2.72                   | 3.48**       |

* p<.01
** p<.001

1.5. Communication of Results
We distributed research project findings to key stakeholders on campus, including those who influence campus IT policy and practices, faculty in the university community, and key instructional support staff.
We also shared results nationally at conferences whose attendees have a specific interest in the use of classroom technology.

We shared early versions of the findings and methodology with research colleagues within our office for critique and feedback. This process created an opportunity for us to discuss survey methodology, including strategies for preventing student survey fatigue, using incentives to increase participation, and improving survey validity, and also to share current best practices with our instructional consultation staff. The findings were also shared with faculty at technology seminars and the university’s Teaching with Technology institute.

We also shared prepublication findings with the collaborating faculty members, key university administrators in information technology, and members of the provost’s office and college deans who play a key role in instructional decision making and campus IT policy. This served the dual role of helping key administrators understand instructional practices on campus and validating the work of the collaborating faculty member.

We summarized the research project in an occasional paper published by the CRLT that was disseminated in both print and electronic form. A printed copy was sent to some 6,000 instructors on the Ann Arbor campus. A summary of the paper was distributed to 3,000 subscribers of the “Tomorrow’s Professor” e-mail list. The study was presented nationally at the SLOAN-C/Merlot Emerging Technologies for Online Learning Conference.

1.6. Influence on Campus Practices

While we have not conducted a formal study examining the influence of the research findings on campus practices, anecdotal comments from faculty consultations and feedback from students on teaching during informal instructional focus groups have indicated that the study and dissemination of information on the use of laptops in class is having an impact on both instructional and classroom management practices. Recommended strategies for laptop integration are being incorporated into course design and classroom policies.

More instructors on campus have been seeking strategies beyond LectureTools to integrate laptops into their teaching. In part, faculty have been motivated by a desire to reduce the potential distractions that laptops can cause in a classroom. In one large class, for example, the instructor gave students skeleton slides, encouraging them to fill in the blanks during lecture. Most students in this class brought laptops, and many of them followed the presentation, completing the blanks on the slides and typing notes during lecture. The majority of students enjoyed this activity because it helped them stay on task and not get distracted.

Instructors are also taking advantage of students’ laptops by engaging students in collaborative writing, editing, and peer reviewing by using Google Docs and other collaboration tools during class. Backchannel communication between students and instructors also increased in both large and small classes: Students send questions and comments via laptops, and the instructor or teaching assistants respond to those questions either during or after the lecture.

In terms of classroom management practices, following the publication of the occasional paper, many U-M faculty who teach large lectures and who in the past allowed students to bring their laptops to class without clear plans for laptop integration have started creating policies for the use of laptops and other electronic devices. Some have asked students with laptops to sit in the back rows of the lecture hall, reserving the front rows as a zone for students without laptops. Anecdotal comments from students in
classes where the laptop-free zone was created were generally positive. Students felt less distracted when they didn’t see others’ laptop screens or hear sounds from keyboards.

Other university instructors adopted a laptop lid-down policy. When instructors need students’ full attention for important concepts or to engage students in hands-on activities such as working in small groups, they ask students to close the laptop lid to avoid potential distraction.

2. Reflection on Design, Methodology, and Effectiveness

2.1. Project Design, Data Collection, and Analysis

The project design effectively applied a mixed method of collecting both qualitative and quantitative data. Data were gathered across a wide range of disciplines, course levels, and instructional styles. As a result, we gained a comprehensive understanding of faculty practices and students’ perceptions of their own attentiveness, engagement, and learning when laptops are present in the classroom. The comparative analysis of data from students’ surveys and faculty interviews effectively explained reasons behind increased attention and engagement during lecture, along with sources of potential distraction.

The quantitative analysis of data collected from both groups demonstrated a statistically significant difference between the two conditions. In addition, content analysis of interviews with faculty members enabled us to pinpoint potential factors that may have caused the differences in students’ attentiveness, engagement, and learning. Based on these findings, we were able to suggest best pedagogical practices for purposefully integrating laptops in teaching. (Descriptions of these practices can be found in the occasional paper mentioned above.)

The sampling technique for the project was purposive (nonrandom), which allowed us to recruit students from a wide range of disciplines and academic levels. This targeted, cross-discipline sampling generated findings that have greater relevance and usefulness to campus faculty than the results from a study in a single class or several classes in a single discipline. Involving different disciplines in both humanities and the sciences increased the applicability of the study findings beyond science or engineering classes.

However, the research project would have been more effective if we could have interviewed students from both the treatment and control groups to further clarify and unpack the meaning of attentiveness and engagement. Student focus groups were planned in the original project design but were dropped due to various reasons (chiefly, a lack of student willingness to participate at the end of a semester). If we were to conduct another research study, we would choose a better time for student focus groups and would offer different incentives to recruit students.

2.2. Effectiveness and Influence on Campus Practices

Involving key campus stakeholders in the early reporting of results was important for helping to influence teaching and learning practices around the campus. Our prepublication meetings with vice provosts, college deans, information technology administrators, and members of the provost’s office allowed these key campus stakeholders to be informed about how technology is being used on the campus. These informal meetings allowed them to ask clarifying questions and check their understandings and drew them into a discussion of the implications of the findings on campus. These meetings created a means for these stakeholders to act as collaborators in a research project that has implications for the campus environment they oversee. We consider these prepublication meetings an integral part of a plan for effectively disseminating education research results on campus. When the findings were published and disseminated across campus, these key stakeholders were already familiar with the study and its
findings, allowing them to be better positioned for influencing the integration of the described best practices within their departments or among their colleagues.

We advise others to engage faculty in the early stage of formulating evaluation research questions that reflect concerns or issues that faculty members currently face in teaching and for which they are interested in finding resources or seeking guidance. This involvement increases faculty interest and willingness to participate in the research study, as well as their eagerness to read the findings.

3. Supporting Materials

Appendix A: Student Surveys
Appendix B: Faulty Survey Questions
Appendix C: Faculty Interview Questions

Notes
3. The features are described at [www.lecturetools.com](http://www.lecturetools.com).
Appendix A: Student Surveys


1. LectureTools End-of-Semester Student Survey (Fall 2009)

The Center for Research on Learning and Teaching (CRLT) is examining the classroom use of laptops and LectureTools in order to investigate their impact on student learning, as well as the extent to which students and faculty need technical support for LectureTools.

Students from several classes are receiving this survey. The survey is voluntary, and responses are confidential and will be presented only in the aggregate.

Survey respondents will have a chance to win one of five $50 gift certificates to an online bookstore. The survey should take less than 10 minutes to complete.

If you have questions regarding the survey, please contact us:
Erping Zhu, CRLT, ezhu@umich.edu, 734-763-3757
Inger Bergom, CRLT, inbe@umich.edu, 734-936-2871
Charles Dershimer, CRLT, dersh@umich.edu, 734-763-4418

The following questions ask about your experiences using a LAPTOP in class.

1. Do you own a portable computer at school (e.g., laptop, notebook, tablet PC)?
   - Yes
   - No

2. The following question asks about your experiences using a laptop in THIS c...

2. How often did you use your laptop in this class?
   - Every class session
   - Most class sessions
   - A few class sessions
   - Never

3. The following questions ask about your experiences using a laptop in THIS c...

3. My **attentiveness** has increased due to laptop use.
   - Strongly agree
   - Agree
   - Neutral
   - Disagree
   - Strongly disagree
4. My laptop helped me to be engaged during lecture.
   - Strongly agree
   - Agree
   - Neutral
   - Disagree
   - Strongly disagree

5. I learned more due to the use of a laptop than I would have without it.
   - Strongly agree
   - Agree
   - Neutral
   - Disagree
   - Strongly disagree

6. How has your use of a laptop changed the amount of time you spend on tasks unrelated to this class?
   - Significantly increased my time on tasks unrelated to lecture
   - Somewhat increased my time on tasks unrelated to lecture
   - Has had no effect on my time on tasks unrelated to lecture
   - Somewhat decreased my time on tasks unrelated to lecture
   - Significantly decreased my time on tasks unrelated to lecture

7. When you brought a laptop to class, how much time, on average, did you spend on the following?
   - A lot (over 30 min)
   - Some (10-30 min)
   - A little (under 10 min)
   - None
<table>
<thead>
<tr>
<th>Activity</th>
<th>A lot</th>
<th>Some</th>
<th>A little</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook or other social networking sites</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
</tr>
<tr>
<td>Visiting websites unrelated to class</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
</tr>
<tr>
<td>Checking email</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
</tr>
<tr>
<td>Playing games</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
</tr>
<tr>
<td>Doing homework for other classes</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
<td>jn</td>
</tr>
</tbody>
</table>
   Other (please specify the activity and the amount of time you spent)

4. Other students' laptop use

8. In general, how much are you affected when other students seated near you use their laptops for tasks unrelated to class?
   - Has no effect on me
   - Somewhat distracts me
   - Significantly distracts me

5. Using LectureTools
9. My **attentiveness** in this class has increased due to LectureTools.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

10. In this class, LectureTools helped me to be **engaged** during lecture.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

11. I **learned more** in this class due to the use of LectureTools than I would have without it.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

12. My **test scores** in this class have been positively impacted from my use of LectureTools.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

13. I am more likely to **ask questions** in class through LectureTools than I would be to ask them by raising my hand.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

14. I would like to take more classes at U-M that use LectureTools.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>


15. In this class, how often did you **follow along with the instructor's slides** using LectureTools on your laptop?

<table>
<thead>
<tr>
<th></th>
<th>Every class session</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most class sessions</td>
</tr>
<tr>
<td></td>
<td>A few class sessions</td>
</tr>
<tr>
<td></td>
<td>Never</td>
</tr>
</tbody>
</table>
16. In this class, how often did you pose questions using LectureTools?

- Every class session
- Most class sessions
- A few class sessions
- Never

17. When you came to lecture, how did you take notes? (Check all that apply)

- Hand wrote notes
- On my computer, but not using LectureTools
- On my computer using LectureTools
- I didn’t take any notes

Other (please specify)
18. Rank the importance of the following LectureTools functions to your learning.

<table>
<thead>
<tr>
<th>Function</th>
<th>Very Important</th>
<th>Somewhat Important</th>
<th>Not Important</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Following instructor’s slides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing animations (videos or learning objects)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answering “clicker” questions (e.g., multiple choice, reorder)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing podcasts of lectures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking notes next to slides on laptop</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drawing on slides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posing questions to instructor or GSI through LectureTools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing responses to questions from instructor or GSI through LectureTools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recording your understanding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Lecture podcasts

19. Did your instructor make podcasts of lectures available on LectureTools?

   Yes
   No
20. How often did you **access the podcasts** outside of class?
- Every week
- Most weeks
- A few weeks
- Never

### 9. Lecture podcasts

21. Why did you **access the podcasts** for this course? (Check all that apply)
- To clarify something from a lecture
- To prepare for a test
- To edit/review my notes from class sessions
- To make up a class

Other (please specify)

22. When did you usually **access the podcasts** for this course? (Check all that apply)
- Right after the lecture
- Before a test/exam
- When I studied for this class
- When I did homework for this class

Other (please specify)

### 10. Overall experiences using LectureTools

23. The **most useful** things about LectureTools are:

24. Do you have any suggestions for changes you'd like to see in LectureTools?
11. Technical issues with LectureTools

25. THE INSTRUCTOR experienced technical problems with LectureTools in the beginning of the semester.
   - Yes
   - No

26. THE INSTRUCTOR experienced technical problems with LectureTools throughout the semester.
   - About every week
   - About once every 2 weeks
   - About once a month
   - Never

27. I experienced technical problems with LectureTools in the beginning of the semester.
   - Yes
   - No
   - I never accessed LectureTools on my own computer.

28. I experienced technical problems with LectureTools throughout the semester.
   - About every week
   - About once every 2 weeks
   - About once a month
   - Never
   - I never accessed LectureTools on my own computer.

12. Basic Background Information (These questions are OPTIONAL.)

29. Gender
   - Female
   - Male
30. Current year at U-M
   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Other (please specify)

31. Race or ethnicity
   - White/Caucasian
   - African American/Black
   - American Indian/Alaska Native
   - Asian American/Asian
   - Native Hawaiian/Pacific Islander
   - Latina/o
   - Other

32. Did you receive your high school education outside of the U.S.?
   - Yes
   - No

33. Are you a first generation college student? ("First generation college student" means that neither of your parents went to college.)
   - Yes
   - No

13. Additional Comments

34. Additional Comments:
The Center for Research on Learning and Teaching (CRLT) is examining the classroom use of laptops and their impact on student learning and attentiveness in the classroom.

Students from several classes are receiving this survey. The survey is voluntary, and responses are confidential and will be presented only in the aggregate.

Survey respondents will have a chance to win one of five $50 gift certificates to an online bookstore. The survey should take less than 5 minutes to complete.

If you have questions regarding the survey, please contact us:
Erping Zhu, CRLT, ezhu@umich.edu, 734-763-3757
Inger Bergom, CRLT, inbe@umich.edu, 734-936-2871
Charles Dershimer, CRLT, dersh@umich.edu, 734-763-4418

The following questions ask about your experiences using a LAPTOP in class.

1. Do you own a portable computer at school (e.g., laptop, notebook, tablet PC)?
   - Yes
   - No

2. The following question asks about your experiences using a laptop in THIS c...

2. How often did you use your laptop in this class?
   - Every class session
   - Most class sessions
   - A few class sessions
   - Never

3. The following questions ask about your experiences using a laptop in THIS c...

3. My **attentiveness** has increased due to laptop use.
   - Strongly agree
   - Agree
   - Neutral
   - Disagree
   - Strongly disagree
4. My laptop helped me to be engaged during lecture.

5. I learned more due to the use of a laptop than I would have without it.

6. How has your use of a laptop changed the amount of time you spend on tasks unrelated to this class?

7. When you brought a laptop to class, how much time, on average, did you spend on the following?

4. Other students' laptop use

8. In general, how much are you affected when other students seated near you use their laptops for tasks unrelated to class?

5. Basic Background Information (These questions are OPTIONAL.)
9. Gender
   - Female
   - Male

10. Current year at U-M
   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Other (please specify)

11. Race or ethnicity
   - White/Caucasian
   - African American/Black
   - American Indian/Alaska Native
   - Asian American/Asian
   - Native Hawaiian/Pacific Islander
   - Latina/o
   - Other

12. Did you receive your high school education outside of the U.S.?
   - Yes
   - No

13. Are you a first generation college student? ("First generation college student" means that neither of your parents went to college.)
   - Yes
   - No

6. Additional Comments
14. Additional Comments:

[Text box with options 5 and 6]
Appendix B: Faculty Survey Questions

Dear [faculty],

Thank you for your willingness to participate in a CRLT study of the impact of LectureTools on students' learning and instructors' teaching practice. Below you'll find a brief survey we hope you will complete to help us better understand how faculty use this tool.

We would like an opportunity to ask you follow up questions about your responses. Could we schedule a 15-30 minute meeting at your office (or another location convenient for you), sometime before November 26? Please let us know a time, or block of time, that would work for you.

Thanks for your participation in this project. We appreciate your time!

Sincerely,

XXXXX
Research Assistant
Center for Research on Learning and Teaching

The purpose of the survey below is to gather information about your use of LectureTools in order to understand its usefulness for teaching and to identify technology support needs. Only aggregate data will be made public.

1. Have you used LectureTools in any course before this semester?

2. Before this term, have you used any of the following classroom teaching technology?
   ___Clickers
   ___Lecture capture (e.g. Camtasia, Mediasite)
   ___Cell phone interactive technologies
   ___Other ________________________________

3. How frequently do you use LectureTools?

4. Why did you choose to use LectureTools?

5. For the following statements, please respond with your level of agreement (SD=Strongly Disagree, D=Disagree, A=Agree, SA=Strongly Agree).
   (5a) I’m better able to cover class material when I use LectureTools.
   (5b) LectureTools saves me time.
   (5c) LectureTools helps me to better organize course materials.
   (5d) LectureTools promotes active engagement during class.
   (5e) LectureTools improves students’ performance on class activities and assessments.

6. Which features of LectureTools have you or your GSIs used in your class? Please check all that apply.
   ___Upload slides to LectureTools
____ Draw on slides during lecture
____ The “Clicker” function (e.g., poll students during lecture, ask multiple-choice questions)
____ View student questions during or after class
____ Post responses to students’ questions posed through LectureTools
____ Review attendance and check participation in activities
____ View summaries of students’ self-reported understanding
____ Record lecture and upload it as a podcast after class
____ Upload learning objects (e.g., movies, Flash and Shockwave animations)
____ Other ___________________________

7. Which of the features above are most useful to you in your teaching? Why?

8. Do you plan to use LectureTools again to teach this or another class? Why or why not?

9. Please describe any technical problems you or your students experienced with LectureTools. (Please describe the issue and frequency of occurrence).

10. What changes would you like to see in LectureTools?
Appendix C: Faculty Interview Questions

CRLT LectureTools Use Interview
Fall 2009  Interview Date: ________________

The purpose of this conversation is not to focus on technical issues, but more how lecture tools influenced your teaching. We will build on how you answered the questions in the survey, and we are interested in going into depth on a couple of areas. We will talk about preparation, what features of lecture tools you used, and how these specific features of the tool helped or did not help you achieve your course goals. We are looking to hear about what worked and didn’t work so feel free to be honest as this is confidential. We have two people here today as one will ask questions and the other will be taking notes. If you feel a need to talk more about technical difficulties, feel free to contact us after this interview and we will pass these along to the lecture tools team.

We planned on 15 minutes of your time, but are you okay of it goes longer? We will also be taking notes on a laptop.

Let’s begin.
Part A:
Prompt: We are interested in how faculty use LectureTools to teach-

Q1.1: How did LectureTools influence how you prepared for this course?

A.1 Listen- What is their focus? Have them provide examples....

A.2 Prompt for how much prep time:

A.3 Prompt for any changes in teaching approach:

Part B:
Prompt: We noticed that you said....
[Include mention from question 4 or survey...]

Q2.1: We would like to know how your use of LectureTools helped you meet your course goals?

B.1 Listen for how he/she elaborates on key term from question 4
B.2 Prompt him or her to provide examples in their answer....

B.3 Prompt for definition of terms used in question 4...
B.4 Prompt him or her to provide examples in their answer....

B.5 If he/she does not make explicit connection between goals & L.T. ask:

Q2.2 So Lecture tools helped you achieve your goals how? Can you provide an example?

Part C:
Prompt: We noticed that you used these features...[Show list of features]

Q3.1 Which of these features were most useful to you and why?

C.1 Listen for how he/she elaborates on these features from Question 6...
C.2 Prompt for definitions of terms used...

Q3.2 Can you describe what you mean by this....?

C.3 If they do not connect these features to course goals ask:

Q3.3 So these features helped you achieve your goals how?
Q3.5 Can you provide an example of what you mean?