Digital Devices in the Classroom: Dilemmas and Discussion

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The promise of technology & transformation of our classrooms, interactions with students

Image from Villemard's Year 2000 series
What are some potential advantages/benefits of student technology in the classroom?

Take a minute or so to write down your thoughts.

Discuss with the person next to you.

Larger discussion.
A tool is only as good as the person using it.
Use of devices in class for learning – e.g.

Classroom response systems:
– Clickers (e.g., TurningPoint, iClicker)
– Web-based/BYOD systems:
  • Top Hat [https://tophat.com/](https://tophat.com/)
  • Poll Everywhere [https://www.polleverywhere.com/](https://www.polleverywhere.com/)
  • Kahoot [https://getkahoot.com/](https://getkahoot.com/)
  • Socrative [http://www.socrative.com/](http://www.socrative.com/)
  • Nearpod: [https://nearpod.com/](https://nearpod.com/)

Backchannel/Q & A tools:
• Twitter: [http://twitter.com](http://twitter.com)
• Google Slides Q & A: [https://docs.googleblog.com/2016/05/slidesQA.html](https://docs.googleblog.com/2016/05/slidesQA.html)
• Today’s Meet: [https://todaysmeet.com/](https://todaysmeet.com/)

“BYOD” (bring your own device classroom response system), requires internet connectivity with web-enabled device (e.g., laptop, smartphone, tablet).

Instructor poses questions in class, students answer on device; can be used with Peer Instruction.

Students can ask Q, discuss topics online during class.
Choosing a system – some Q to consider:

• Are you able/allowed to use it? (Infrastructure, ancillary fee policies, etc.)
• Costs (to school/students)?
• Features – what’s important to you?
  – Question types
  – Being able to track student responses/data
  – Do you want to just ask Q, or let students ask you Q via the system?
Let’s try a BYOD system!
Please visit: www.lecturetools.com
Login info:
Email address = demo9872
Password is blank.

https://my.lecturetools.com/users/login
Welcome to LectureTools education

LectureTools Update: Student Walkthrough

Respond to polls with laptop or phone
Use LectureTools on your browser to respond to polls or text in answers with your cell phone. Make sure your number is attached to your account in settings.

Ask questions at any time
All questions posed during or after class will go to your instructor. Answered questions appear anonymously for the whole class to see.

Take notes online and flag slides
Use LectureTools to type notes online associated with slides or flag slides to review later under browse slides.

Click on Enter Your First Course

or Logout
Choose today’s date
Lecture Tools demo
Percentage of students owning Internet-capable devices:

- **2%** none
- **6%** just one
- **92%** at least two
- **64%** three or more
- **31%** four or more
- **15%** five or more
- **10%** six or more

Figure 5. Device ownership history, with 2016 projections\(^{10}\)

Device Ownership Pervasiveness

Single-device ownership is rare (figure 6). Almost half of the undergraduates surveyed (47%) own a laptop, a tablet, and a smartphone. The next most popular combination was laptop and smartphone ownership (38%). Just 4% own only a laptop, 3% only a smartphone, and 1% only a tablet. Two percent of all students do not own any of these devices.

Figure 6. Student laptop, tablet, and smartphone ownership


Percentage of students trying to connect devices to the network at the same time:

- 7% none
- 32% just one
- 61% at least two
- 11% three or more
My perspectives

The good

• Decent replacement for clickers for in-class questions.
• I love that students can ask me Q in the system – more Q asked in class.
• Some data gathered (not a lot with version I used).

The less good

• Need good wifi … and some large rooms lack it.
• Laggy compared to clickers.
• Some features missing for “presentation” part of LT.
• Cost to students (though I used with university pilot).

Good & bad?

Students liked the ability to take notes in the system …

I asked students to bring web-connected devices and use them in my classroom.
What is a concern you have about (or possible disadvantage of) student devices in the classroom?
SERIOUSLY. TEACHERS KNOW YOU ARE TEXTING

NOBODY JUST LOOKS AT THEIR CROTCH AND SMILES
Students who use digital devices in class 'perform worse in exams'

Study finds use of computers by students in lectures and seminars has 'substantial negative effect' on performance

Allowing students to use computers and the internet in classrooms substantially harms their results, a study has found.

The paper published by the Massachusetts Institute of Technology found that students barred from using laptops or digital devices in lectures and seminars did better in their exams than those allowed to use computers and access the internet.

The researchers suggested that removing laptops and iPads from classes was the equivalent of improving the quality of teaching.


The Impact of Computer Usage on Academic Performance: Evidence from a Randomized Trial at the United States Military Academy

Susan Payne Carter
Kyle Greenberg
Michael Walker

May 2016

The NEWEST no-laptop study – Payne Carter et al.

Randomized study of students in West Point Economics course with multiple sections, small classes.

Classrooms assigned one of 3 possible treatments:

- Students prohibited from using laptop/tablet (Control)
- Students allowed to use laptop/tablet ("Unrestricted" use)
- Students allowed to use tablet flat on desk only (Modified tablet)
Payne Carter et al. study
Treatments lasted through entire course, final exam scores used for comparison.

“Average final exam scores among students assigned to classrooms that allowed computers were 18 percent of a standard deviation lower than exam scores of students in classrooms that prohibited computers.”

1.7 on a 100 point scale.

Device use was monitored on 3 occasions. ~80% of students using device in “unrestricted” classroom; 41% of those in modified tablet classroom.

No mention of pedagogical methods used in the course.
Laptop use lowers student grades, experiment shows

'It can change your grade from a B+ to a B-.'
—Faria Sana, researcher

Laptop losers: Tech actually hindering kids in classrooms

Using Laptops In Classrooms Lowers Grades: Study

New research shows laptops in class impact grades

Close That Laptop in Class!
Multitasking on a laptop in class reduces learning for user and nearby peers.
“Laptops and smart phones do not cause more distraction than windows through which students look at birds and flowers, yet you don't seal the windows just because of that.”

-Eric Mazur, as quoted by Fang, 2009

What do you think?
Are digital devices a different sort of distraction?

http://www.theatlantic.com/technology/archive/2013/06/skinner-marketing-were-the-rats-and-facebook-likes-are-the-reward/276613/
What can/should we do (in our classrooms)?

Discuss with the person next to you.

Larger discussion.
Ban laptops/devices from the classroom?

In a string of recent education articles, researchers have praised the benefits of hand-written notes and instructors have forbidden computers from classrooms. Frustrated with her student’s technological fixation, Associate Professor Carol E. Holstead reports, “I told students they would have to take notes on paper. Period.” In such a learning environment, Anne-Marie, who can’t listen without pen in hand, would thrive. Rick, though, who relies on various technologies to supplement or replace handwriting, would struggle.

Holstead’s preference for handwriting over technology is part of a recent trend to ban laptops in the classroom advocated by critics such as Hinda Mandell, Dan Rockmore, and Anne Curzan. Recently, National Public Radio even picked up the story, reporting that “there are still advantages to doing things the old-fashioned way.” All describe common problems: student distraction and their reluctance to process information, perhaps the defining pedagogical concerns of the 21st century. As educators race to address these problems, though, disability has been noticeably absent from the debate.


Also see: http://www.thetattooedprof.com/archives/609
“Struggling against reality is exhausting nonstop labor with profoundly disappointing results…”

– Martha Beck

Can we help students to learn “digital civility” and develop “digital restraint” skills?

Some options

• Share information/open discussion about capacity of web-enabled devices to distract, possible impact on learning.
• Incorporate “technology breaks” in class.
• Collaboratively develop a code of civility for the classroom.
  – Zoned classrooms (people using devices sit in designated region of class to avoid distracting others).
• Get students using devices productively in class activities (i.e., structured/academic use).
Thank you!
A handout is available.

Please feel free to contact me:

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https://twitter.com/TCNoel
References & suggested reading


Supplemental slides
Some of the major studies …
Laptop multitasking effects: Sana et al. experiments

**Experiment 1**
- Does *laptop multitasking* hinder learning?

**Experiment 2**
- Does being in view of a *laptop multitasker* influence learning?

Adapted from Sana et al. 2013
Laptop multitasking effects: Sana et al. experiments

**Experiment 1**

- Does **laptop multitasking** hinder learning?
- All participants used laptops.
- Multitasking participants given extra online tasks to complete during lecture at their convenience.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Laptop unitaskers</th>
<th>Laptop multitaskers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note quality (/5)</td>
<td>4.1 ± 1.0</td>
<td>2.7 ± 1.2*</td>
</tr>
<tr>
<td>Comprehension test score</td>
<td>66 ± 12</td>
<td>55 ± 11**</td>
</tr>
<tr>
<td>(100)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p=0.001; **p=0.003

Significant effect of condition: $F(1,38) = 10.2$, $\omega^2=0.20$

Adapted from Sana et al. 2013
Experiment 2

• Does being in view of a laptop multitasker influence learning?
• Only multitaskers used laptops.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Not in view of multitasking peer</th>
<th>In view of multitasking peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note quality (/5)</td>
<td>3.6 ± 1.3</td>
<td>3.7 ± 1.2</td>
</tr>
<tr>
<td>Comprehension test score (/100)</td>
<td>73 ± 12</td>
<td>56 ± 12*</td>
</tr>
</tbody>
</table>

*p<0.001

Significant effect of condition: F(1,36) = 21.5, ω²=0.36

Adapted from Sana et al. 2013
Fig. 1 from Aguilar-Roca et al. 2014. “Illustration of the lecture hall used for teaching all four sections. In the Zoned classes, two-thirds of the lecture hall were designated as laptop-free and the remainder was designated as laptops allowed. Letters A–G correspond to the seven locations observer stood while monitoring computer use.”

Tested Control (no restrictions on where laptop users can sit) vs. Zoned seating.

Use of laptop-free/laptops allowed zones did not affect overall student performance … BUT laptop users typically performed more poorly than non-laptop users under both zoned and not-zoned conditions.

Students largely supported zoning approach (and strongly oppose laptop banning).
Fig. 2 from Aguilar-Roca et al. 2014. A) The percentage of students who attended lecture and the percentage of the attending students who elected to use laptops on 13 observation dates throughout the 10 week quarter were similar in the Control and Zoned sections. B) Average percentage of laptop users off-task at any one time was significantly higher in the Zoned versus Control sections (*** = p < 0.0001).
Segregation of laptops/devices as accommodation?

This new no-laptops study has me thinking, painfully, about how I may have advised instructors about their classes. 1/9

https://twitter.com/polarisdotca/status/731269557336186881
Peter read:
which led him to say ...

https://twitter.com/polarisdotca/status/731269557336186881
“...the students in her large class were behaving abominably. They wandered in late, left early, read the newspaper, chatted with friends during the lecture, and napped; not surprisingly, a large number of them were failing the course. It was her first semester teaching a large class. She never wanted to do it again.”

- Carbone, 1999 “Students behaving badly in large classes”
The good old days …?

“... faculty generally have found that large classes have poorer attendance, louder packing up of books a few minutes before the end of class, more cheating on exams, and more off-task behavior during discussions and group activities. They also report a startling array of innovative disruptive behaviors during class, including talking on cell phones, watching portable televisions, sitting through the lecture with headphones on, having pizza delivered during the middle of class, fraternity pledges’ pretending to have a nervous breakdown during an exam, and passionate making out in the back of the classroom.”

- Carbone, 1999 “Students behaving badly in large classes”