

Do We Need Discreet Computing in Instruction?

Definition: *discreet*—heedful of potential consequences

Torgersen Hall, also referred to as the Advanced Communications and Information Technology Center (ACITC), contains the most technologically advanced classrooms on the Virginia Tech campus. Virginia Tech's Learning Technologies Division—which includes the Faculty Development Institute, Educational Technologies, the New Media Center, the Assistive Technologies Laboratory, the Graduate Education Development Institute (GEDI), and the Pervasive Computing Laboratory—resides in Torgersen Hall. Across the corridor from the Learning Technologies Division are numerous research laboratories: Computer Science's Human-Computer Interaction Lab, Computer Engineering's e-Textiles Lab, ESM's University Visualization and Animation Group, and Digital Libraries. Thus opportunities abound in Torgersen Hall for collaboration among pedagogists, teaching and research faculty, and students to explore innovative technologies for the purpose of enhancing student engagement and learning.

I see this every day as I walk down the halls, through the atrium, and across "The Bridge" to and from my office in Torgersen Hall. As I step off the elevator, I see progress being made on our first TeamSpot deployment (<http://www.tidebreak.com>) in the university library. The other day, as I walked by the large auditorium classroom, hundreds of students with their wireless tablets were engaged in a large-scale test of DyKnow (<http://www.dyknow.com/>). And every

time I go to get a bottle of water from the vending machine on the first floor, I walk by the classrooms. Most often, the classroom activities I observe involve a teacher lecturing to a group of students: PowerPoint is displayed on the LCD projector, and students sit at their desks with their laptops or tablets. But often as I walk by classes in session, I see laptop displays showing games of chess or solitaire, pages of ESPN.com, or e-mail activities.

The use of technologies by students in traditional learning spaces is a popular and controversial topic of discussion among educators. Some argue for a complete ban on mobile devices (laptops/tablets, cell phones, PDAs), whereas others push for total acceptance of these devices in the classroom. In between these two positions is Dennis Adams, the chair of the Decision and Information Sciences Department in the C.T. Bauer College of Business at the University of Houston. Adams, who wants a "fair fight" when competing with students' laptops and cell phones in his classroom, would like to be able to turn Internet access off and on as needed.¹ Adams, like many other teachers, believes that classroom access to the Internet can be as much a barrier to learning as it is a supportive teaching tool.

Internet access in the classroom can be a barrier for several reasons. Today's multitasking, "Generation M" students routinely play solitaire, shop on Amazon.com, participate in several IM chats, and respond to e-mails in class while simultaneously Googling the instructor. Yet though this type of behavior may appear to be multitasking, psychology and neuroscience researchers report that a student's switching across multiple

information sources is actually *sequential* processing. Furthermore, this constant "mental switching" results in decreased learning efficiencies.²

Cheating is another faculty concern pertaining to the use of mobile devices in the classroom.³ Students using Bluetooth, IR, point-to-point WiFi, IM, and cellular SMS can contact other students in the same physical space or can cheat "at a distance."

In addition, students who use laptops or other devices in the classroom may be perceived by the instructor as being inattentive to the lecture. Instructors whose teaching philosophies reside in the formal educational arena believe that students should pay attention during lectures and interact accordingly. These teachers may forbid students from bringing laptops and other mobile devices to class.

Decisions to deter the use of mobile devices in classrooms are controversial. For example, Virginia Tech has a mandatory computer requirement for all incoming freshmen. Virginia Tech's College of Engineering is now requiring all engineering freshmen to purchase tablet PCs and is actively modifying course structures to encourage students' use of the PCs in the classroom. Banning these devices from the classroom, either through policy or more active methods, would be met with opposition from faculty, students, and parents. Freedom of speech, the FCC forbiddance of radio-frequency blocking, and emergency-contact scenarios would all be cited. A decision to pursue this type of constraining activity would also likely be challenged by information and instructional technologists. Still, the

number of faculty concerns is increasing, as demonstrated by current journal and news articles.⁴ The perceived inappropriate use of mobile devices in the classroom warrants the investigation of control mechanisms as an option for teachers.

Mechanisms currently exist that could be used to systematically constrain network and peer-to-peer connectivity in a physical learning space. One approach is to block a classroom's network access. Several colleges and universities, including Bentley College in Massachusetts,



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have installed network on/off, or “kill,” switches to control wired network access in their classrooms. The Bentley control, referred to as the “classroom network control system,” has five settings. Using this switch, teachers have varying levels of network-access control: allow all access; allow no access; allow access only to campus services; allow access to e-mail but not to the Internet; or allow access to the Internet but not to e-mail. Bentley has recently extended this model to support wireless network blocking.⁵ On other campuses where Internet connectivity is wireless, some individuals are using “killer” WAPs to jam signals in the classroom. NaturalNano offers a copper paint that blocks wireless cellphone and computer network radio signals within a physical space. Another approach involves the control and monitoring of students' computer and network behavior with software applications. Vendor solutions like DyKnow Monitor, Synchron-Eyes, and Software Secure Classmate offer this functionality.

On the other hand, some educators claim that students' use of mobile devices in the classroom is not producing a new problem. Christopher Knapper, the director of Queen's University's Instructional Development Centre, explains these new

technologies are simply expanding the continual challenges of classroom etiquette. He argues that it is the responsibility of the instructor to come up with new, innovative measures that will engage the student.⁶ Stephen Marshall extends this viewpoint by identifying the academic institution as the entity that is primarily responsible for improving the quality of a student's lecture experience. To accomplish this, institutions must provide faculty with the resources, training, time, and support that will allow them to more effectively enhance student engagement

and learning.⁷ And the resources and training must focus on new technologies.

When debating the disadvantages and advantages of classroom connectivity and mobile devices and possible ways to improve student engagement, instructors may want to consider the difference between Type I and Type II applications of instructional computing. Type I applications focus on using computers to perform traditional teaching and classroom activities. An example of a Type I application would be replacing chalk, blackboards, and transparencies with the same content in PowerPoint. Although Type I applications can and do improve efficiencies in the classroom, they do not represent innovative uses of new technologies in teaching and learning. By contrast, Type II applications attempt to explore new means of student collaboration, to provide complex modeling and virtual experience opportunities, to study simulated and informal learning techniques, and to enhance students' research capabilities.⁸

In closing, I would like to return to the question in the column title: Do we need discreet computing in instruction? Instructors may very well want and need to control the use of technologies in the classroom. Filtering network protocols

and monitoring wireless activity are certainly ways to obtain this control. But instructors should be heedful of the consequences of these actions, particularly when the roles are reversed and they find their own activities being observed. Likewise, faculty who are eager to introduce new technologies into their teaching should balance such activities with the anticipated outcomes. Although increased student engagement is the watchword of the day within academia, colleges and universities must be heedful of the effort and resources necessary to obtain this goal.

Regardless, students have embraced mobile technologies. Cell phones, MP3 players, and laptops facilitate their everyday lives by offering convenience, entertainment, constant communication and presence, and social status. In fact, their use will become more ubiquitous as advances continue in pervasive computing research. This symbiotic relationship between students and mobile devices is not going away. How do we leverage this phenomenon in developing more effective ways of teaching and learning?

Notes

1. Dennis Adams, “Wireless Laptops in the Classroom (and the Sesame Street Syndrome),” *Communications of the ACM*, vol. 49, no. 9 (September 2006): 25–27.
2. Claudia Wallis, “The Multitasking Generation,” *Time*, March 19, 2006, <<http://www.time.com/time/magazine/article/0,9171,1174696,00.html>>.
3. Brock Read, “Wired for Cheating,” *Chronicle of Higher Education*, July 16, 2004.
4. Cristina Silva, “Some Colleges Crack Down on Laptop Use in Classroom,” *Boston Globe*, June 10, 2006; Jeffrey R. Young, “The Fight for Classroom Attention: Professor vs. Laptop,” *Chronicle of Higher Education*, June 2, 2006.
5. Young, “The Fight for Classroom Attention.”
6. See Tim Loughheed, “The Internet as Class Distraction,” *University Affairs*, January 2002, <<http://www.universityaffairs.ca/issues/2002/jan/en26.pdf>>.
7. Stephen Marshall, “The Sesame Street Syndrome,” *e-Literate*, November 18, 2006, <http://mfeldstein.com/the_sesame_street_syndrome/>.
8. See the “Technology and Instruction” page on the Maine Association for Middle Level Education Web site: <<http://www.mamleonline.org/tech3.html>>.

William O. Plymale is Director of Research, Development, and Systems in Virginia Tech's Learning Technologies Division. He is currently pursuing a Ph.D. in Computer Engineering at Virginia Tech, with research interests in pervasive and ubiquitous computing.

