Unstructured Personal Technology Use in the Classroom and College Student Learning: A Literature Review

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College student personal technology use in the classroom, namely cell phones and laptops, has become rampant. This review of literature examines research concerned with the impact of student unstructured technology use in the face-to-face college classroom and academic performance (learning). Student motivations for and descriptions of use are also examined. Unstructured use refers to the operation of said technology during face-to-face meetings for purposes unrelated to class. In brief, research demonstrates an emphatic negative relationship between unstructured technology device use during class and learning performance. While equally distracting as cell phones, laptops create an instructional challenge insofar as offering more pragmatic electronic applications central to learning. A growing consensus suggests that a total ban of all personal technology use during class is not a functional solution. Six recommendations for managing student personal technology use in the classroom are provided for teachers to consider.

In many ways, personal technology (smartphones, laptops, tablets) has served to revolutionize the world. Humans are continuously available to others and have the option of communicating through a variety of mediums (texting, Instagram, email, FaceTime, voice-to-voice). Historically, technological innovations have been accompanied with advantages and disadvantages. Modern personal technology use offers benefits and drawbacks. Most contemporary college students have always known a world with smart electronic devices. This literature review examines the impact between student unstructured technology use in the college classroom and academic learning. To be clear, unstructured use refers
to students operating the technology during face-to-face class sessions for purposes not related to class. Six recommendations for the instructional management of unstructured personal technology use in the classroom are also provided.

**Cell Phones**

The “jury is in” with respect to the unstructured use of cell phones in the classroom: It has demonstrated an emphatic negative relationship to the academic performance of college students (Barnes et al., 2012; Ellis, Daniels, & Jauregui, 2010; End, Worthman, Mathews, & Wetterau, 2010; Gingerich & Lineweaver, 2014; Harman & Sato, 2011; Junco, 2012; Kuznekoff & Titsworth, 2013; Muyingi, 2014; Ravizza, Hambrick, & Fenn, 2014; Wei, Wang, & Klausner, 2012). Texting is the mainstay of college student cell phone use in the classroom. All told, somewhere between 69% (Junco, 2012) and 92% (Tindell & Bohlander, 2012) of students have admitted to texting during class. Additionally, Junco revealed that the frequency of texting on a fairly regular basis (34%) exceeded the use frequency of other features (13% Facebook; 11% email; 8% surf). McCoy (2013), in comparison, found that 62% of students reported using phones between one and 10 times a class period with the most frequent activities being texting (86%), checking the time (79%), emailing (68%), social networking (66%), and surfing (38%). Other research suggests that students send between two and three text messages per class session (Wei, Wang, & Klausner, 2012). Students are more likely to text in large class sizes, when the classroom has physical barriers impeding the instructor’s view, when the instructor turns away from students (e.g., to write on the board), and when the instructor fails to circulate around the room (Tindell & Bohlander, 2012).

Several studies have specifically examined texting and academic performance. Harman and Sato (2011) observed a negative correlation between texting and grade point average as well as a negative correlation between texting and class standing, meaning that seniors text less than first-year students. Junco (2012) identified negative correlations between texting and grade point average as well as Facebook use and grade point average. Students typically underestimate the impact that such use has on academic performance. Barnes et al. (2012) found that all students recognized that texting during class interferes with learning although high-volume texters did not think it was as significant as low-volume texters. Indeed, the negative impact on academic performance is staggering. Barnes et al. tested 40 students twice, once in a texting condition and once in a
non-texting condition, and discovered that students scored 27% lower on end-of-class quiz scores when in the texting condition. In another study, sending three texts during one class period resulted in students scoring an average of 16 points lower on an end-of-class quiz (Ellis et al., 2010). Likewise, Gingerich and Lineweaver (2014) observed a 14% drop in student test scores when combining results of two related studies of texters.

Other types of cell phone use have also demonstrated a negative impact on student learning. End et al. (2010) compared student performance by simply calling students twice during a video lecture; students were directed not to answer; those who were called scored 27% lower on the disrupted material (content covered at the time of the call) than students who did not receive calls. Similarly, Kuznekoff and Titsworth (2013) tested three groups of students during a short video lecture and directed groups to use phones to complete non-class related activities and found that students in the control group scored 1.5 grades higher and took 62% more notes than students in the distraction groups.

It is clear that unstructured use of a phone during class time is associated with lower performance on class-specific assessments (quizzes, note-taking) as well as overall academic performance (grades and grade point averages). Moreover, a range of phone-based activities (texting, Internet use, receiving calls) makes the student susceptible to this outcome. Unstructured cell phone use during class appears to have limited academic value.

**Laptops/Notebooks**

Laptops and notebooks present a different challenge to classroom teachers as these devices appear to offer more instructional relevance. Students like to use these devices to take notes and to access course-related material, such as e-books or class websites. However, using laptops for unstructured purposes can be just as damaging to learning as unstructured cell phone use.

Wurst, Smarkola, and Gaffney (2008) observed three student cohorts (by enrollment years) of business honor students in relation to laptop use and discovered that laptop use did not improve academic performance in the way of grade point averages. Interestingly enough, retrospectively, the cohort without laptops reported greater satisfaction with their education. Sana, Weston, and Cepeda (2013) found that students who multitasked 12 times on laptops during a lecture period scored 11% lower on the end-of-class content assessment than laptop users who did not multitask.
Zhang (2015) conducted a path analysis on self-reports of college students that examined the relationship between academic performance (midterm grades), multitasking on laptops, and other variables in a large lecture environment. While student self-efficacy, motivation, and self-regulation were positively related to academic performance, laptop use was negatively correlated to academic performance and, furthermore, laptop multitasking demonstrated the most significant negative relationship to self-regulation (Zhang, 2015). In other words, highly self-regulated learners are less likely to use laptops in class.

Fried (2008) examined the performance of psychology students by using weekly self-reports with respect to attendance, in-class laptop use, and classroom environment in a lecture hall. Laptop users reported being off task about 23% of the time during class and scored significantly lower on the objective tests and homework assignments. Also noteworthy, other students reported being distracted by laptop users.

Using devices that distract other students creates a social issue in a learning community that extends beyond an individual’s choice. Sana, Weston, and Cepeda (2013) observed 38 students in a psychology lecture. Half of the students were seated in view of a confederate student who used the laptop for noninstructional purposes while the other half of students were seated so as not to have a view of a laptop user. Students who could view the laptop user scored 17% lower on the end-of-class learning assessment measure than students who could not view the laptop user. In essence, allowing students to use laptops in class for noninstructional purposes also serves to injure the learning of their classmates. Obviously, this creates an ethical dilemma as instructors need to navigate a balance between individual student autonomy and the larger learning impact on the classroom community.

Beyond distractions, research suggests that using laptops to take notes is less effective than taking handwritten notes. Mueller and Oppenheimer (2014) conducted three studies that compared longhand notetakers with laptop notetakers and, while there was no difference with respect to student performance on fact or recall assessment, longhand notetakers outperformed laptop notetakers on conceptual material (the deepest level of learning). Laptop users tend to take verbatim notes, even when trained not to, and verbatim notes, regardless of how recorded, resulted in lower test scores (Mueller & Oppenheimer, 2014).

More recent research has stepped beyond understanding the relationship between unstructured use in the classroom and learning. Tatum, Olsen, and Frey (2018) operationalized psychological reactance theory to
explain motives behind student dissent from class policies that restrict or prohibit personal technology use. Psychological reactance theory posits that humans resist attempts to restrict personal autonomy. These authors believe that the millennial student views 24/7 social network connectivity as appropriate and normative and that an attempt to interfere with such access constitutes a violation of freedom so as to expect psychological reactance. Two forms of dissent, expressive (attempts to gain support) and vengeful (retaliation), were identified while another form of dissent, rhetorical (refutation), was not found to be significant (Tatum et al., 2018). In other words, theoretically, many students understand that personal technology use during class is inappropriate but do so anyway in order to establish their autonomy. Other research offers an alternative explanation of persistent unstructured technology use. Self-report data from college students in Namibia suggests that Internet addiction, along with permissive class policies and poor lecture engagement, are prominent reasons for unstructured technology use in class (Muyingi, 2014).

To sum up, student laptop use during class poses complications. Teachers and students need to weigh the value of learning features made available to users in exchange with the potential distraction posed to both users and other students in class. Motivations for personal use appear to be based on the individual student rather than on the student-teacher relationship or the relationship with classmates.

Beyond the Classroom

While most of the research examined above has focused on unstructured technology use in the classroom, one study reported on use patterns outside of class in relation to academic performance. Junco and Cotton (2012) published results of self-reports from 1,774 students in relation to ICT use with respect to study time. Daily averages for students in this study included 97 texts, over two hours Facebooking, one hour emailing, and two hours Internet searching. While Internet skills were positively correlated to grade point average, emailing and searching did not demonstrate a significant relationship. Junco and Cotton argued that the behavior outside of class is similar to the behavior in class and, seemingly, produces the same results. In other words, it is unlikely that students make up for being distracted in class by studying more efficiently outside of class.

As with many innovations, expectations do not always come to be realized. Tossell, Kortum, Shepard, Rahmati, and Zhong (2015) were able to survey student expected learning values of smartphone use (first-time us-
ers) prior to actual use and then again one year later after logged use, finding that realized actual use fell short of expected use; ultimately, students came to realize that phones served as a distraction inside and outside of the classroom, even though the devices, to some degree, had been used for academic purposes.

Another study focused on socialization and new media technology. Morreale, Staley, Stavrositu, and Krakowiak (2015) reported on perceptions of communication competence and dispositions toward communication technologies from the perspective of first-year college students and found that women were more likely to text, use phones, network, and use photo-sharing websites than men, while men tended to use computers, view YouTube, visit chat rooms, and engage in more gaming than women. Although face-to-face communication was preferred over mediated communication for both men and women, Morreale et al. (2015) found that practices did not match preferences and that students placed little value on the importance of choosing from the variety of medium for self-expression.

**Summary**

Contemporary college students’ unstructured use of cell phones during class has become rampant. The heaviest users underestimate its impact on their academic performance. Receiving messages appears to be just as damaging as sending messages. While the behavior seems to attenuate with age and class standing, it does not dissipate altogether. Laptop use is perplexing as those devices offer more academic relevance. While the superiority of note-taking using laptops appears to be in question, student access to e-books and course-relevant material offers merit. While taking notes on the laptop may not be as productive as taking notes longhand, note-taking in either form remains valuable and keeps students engaged. Regardless of the device, students overestimate their ability to multitask. Highly self-regulated learners tend to fair better in this arena and tend to limit personal use of technology during class. Motivations for violating class policies appears to be user centered rather than relationship centered, meaning directed at the teacher.

**Recommendations**

Clearly, students’ unstructured use of technology in the college classroom has a detrimental impact on learning. However, eliminating the use of technology is not a functional or desirable solution in today’s educational environment. Not only are college students attached to and persistent
about the use of technology, it is important to embrace structured use. Kangas-Dwyer and Davidson (2013), for example, did not find a difference in student academic performance when comparing student use of e-books and traditional paper books. And, e-books tend to be less expensive. In that vein, banning laptops in class discourages book use. As Zhang (2015) observed, outcomes are really connected to self-regulated user decisions rather than to the laptop as a device. The teaching challenge involves developing a class use policy that promotes learning and discourages distraction. Accordingly, instructors should consider six recommendations.

First, teachers should avoid taking student technology use violations as personal affronts. Developing an understanding of any problem is a key to addressing it. Muyingi (2014) revealed an association between in-class use and Internet addiction. As a teacher, you may be witnessing legal addictive behavior. Alternatively, Tatum, Olsen, and Frey (2018) ground an explanation of persistent student personal technology use in psychological reactance theory; a classroom policy that restricts personal technology use denies student autonomy. Use of the device restores a sense of autonomy for the student. Hence, the student is responding to the policy rather than to the teacher. At the same time, and of upmost importance, while psychological reaction theory and Internet addiction explain persistent use, they fail to excuse such behavior. Students tend to engage in this behavior in all classrooms, regardless of instructor. Moreover, college students use personal technology this way in peer relationships (Morreale, Staley, Stavrositi, & Krakowiak, 2015). Despite governmental laws and warnings, people continue to text and drive cars. In the end, teachers are better off viewing the behavior as an unproductive habit that is difficult to control rather than a personal commentary about the student-teacher relationship.

Second, instructors should educate students about the negative impact between unstructured technology use and academic performance. As with other societal problems, education plays a role in managing behavior (cigarette smoking cessation, immunizations, seat belt use, etc.). Students grossly underestimate the negative impact of unstructured technology use on academic performance. Ravizza, Hambrick, and Fenn (2014) observed that students developed a false confidence in their ability to multitask using portable devices as the semester progressed. Teachers need to go beyond establishing a written course policy. Consider reviewing research on the subject during class. Engage students in a classroom discussion. When relevant, have students read about it or even research
it. Integrate the topic on a regular basis throughout the course as one conversation is insufficient. Make it a regular announcement when beginning class, when proctoring an exam, or before student presentations are given in class.

Third, focus on the majority of students who abide by the policy. Avoid ruminating on the problem of user violations. Instead, dwell on the big picture. Finn and Ledbetter (2014) found that most students prefer to have a personal technology use policy in place during class time and that policies discouraging phone use were negatively correlated to perceptions of instructor aggression while policies that discouraged the use of laptops/tablets were positively correlated to perceptions of teacher aggression. Most students see the need for and support the restraint of cell phone use. At the same time, most students would like the right to use laptops within defined parameters. Students can make compliance decisions once boundaries are known. It is easy for teachers to spend too much time trying to manage the behavior of a few while ignoring the compliant behavior of the majority. Concentrate on students who come to class engaged to learn and use the technology consistent with course policy.

Fourth, teachers need to work on managing the problem rather than eliminating it. Forni (2008) articulated the need for civility in the era of the Internet and suggested a relaxed sense of classroom formality, one that communicates respect, constraint, and consideration. Appropriate behavior needs to be socialized and socialization is part of the educational process. Address incivility with civility (Forni, 2008). Make polite requests for students to restrain use rather than engaging in strict classroom policing actions. It is important to convey that a face-to-face classroom environment is a learning community and that personal choices of technology use can injure the performance of others (Sana, Weston, & Cepeda, 2013). Leading a civil discussion on the need for a policy on the first day of class affords the majority of students to communicate a negative reaction about distracting behavior. This may circumvent dissent motivated to seek peer support. A civil discussion on the first day of class allows for that view to be expressed before violations occur. That discussion also allows for an appropriate environment of peer expectations to emerge as the course progresses.

Fifth, promote structured use. Let it be known that laptop users may be called on to respond to instructional requests during class. Ask laptop users to perform an action related to class, such as looking up the meaning of a word, verifying a due date for an assignment on the course
website, or checking the syllabus for other course information. Allow students to use search engines or to access something through the college library that is related to class. Use websites, like Kahoot.com, to engage in learning assessment (this suggestion is phone friendly). Obviously, one downfall of this recommendation involves making device use permissible, which then creates a window for unstructured use. Nonetheless, this practice will establish a classroom norm for teacher regulation of acceptable and unacceptable use. It also demonstrates flexibility on the part of the teacher.

Finally, teachers need to view the problem through a historical lens. Unstructured personal technology use is not the first classroom distraction nor will it be the last classroom distraction. Daydreaming began long ago. Students have been writing notes unrelated to class for a long time. Some students have doodled. While this does not excuse or remove the need to monitor technological distractions, it does serve as a reminder that distracted learning is not new; rather, using personal technology is a more recent edition of the problem. As in the past, teachers need to forge ahead by encouraging a culture of engagement and learning.

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References


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