

Grade: 80 %

## Effects of In-class multitasking on Learning

The purpose of in-class lecturing is to enable acquisition of knowledge through attentive listening and information processing. Unprecedented growth of ubiquitous and pervasive information and communication technologies (ICTs) over the past decade has enormously expanded opportunities and options for knowledge acquisition and learning (Sun et al., 2008). The use of student-owned ICTs (e.g., laptops, cell phone, etc.) has become more prevalent in classrooms than ever before, giving rise to massive in-class multitasking. These ICT devices present educational opportunities for students but can also create learning problems. Psychological and media communication research indicates that our ability to engage in simultaneous tasks is, at best, limited (Junco, 2012). Thus, multitasking (e.g., texting, checking email, and online social networking) during lectures can hamper our ability to listen and process learning material attentively in the classrooms. Overall disadvantages of multitasking seem to outweigh its advantages. In this research paper, I argue that in-class multitasking has negative effects on students' learning outcomes.

This research paper examines contemporary literature and presents its findings on the effects of in-class multitasking on students' learning. These findings are organized in four logical sections. Section one review the concept of in-class multitasking. In section two, I describe the research on how the split of human attentional resources in multitasking cause decrement in human capacity to process information efficiently and effectively. Section three provides a review of commonly used multitasking devices and tasks. Finally, conclusion and recommendations are provided in the last section of this report.

Multitasking is a common phenomenon. While you are reading this research paper, you may also be attending to an email alert on your cellphone, sipping coffee, or watching a soccer game on your laptop. Similarly, in in-class multitasking, students perform arbitrary task switching during a lecture. A student attending a lecture may choose to read a text message on cellphone, whisper with the students sitting nearby, or update his or her status on Facebook. According to Sana and Weston (2013), multitasking occurs in three ways: (1) working on two tasks simultaneously, such as listening to the lecture and taking notes; (2) switching between two tasks continuously and repeatedly, such as answering emails and listening to the discussions, and (3) performing tasks successively. All the forms of multitasking split the learner's attention-resources. Cognitive science research has explained how the attention process works and how multitasking negatively affects efficiency and learning outcomes.

A multitasking type of lifestyle is intended to increase efficiency; however, there are limitations to how well individuals can concurrently perform multiple tasks (Posner, 1982). Multitasking increases the chances of making mistakes and missing important information and cues. Multitaskers are also less likely to retain information in working memory, which can hinder problem solving and creativity. But it is interesting to note that four in 10 (40%) teens say "they would die without their cell phones", and nearly half (46%) say that having a cell phone is the "key to their social lives" (Trim 2009). With this context, it becomes imperative to understand and analyze the ill-consequences of in-class multitasking.

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Human processing is insufficient for attending to multiple stimuli (Juno, 2012). Research in cognitive science suggests that multitasking places considerable demands on our brain's resources, which, in turn, decrement overall performance (Broadbent, 1958). Numerous other empirical studies (e.g., Judd, 2014; Hembrooke, 2003) have also provided evidence for undesirable consequences of multitasking in the context of in-class learning. The research shows that when students are focused on a single primary task, their attention is well directed, and the information is adequately processed, encoded, and stored (Naveh-Benjamin, Craik, Perrett, & Tonev, 2000). When a secondary task is added, attention must be divided, and processing of incoming information becomes fragmented. As a result, our ability to encode information is disrupted, and this reduces the quantity and quality of information that is stored (Pashler, 1994). When students eventually retrieve information that was processed as a primary task, i.e., without interruptions, they are likely to experience minimal errors. When the students retrieve the information processed via multitasking, i.e., which significant interruptions, they are more likely to experience some degradation in their academic performance (Wickens & Hollands, 2000). To reduce negative effects, it is imperative to identify the commonly used multitasking devices by the students.

Laptops and cell phones are the most common multitasking devices students use during classes (Juno, 2012). Judd (2014) examines the relationship between Facebook and multitasking by analyzing comprehensive time-based log data generated by Facebook activities of students during learning sessions. Facebook was the second most common task used by students. These results confirm that Facebook is a key contributor in the stream of multitasking activities. Allowing the use of laptops and Smartphones in class means we have a major distracter to learning in our class. "Generation M2: Media in the Lives of 8- to 18- Year Olds" is a large scale, nationally representative survey by the Foundation about young people's media use. A survey was conducted between October 2008 and May 2009 among a nationally representative sample of 2002 students from 3<sup>rd</sup>-12<sup>th</sup> grade. The students were asked to keep a diary for seven days. The multitasking proportion for each students was calculated based on these diaries. The survey report reveals that the media multitasking habit starts early. It further says that a third of the participants watch TV, text, listen to music, or use some other medium while doing homework. The habit of multitasking while doing homework is distressful because multitasking while learning has the biggest potential down side (Rideout, 2010). Rideout says, "I don't care if a kid wants t tweet while she's watching American Idol, or have music on while he plays a video game. But when students are doing serious work with their minds, they have to have focus." The survey found that 80 percent of college students admit to texting during class and 15 percent say they send 11 or more texts in a single class period. A study by Junco (2012) investigates the frequency of in- class multitasking of students (Table 1) and examines the relationship between multitasking and academic performance as measured by actual overall semester GPA.

The findings of Junco's study indicate that use of laptops compels students to do off-task activities and results in low academic performance. Another study (Sana, Weston, & Cepeda, 2013) investigates the use of laptops in university classrooms. The study found, as shown in figure 1, that participants who multitasked on a laptop during a lecture had lower comprehension scores compared to participants who did not multitask. In a second set of experiments the

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participants who did not multitask, but were in direct view of a multitasking peer, scored lower on a test compared to those who were not. So, in-class multitasking affects not only the users but also impinges on nearby students in the class.

Hammerness (2012) reports that using the brain's organizational skills properly can help produce positive results towards reducing chaos, inefficiency, and negativity in daily life. A person must conquer "Rules of Order" to achieve success in leading a content and organized life. These six rules include: controlling emotions, sustaining attention, knowing when to move on to another task, molding information into ways it will be useful, shifting between tasks, and finally putting the previous five rules together to complete the overall transformation. The author concludes that distraction in the learning process leads to reduced conceiving of knowledge.

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From a neuroscience perspective, students who multitask heavily suffer significant mental impacts. A basic demonstration of the brain's limited attention capabilities would be observing the difficulty of patting one's head while rubbing one's stomach at the same time. When our brain's limited resources are spread out across multiple activities, it results in all of the activities being performed at a lower standard than if each one was to be performed individually. The prefrontal cortex does not develop fully until a person reaches their mid-20s (Diamond, 2002). The prefrontal cortex is responsible for thought and attention control. Throughout the teenage years, neuron patterns are being formed and weeded out. The formation of these patterns is influenced by the external environment and stimuli. Early studies have shown that the neural pattern development of those who multitasks is different than those who do not. Moreover, the consequences of multitasking are observable in every day anecdotes. Young children who are watching television cannot hear their mother calling them. As a mother, I found that despite intentions, when my children tried to do their homework in front of the television, they would take significantly longer and produce a sub-par product.

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Some research studies have reported benefits of multitasking as well. For instance, Shah (2010) argues that multitasking is an effective way to decompress after long periods of focused activity. Multitasking may actually stimulate thought in certain situations. Some people with attention deficit hyperactivity disorder (ADHD) perform well when multitasking, by demonstrating high levels of performance in some types of creative thinking, and coming up with unique connections between thoughts and subjects. According to Sharples, Taylor and Vavoula (2010), there exists a gap between how today's digital natives learn in schools and how they work and interact outside of school. This trend demands the need for keeping pace with technological advances and to adapt to students' learning needs. With more widespread use of personal devices, studies are starting to show evidence of the value of incorporating mobile devices in teaching and learning. Media use and multitasking makes the present generation unique (Sharples, Taylor, & Vavoula, 2010). Old educational modules are not functional anymore. New educational strategies are desperately needed to engage students. Many professors use a PowerPoint as they lecture, forcing the audience to simultaneously focus on the voice and the visuals. On the other hand, most schools treat the phone as a disruptive force that must be managed and often excluded from the school and the classroom (Lenhart, Ling, Campbell, & Purcell, 2010). Preceding

Preceding review of literature highlights that in-class multitasking using cellphone and laptops cause learning hindrance despite some reported benefits. There is no doubt that the information and communication devices have great potential to enhance teaching and learning and facilitate active learning by enabling students to customize the transfer of and access to information in order to build on their skills and knowledge and to meet their own educational goals. At the same time, when ICTs were not a required part of the class, the students in these studies reported lower levels of engagement and learning. The instructors can conduct in-class experiments to reveal to the students the negative impacts of in-class multitasking. Consequently, it is recommended to formulate a relaxed and need based ICTs usage policy for classrooms as part of the curricula. The instructors should design laptops and other electronic devices based activities that are connected to course learning objectives, Administrators need to design guidelines for schools to adopt ICTs in their curricula. As mobile phones are major distracters, I recommend that teachers should regulate the use of mobile phones in the classroom. They should establish when and where students store mobile phones before entering the classroom. They can develop social contracts as an agreement to define expectations for how, when, why, and where mobile phones will be used in the classroom. Though schools have the legal right to ban mobile phones on school campuses, it is more reasonable and productive for both educators and learners to utilize these technologies in a way that maximizes student learning.

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References are used appropriately and integrated into the arguments well.

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