A Cross Country Analysis of Multitasking with Technology in Academic Settings

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ABSTRACT

Multitasking by students has become extremely prominent within the classrooms of colleges and universities around the world. While supposedly paying attention to lectures and taking efficient notes, students can be seen texting and using social media on their phones, or having a wide variety of possible tabs and windows pulled up on their laptops or tablets. This apparent habit of almost every higher-education level student has raised a multitude of questions in various fields of study over the years. It has also provided professors with yet another obstacle that they must overcome to effectively teach their students. In this research, we explore these issues by focusing on the role of technology related factors impacting multitasking in academic settings. Our contribution from this study is in the preliminary comparative analysis of results obtained from two countries – China and the United States.

Keywords

Multitasking, technology, academia, information systems, learning

INTRODUCTION

In our current modern "high-tech" world, people can do everything on their phone, laptop, or tablet. Multitasking while using electronics gradually has become a central part of our daily life. People can be seen paying bills while watching a movie, checking their email while driving, shopping online while cooking, making appointments while walking, and doing homework while chatting with friends on online social networks. Multitasking has become more and more tightly integrated into our lives - people subconsciously assume that we have the ability to do more than one thing at a time. People also believe that connecting with technology helps their lives become richer and simpler. However a previous study found that multitasking affects a person's effectiveness and productivity (Kamal & Silva, 2013).The field of psychology has provided a significant number of studies dealing with multitasking, its possible causes, and the effects it has on the people doing it, mainly students. A common theory that repeatedly shows up in psychological studies on multitasking is that 'true multitasking' is impossible. This theory comes from the basis that, according to psychologists, the brain is unable to focus on more than one thing or activity at the same time. According to them, what is actually happening is that our brains are rapidly switching back and forth between the various tasks that a person may be performing, and this rapid switching happens so fast that it just seems like you are doing everything simultaneously (Judd & Kennedy, 2011; Jez, 2011).

Another field that has provided a rather large number of studies on multitasking is the broad field of education. These studies dealt mainly with the academic consequences that students face as a result of multitasking, and the effects it has on professors' teaching methods and styles. There are some cases and studies where professors across the country seem to think that they have successfully developed a solution or multiple solutions to overcome this ever-trending obstacle of multitasking. Studies on multitasking are becoming more prevalent in the field of technology and information systems. These studies mainly look at how technologies and software are playing a factor into the whole multitasking epidemic.

In the college classroom, it is very common to see students checking their email, texting, tweeting, or playing games while listening to the professor. Some students take notes on their laptops, while others may research the information being taught if it remains unclear (as opposed to simply asking the professor for more information). However, the question then arises as to how does this sort of multitasking affect their learning? Do students realize that these sorts of activities are distracting them and decreasing their learning efficiency? How much negative influence does multitasking have on learning? Scientists believe that multitasking is much more complex than most people believe. It may be possible for our brains to process more than two general things at once, such as visual information, acting audition, or auditory information. However, when the brain needs to process information, such as when one is attempting to arrive at a conclusion, witness creativity, or produce language, it is not possible to attend to two tasks at the same time. According to Terry Doyle, "Our brain works hard to fool

us into thinking it can process information from more than one source at a time. It cannot. " (Doyle & Zakrajsek, 2013). In his research, Doyle indicates that our brain will shut down one task in order to complete the other task. Learning is a complex process - it involves listening, reading, reacting, and comprehension abilities. It then appears that learning efficiency may be impacted as the number of tasks that an individual has to carry out simultaneously increases.

This research study explores these issues further by building on a previous study that developed a conceptual model of multitasking in academic settings (Kamal, Kevlin, and Dong 2016). Although there have been a number of studies that have investigated this context – very few have focused on the role of technology. Those that have, do not provide conclusive results. Subsequently, the goal of this study was to bring additional clarity to this issue. Therefore, our research question for this study is: *What role does technology-based factors have to play in multitasking in academic settings?* To address this question, survey questionnaires were designed from the conceptual model and administered at a high school in China and at a four year college in the United States. Our contribution from this study is in the preliminary comparative analysis between the results from the two countries.

MULTITASKING IN ACADEMIC SETTINGS

Among the various papers related to the topic at hand, many seem to agree that multitasking can adequately affect an individual's ability to retain information and learn effectively in an educational environment. Various researchers have attempted to set up experiments that could identify the possible causes of these lapses in information retainment and while many have found some predominant factors, results are skewed across the board due to the sheer amount of variables present.

Conceptual Model

Kamal, Kevlin, and Dong (2016) developed a conceptual model of multitasking in academic settings based on extensive literature review. The model is shown below.
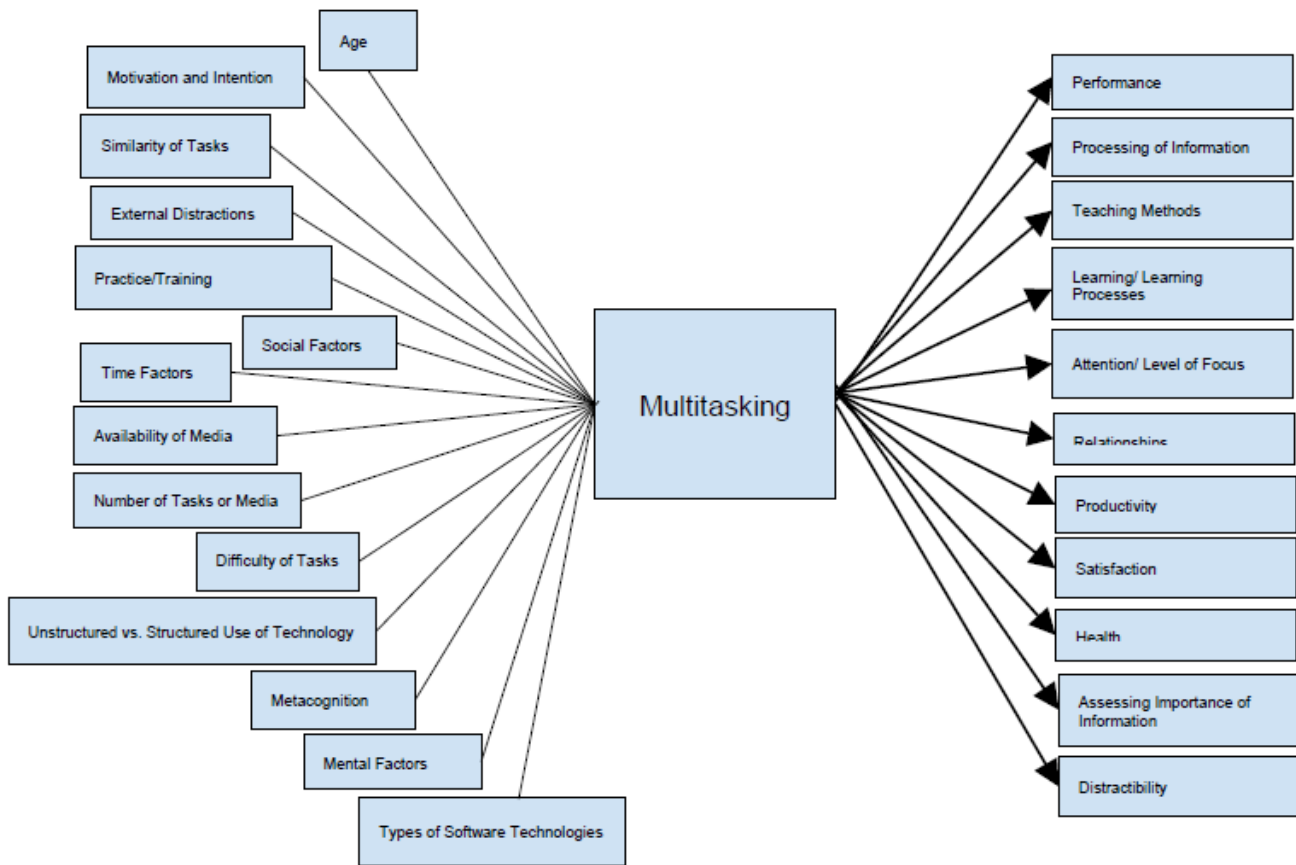

Figure 1. Conceptual model of Multitasking in Academic setting (Kamal, Kevlin, and Dong, 2016)

The boxes on the left of figure 1 represent independent variables impacting a student's ability to multitask. On the other hand, the boxes listed on the right of figure 1 represent the dependent factors. This comprehensive model serves as a solid base

foundation from which we may select independent and dependent factor(s) to develop propositions and hypotheses that can be tested out and analyzed to help us better understand the true benefits of multitasking in academic settings.

Role of Technology

Various researchers have tended to focus on variables such as devices around the student or distractions that would cause a lack of information retention (Sana, Weston & Capeda 2013; Hammer, Ronen, Sharon, Lankry, Huberman & Zamstov 2010; Hembrooke & Gay 2003; D'Agostino 2010; Fried 2008). Results from these extant studies are varied and not conclusive in their findings. Subsequently, we have decided to focus on the role of technology in multitasking in academic settings to bring more clarity to the issue.

We note that out of the thirteen independent factors (the boxes on the left-hand side) in the model, four of the factors relate directly and indirectly to the role that technology may play in triggering/impacting multitasking behavior in an academic setting. These are specifically, *External distractions*, *Availability of Media*, *Unstructured vs. Structured use of technology*, and *Types of software technologies*. External distractions refers to whether other students around a given individual in the same classroom is using a technology device that may cause distraction and hinder the individual's ability to pay attention in class. Availability of Media refers to whether a given student has specific technologies (e.g. laptop, tablet computer, smartphone, e-reader, etc.) with him/her during the class and whether that triggers him/her to use it just because he/she has readily access to it thereby creating a scenario where they may then attempt to both use the particular device and at the same time attempt to pay attention to material being presented in class. Unstructured vs. Structured use of technology refers to whether students are asked to perform a task using a given technology e.g. they may be asked to take an online quiz or work on an assignment electronically – this would depict an example of a structured use of technology. By contrast, unstructured use of technology is defined as students using technologies of their choice when doing assignments or tasks related to the class that did not mandate that they need to use technology to complete them. The last technology-based factor relates to Types of software technologies. This factor refers to the nature of the actual software applications that the student may be using at any given time. Certain applications may require less skill to operate and thereby may facilitate the use of that application while trying to do other tasks at the same time. The following section outlines the method used and results obtained from testing the following three technology-related factors – external distractions, unstructured vs. structured use of technology, and types of software technologies. These factors were investigated through surveys administered at two educational institutes – one in China and one in the United States. Our contribution from this study is in the preliminary comparative analysis between the results from the two countries.

METHODOLOGY

Survey questionnaires were designed and administered to test three of the four technology-related factors in two countries – China and the United States. In China, the survey was administered to students in their senior year in high school. In the United States, the survey was administered to students at a four year college. Students in their freshman and senior year in the U.S College participated in the survey. It is important to note that the age range of the Chinese high school seniors were the same as the ages of the U.S college freshman. The survey questions were formulated from the conceptual model in figure 1. Data from the surveys were analyzed by correlating and grouping the students based on their quiz scores. Two groupings emerged - students whose grade were above 75, and the other group had students scoring below 75. The following table, outlines the nature of the students that participated in the survey.

Country	China	United States	
Number of students	40	42	
Type of class	High School Senior	College Freshman	College Senior
Age	17 – 18	17 – 18	20 - 24

Table 1. Survey participant information

RESULTS

The following sub-sections summarize the results from the survey questions that are related to the three technology-based factors from the conceptual model.

Technology factor: External Distraction

The question that relates to this factor in the survey was: *Do you usually listen to music when you are studying?*
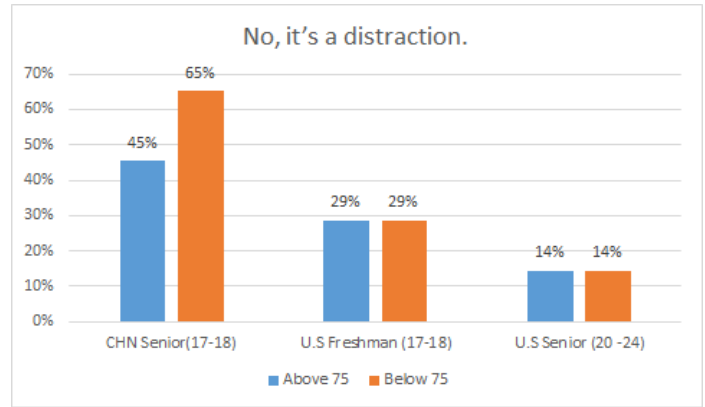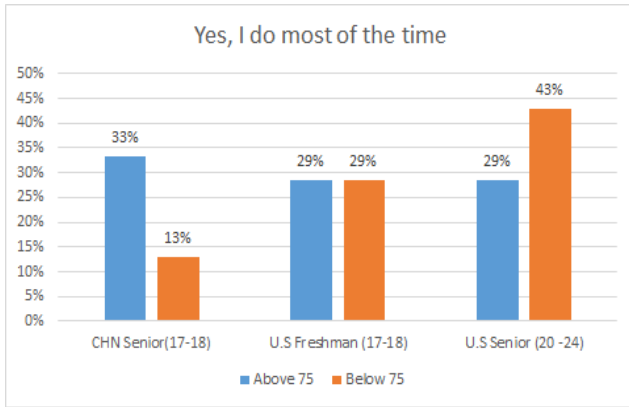
Table 2. Survey results from Question 1 regarding External Distraction factor

According to the results depicted in table 2 above, it is seen that U.S. students tend to think that listening to music while studying won't be a distraction. However, the Chinese students felt that it is a distraction. Most Chinese students think listen music while studying will impact their attention.

Another question that relates to this factor in the survey was: *Do you usually text with your friends when you are studying?*
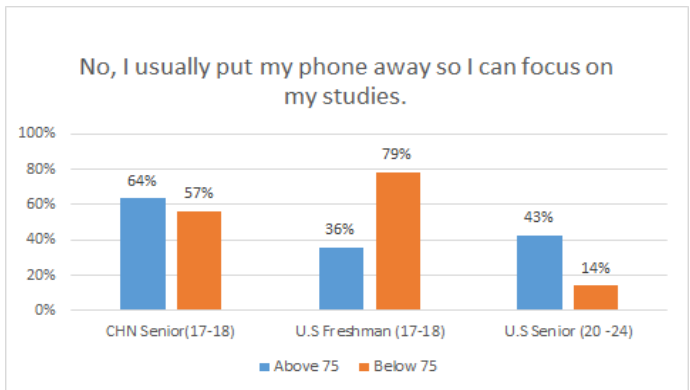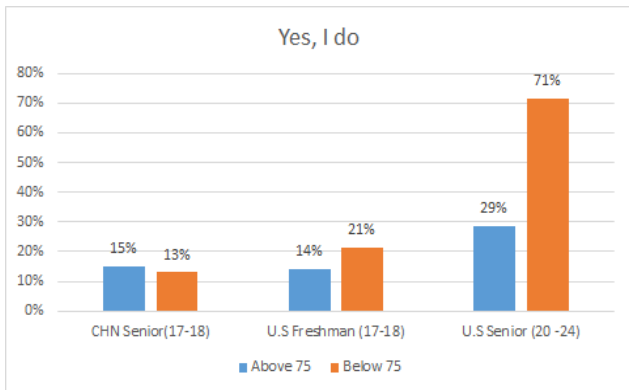

Table 3. Survey results from Question 2 regarding External Distraction factor

According to the results depicted in table 3 above, majority of the Chinese students and U.S. College Freshman usually put their phone away in order to concentrate on their studying. However, majority of U.S. College Seniors whose scores were below 75 reported that they texted while studying.

Another question that relates to this factor in the survey was: *If you put your cellphone and laptop in front of you, will those distract your attention?*
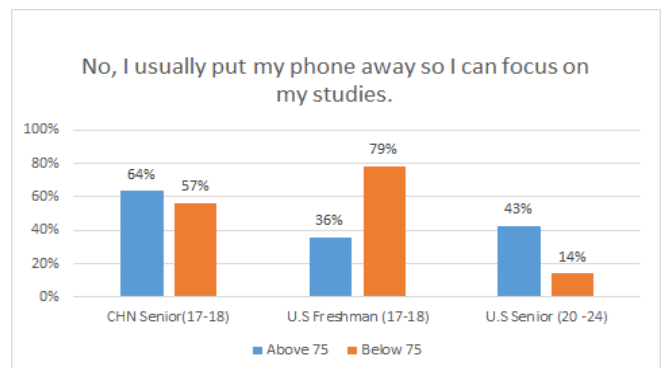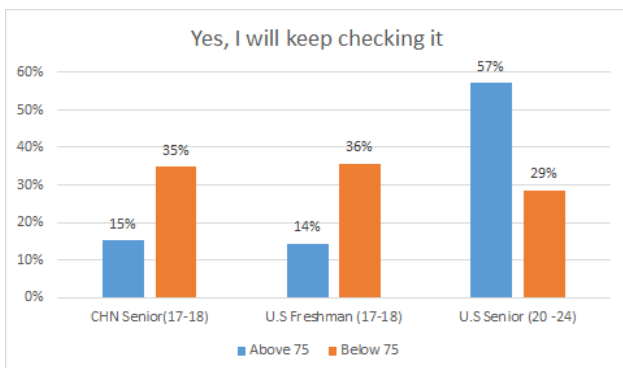
Table 4. Survey results from Question 3 regarding External Distraction factor

According to the results depicted in table 4 above, 57% of U.S. College Seniors whose grades were over 75, realized that they were addicted to technology. If there is a phone or laptop in front of them, it triggers them to use it and impacts their concentration. Therefore, they try to avoid using technology devices while studying.

Technology factor: Types of Software Technologies

The question that relates to this factor in the survey was: *Do you usually listen to music & Text with your friends when you are studying?*
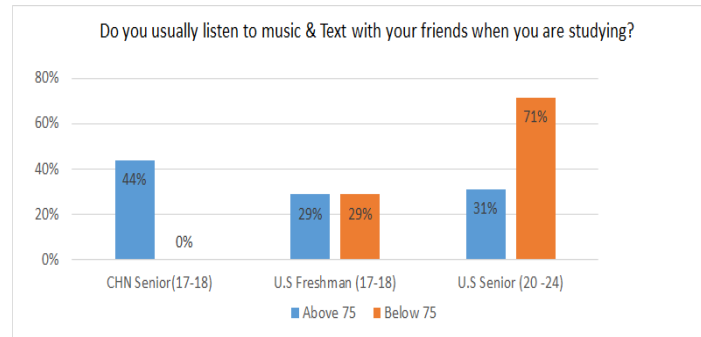

Table 5. Survey results from Question regarding Types of Software Technologies factor

According to the results depicted in table 5 above, 71% of U.S. College Seniors whose grades were below 75 reported that they usually listened to music and texted while studying. It then appears that when certain software require less skill, it will trigger users to do take on additional tasks at the same time. This also implies that when an individual does more than one task at the same time, it will decrease their learning efficiency, thus leading to decreased accuracy of the task.

Technology factor: Unstructured vs Structured use of technology

The question that relates to this factor in the survey was: *If you are required to take notes on a laptop/tablet during class, will it cause some form of distraction?*
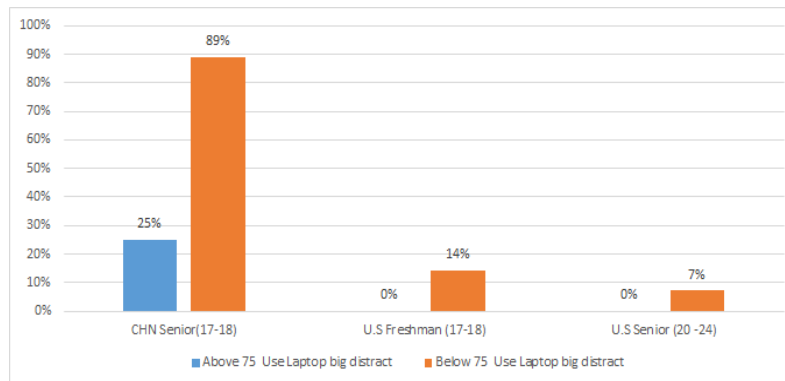

Table 6. Survey results from Question regarding Unstructured vs. Structured use of technology factor

According to the results depicted in table 6 above, 89% of Chinese students believed that using a laptop for taking notes during class will trigger them to do something else. However, most U.S. College students – both freshman and seniors - don't think it is going to distract them.

CONCLUSION

In this preliminary study, we identified and extracted the technology related factors that may affect multitasking in academic settings. Initial findings imply that other factors such as the classroom environment, individual self-control in the use of technology devices during class may impact the extent and effectiveness of multitasking in the classroom. Future studies will build on these first findings to explore these issues further. We strongly believe that findings from these studies will have implications for both academics and practitioners. For academics, it will help to shed light on how multitasking with technology can be effectively used within learning environments. And on the other hand, for Information Systems practitioners, it will help to guide better information technology applications and tools design.

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