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Media Multitasking in University Students: Relatedness of Video to Learning Content

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Media Multitasking in University Students: Relatedness of Video to Learning Content

Maryum Khan

Honours Psychology Thesis

Department of Psychology

Brescia University College

London, Ontario, Canada

April 2019

Thesis Advisor: Dr. Anne Barnfield

Abstract

This study examines the impact of multitasking on memory. Specifically, how the relatedness of a medium affects learning. The media used for the purposes of the current study were documentaries. The study consisted of 36 students recruited from Brescia University College. Participants completed a set of questionnaires which included their demographics, academic information, computer/internet usage, and their perceived ability to multitask. Participants then completed a reading comprehension task while the documentary was played in the background. Although there was no significant effect, participants scored higher on the first part of the multiple-choice test which suggests that they understood the general idea of the passage. Contrary to the hypothesis, there was no significant effect found on participant performance and video similarity when students media multitasked. Further research could examine the effect of multitasking across different cultures and ethnic backgrounds.

Keywords: media multitasking, similarity, task switching, performance

Media Multitasking: Relatedness of Video to Learning Content

Multitasking is defined as “a person’s ability to do more than one thing at a time” (Cambridge Dictionary, n.d., n.p.) and media multitasking as “a person’s consumption of more than one item or stream of content at the same time” (Ophir, Nass, & Wagner, 2009, p. 15583). For the purpose of the current study, media multitasking is defined as using two or more types of media at the same time or using media while performing non-media activities, such as watching a movie while studying (Schoor, Baumgartner, Sumter, & Valkenburg, 2015). With increased use of technology, media multitasking has raised concern especially in learning institutions such as schools and universities. Multitasking increases distraction, deteriorates memory and overall, decreases productivity and performance (Demirbilek & Talan, 2017). Students often use social media or watch a television show while completing their homework. University/college students are most likely to surf the internet while listening to a lecture which causes a significant amount of distraction, both for the individual and for those around them (Schoor et al., 2015). Due to the increasing use of technology, it is important to be aware of the known consequences of this form of distraction.

Many people think they are being efficient when completing more than one task at the same time; however, research has shown evidence to contradict this concept. About sixty-two percent of university students use some form of medium while taking part in academic activities (Schoor et al., 2015). Furthermore, when compared to other forms of media, individuals are most likely to watch TV or listen to music while reading (Lin, Lee, & Robertson, 2011). It has also been reported that about thirty-three percent of teenagers use some form of media while completing their homework. (Lin et al., 2011).

Media multitasking has been shown to be especially prevalent among students. Schuur et al. (2015) conducted a review consisting of fifty-six studies and investigated the relationship between media multitasking and youths' functioning in cognitive control, academic performance and socioemotional functioning. Frequent multitasking makes individuals adapt to constant switching between activities, which creates difficulties to focus on a specific activity (Schuur et al., 2015). Multitasking has a significant negative effect in performance on tasks since humans' processing abilities are limited (Demirbilek & Talan, 2017). Furthermore, a study was conducted to determine the effects of media multitasking when texting and using social media while learning (Demirbilek & Talan, 2017). Media multitasking interferes with cognitive control, therefore, not allowing the mental processes and behaviours to adapt in response to internal goals (Schuur et al., 2015). Youth who have weak cognitive control were found to be poor multitaskers due to difficulty in filtering relevant and irrelevant information from their surroundings (Schuur et al., 2015). However, there is insufficient evidence that multitasking can be advantageous on cognitive control since individuals are using several streams of information at the same time (Schuur et al., 2015). Youth who have strong cognitive control were better multitaskers since it was easier for them to retain important information (Schuur et al., 2015). Research has suggested that strategies used in multitasking affects performance. Individuals who use parallel strategies for tasks that overlap each other, and serial strategies are used for tasks that are completed in chronological order (Lui & Nam, 2018). Those who use parallel strategies saw a significant decline in performance compared to those who used serial strategies when multitasking (Lui & Nam, 2018). Students who media multitask during a lecture have poor grade performance when compared to students who take notes using a pen and paper (Demirbilek & Talan, 2017), which suggests that taking notes on paper increases cognitive control and thus, multitasking ability.

Completing two or more tasks simultaneously reduces attention and disrupts focus from the primary task (Demirbilek & Talan, 2017). Despite potential benefits, overall findings indicate that the use of media during academic activities poses a risk to students' academic performances since the time they have for studying is divided between two activities.

According to Kahneman (1973), the capacity theory assumes that individuals are limited as to how much mental work can be performed at a given time. Certain activities are more attention-demanding than others and when the supply does not meet the demand, performance significantly deteriorates (Kahneman, 1973). Divided attention is when two activities equally require the same level of cognitive effort to complete the assigned work (Finley, Benjamin, & McCarley, 2014; Kahneman, 1973). High attention demanding tasks use more cognitive effort and are therefore associated with difficulty (Kahneman, 1973). Divided attention makes it difficult to focus on a single stimulus due to the other task's cognitive demands (Finley et al., 2014). Activities completed simultaneously, where both tasks required attention, created interference. Consistent with Kahneman's capacity theory, Finley et al. (2014) administered computerized tests to undergraduate students to determine peoples' perceptions of the dangers of texting and driving, to mirror the effects of divided attention. The findings of Finley et al. (2014) showed that drivers underestimated the consequences of divided attention. Their perceived ability to focus on the two tasks simultaneously was proven incorrect.

The Yerkes-Dodson law provides explanation for how multitasking can both improve or deteriorate performance. Yerkes and Dodson (1908) administered electrical shocks on mice to determine its impact on motivation to complete a maze. The purpose of the study was to see if the intensity of the electrical shock made mice avoid a specific path, and to determine which electrical intensity was most favourable (Yerkes & Dodson, 1908). Findings revealed that when

the intensity of the shocks increased, the mice's performance declined, and they tried their best to escape (Yerkes & Dodson, 1908). Adler and Benbunan-Fich (2014) used the Yerkes-Dodson law to explain decreased performance when participants engaged in multitasking. They instructed participants to switch between tasks to determine how different types of multitasking behaviour affected performance. Those interrupted during a task showed improvement in performance when the task was easy, but this interruption hindered performance when the task was difficult (Adler & Benbunan-Fich, 2014). According to the Yerkes-Dodson law, the best performance is in the middle where there is optimal workload and attention (Adler & Benbunan-Fich, 2014; Yerkes & Dodson, 1908). Arousal helps focus and increase motivation up to a certain point and low levels of arousal hinder performance due to lack of stimulation (Adler & Benbunan-Fich, 2014; Yerkes & Dodson, 1908). At high levels of workload, performance decreases because of the inability to manage overload (Adler & Benbunan-Fich, 2014). As a result, easy tasks are associated with low arousal and a little more stimulus may improve performance (Yerkes & Dodson, 1908). Individuals who were forced to multitask and presented with an easy task scored higher than participants who multitasked with their own choice (Adler & Benbunan-Fich, 2014). Therefore, weak and strong stimuli were not as predictive of performance as an intermediate stimulus (Yerkes & Dodson, 1908).

Research suggests that different media content impacts learning when multitasking. Lin et al. (2011) investigated the effects of video content on test scores of a reading comprehension task when engaging in multitasking behaviour. The purpose of this study was to determine the effects of different media on comprehension and multitasking abilities. Participants were shown one of two videos while performing a reading comprehension task. One of the videos was a documentary on drinking and driving and the other was a clip from a sitcom (Lin et al., 2011).

The comprehension task consisted of three articles which were created with equal levels of difficulty, followed by multiple choice questions. Participants were given six multiple choice questions from each article where two questions tested basic knowledge, two intermediate, and two in-depth analysis questions (Lin et al., 2011). More questions were answered correctly when told that the video was testable. Interestingly, the news report caused more distractions but was also more easily ignored compared to the comedy clip (Lin et al., 2011). The documentaries used in Lin et al.'s (2011) study were not related to each other or to the passages. Further research would explain if video similarity can influence learning when multitasking.

Similarity of content has been known to facilitate switching between activities (Arrington, Altmann, & Carr, 2003). Task similarity is the degree of shared characteristics between two or more tasks (Arrington et al., 2003). Similarities between two tasks helps one to retain information longer. Arrington et al. (2003) investigated the effect of similarity on task switching. When two tasks were similar, it was easier to switch between tasks than when both tasks were dissimilar (Arrington et al., 2003). This facilitation can be explained by memory strength. Memory strength is determined by linking pieces of new information with old information (Hembrooke & Gay, 2003). Consistent with Arrington et al. (2003) and Hembrooke and Gay (2003), Korteling (1993) found that the increased similarities between two activities made it easier to perform the subtasks as a single task. The inability to separate two activities is referred to as incoherent similarity. Incoherent similarity refers to tasks that are distinct but still resemble each other at a superficial level (Korteling, 1993). Increased similarity created disruption since participants overlapped information (Arrington et al., 2003). Similarity has shown to either help task switching or to make it more difficult (Arrington et al., 2003). It has been proposed that there are more similar component processes in comparable activities which

may cause less disruption (Arrington et al., 2003). On the other hand, increased similarity may cause interference which would slow down the pace when switching from one task to another (Arrington et al., 2003). Overall, results indicated that task switching was faster and easier when there was increased similarity between the two tasks. Ophir et al. (2009) investigated if the level of proficiency in multitasking had a relationship with stimulus similarity. The purpose of this study was to determine if high multitaskers paid more attention to unrelated stimuli. Heavy media multitaskers were more likely to get distracted by irrelevant stimuli than low media multitaskers (Ophir et al., 2009). Consistent with Schuur et al.'s (2005) study, individuals were not able to effectively switch between tasks since they were unable to filter out disturbances.

Previous research has focussed on the impact of media multitasking on learning. Most of the literature has shown multitasking to be ineffective when learning and therefore, results in decreased performance. According to Kahneman's (1973) capacity theory, certain tasks are more attention demanding than others and if there are not enough resources to meet the demand, performance deteriorates. Consistent with the Yerkes-Dodson law, Adler and Benbunan-Fich (2014) found that individuals who multitasked at their own discretion performed better at more hard tasks than they did at simple tasks. The cognitive load theory gives insight into why multitasking is ineffective (Schuur et al., 2005). Switching between activities or completing multiple tasks at the same time disrupts attention and focus. Studies have shown that as cognitive load increases due to multitasking, individuals require more time to complete the task (Demirbilek & Talan, 2017).

Media multitasking has shown to have a significant effect on performance, especially in students' academic performance. Past research often focuses on the time spent watching TV rather than the effect of TV solely playing in the background (Lin et al., 2011). Furthermore, the

similarity between tasks has shown to improve task switching (Arrington et al., 2003; Hembrooke & Gay, 2003; Korteling, 1993).

The goal of the current study is to determine if task switching can be facilitated by the degree of similarity between tasks. In this study, a documentary was played in the background while participants performed a reading comprehension task. The purpose of the current study was to determine the effects of media multitasking when learning. This study examines specifically if the similarity of medium to learning content had any impact on learning. The media used in this study were two documentaries, one related and one unrelated to the passage while participants completed the reading comprehension task. Once participants finished reading the passage while the documentary was played in the background, they were given a multiple-choice test to assess their learning. It was hypothesized that similarity of medium to learned content would improve multitasking ability. It was predicted that participants' scores on the reading comprehension task would be higher when showed a documentary related to the passage than when the documentary was unrelated to the passage.

Methods

Participants

The study consisted of 36 female, undergraduate first year psychology students from Brescia University College. Participants were between the ages of 17-25 years old and were compensated by receiving a credit towards their Psychology 1000 course. This was a voluntary study and participants had the option to leave at any point during the study and still receive their class credit for the course.

Materials and Procedures

Once participants were recruited and signed up for the current study using the SONA system, they were asked to come to the PURL room at a designated date and time. The experimenter drew a label with the numbers either “1” (control), “2” (related), or “3” (unrelated) which determined the participant’s assigned condition beforehand. Participants were tested individually to minimize distractions. Upon arrival, they were asked to take a seat, read and sign the letter of information (Appendix A) and then the informed consent form before beginning the study. After the researcher answered participants’ concerns, they were given a set of questionnaires adapted from Ozer’s (2014) study which included participants’ demographics, academic information, internet/computer usage, and their perceived ability to multitask (Appendix B). After completing the questionnaires, participants in conditions 2 and 3 had a 10-minute documentary (Appendix C) played on a laptop in the background while reading the passage on microbiology which was testable. Those in the control condition were given ten minutes to read the passage followed by a multiple-choice test to assess their learning. The two documentaries: “Mysterious Microbes” and “Dolphins: Breaking the Code” were both retrieved from “Changing Seas TV” and were G-rated and appropriate for all viewers. The reading comprehension task consisted of a 1,240-word passage taken from Chapter 1 of Pommerville’s (2018) textbook, *Fundamentals of Microbiology*. When the experiment began, the experimenter sat quietly at the back of the room to minimize distractions. Once the documentary was over, the experimenter handed the multiple-choice test pertaining the passage to the participants and returned to the back of the room. Participants were given unlimited time to answer six multiple choice questions (Appendix D) regarding the microbiology passage without access to the text. The questions were created following the guidelines used in Lee et al.’s (2011) study. The level of difficulty ranged from two basic, two intermediate and two in-depth knowledge questions.

Once participants completed the multiple-choice test, they were asked to record their accumulated level of attention they paid to the documentary and to the microbiology passage with both percentages adding up to 100 (Appendix D). The study took approximately 30 minutes to complete. Upon completion of the study, participants were given a debriefing form (Appendix E) which briefly explained the purpose of the study they participated in.

Results

Twelve participants were assigned to the control condition ($M = 3.42$, $SD = 1.44$), twelve to a related documentary played in the background ($M = 3.33$, $SD = 0.99$), and twelve to an unrelated documentary played in the background ($M = 3.50$, $SD = 1.17$).

A one-way ANOVA test was used to analyze the data. There was not a significant effect of the relatedness of the documentary on test scores, $F(2, 33) = 0.06$, $p = .04$, as shown in *Figure 1*. This indicates that the relevance of the documentary to the passage did not influence test scores. However, as shown in *Table 1*, participants performed better on the first half of the test than they did on the second half. This shows that majority of the participants were able to grasp key ideas from the reading.

A Pearson's correlation test was used to analyze the relationship between participants' perceived ability to multitask and their scores on the multiple-choice test. There was no significant correlation found between participants' ease of multitasking and their test scores, $r(34) = -.18$, $p = .285$, indicating that their self rating of ease of multitasking did not predict test scores (*Figure 2*). There was no significant correlation found between participants' capability of multitasking and their test scores, $r(34) = -.12$, $p = .485$, indicating that capability of multitasking did not predict test scores (*Figure 3*). Lastly, there was no significant correlation found between

participants' self-rating of the level of interference multitasking caused, $r(34) = -.18, p = .485$.

This indicates that perceived interference of multitasking did not affect test scores (*Figure 4*).

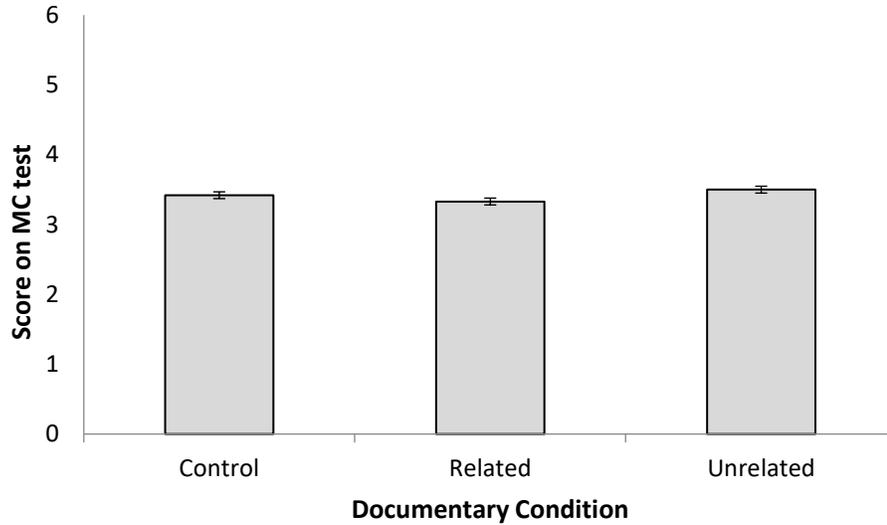


Figure 1: Mean test scores on the multiple-choice test of participants in control ($SE = .417$), documentary related ($SE = .284$) and unrelated ($SE = .337$) conditions. Standard errors are represented in the figure by the error bars attached to each column.

Table 1

The Percentage of Correctly Answered Questions by Participants in each Condition

Question	Questions correctly answered by participants (%)		
	Control Condition	Related Condition	Unrelated Condition
1	100	100	100
2	50	83	67
3	75	50	58
4	16	0	25
5	42	58	42
6	58	42	58

Note. Out of the six questions on the test, majority participants answered the first three questions correct. This indicates that participants were able to grasp key points from the passage while the documentary was played in the background.

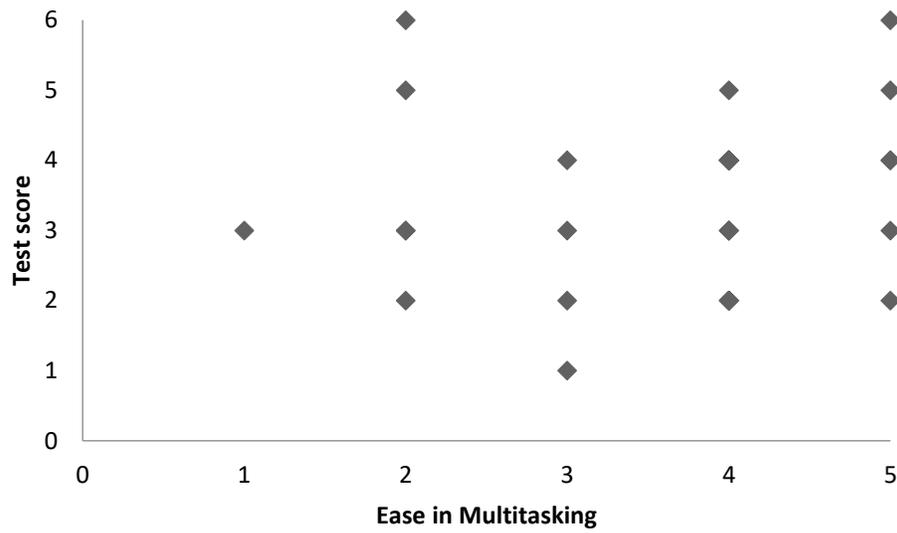


Figure 2. No significant correlation was found between participants self-rating of ease in multitasking and their scores on the multiple-choice test.

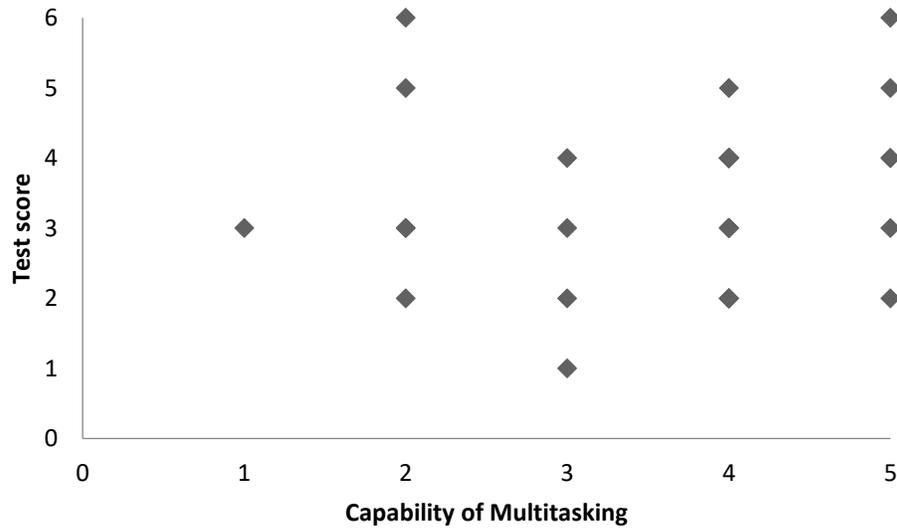


Figure 3. No significant correlation between participants self-rating of their capability to multitask and their scores on the multiple-choice test.

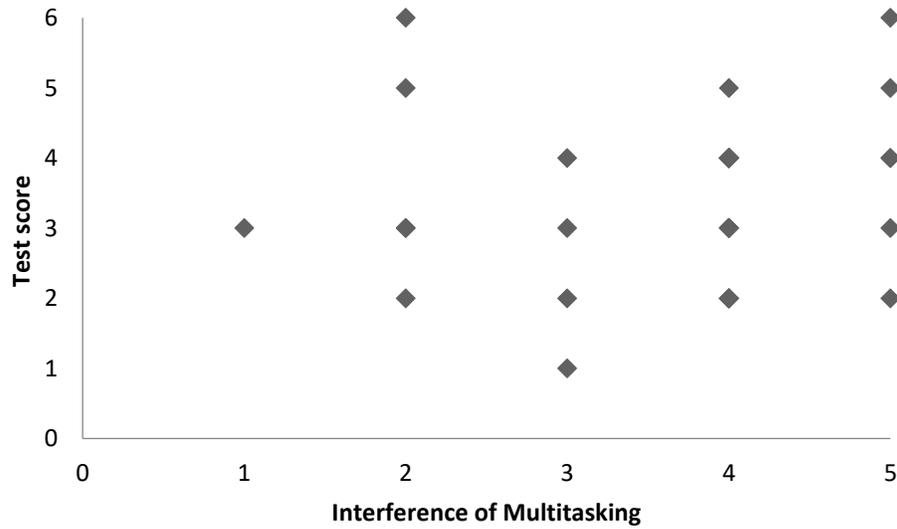


Figure 4. No significant correlation was found between participants self-rating of interference of multitasking and their scores on the multiple-choice test.

Discussion

The results were inconsistent with the hypothesis that similarity of video to learned content would improve multitasking ability and would therefore result in higher scores on the multiple-choice test. Similarities between the two tasks should have facilitated recalling the passage, however, findings revealed that there was a null effect. There was no influence of video similarity when media multitasking on participants' performance.

Although most literature supports the view that multitasking is ineffective and significantly decreases performance on tasks, there is some evidence that multitasking may in fact improve performance. In general, completing multiple activities at the same time saves time and increases productivity (Liu & Nam, 2018). Individual differences play a significant role by influencing attention, intelligence, working memory capacity, and the ability to switch between tasks when exposed to multitasking environments (Liu & Nam, 2018; Courage, Bakhtiar, Fitzpatrick, Kenny, & Brandeau, 2015). There are two types of multitasking strategies: serial and parallel. Serial strategies include tasks that are completed in chronological order, one after the other (Liu & Nam, 2018). Parallel strategies consist of tasks that overlap each other and are most commonly associated with a decline in performance (Liu & Nam, 2018). Since participants in the current study were using parallel strategies when completing the tasks, they must have experienced increased disturbances. Liu and Nam (2018) determined the relationship between working memory capacity, task difficulty, and multitasking performance to improve performance on a task and understand the mechanisms involved. Findings demonstrated that an increase in

task difficulty decreased performance. Activities that required greater cognitive load decreased performance and those that required minimal cognitive functions increased performance in multitasking environments (Liu & Nam, 2018). As task performance declined, workload and task difficulty improved (Liu & Nam, 2018).

Research has shown that individuals trained to multitask showed increased performance. Anguera et al. (2013) administered a racing game to adults to determine how a game can be used to evaluate cognitive abilities across different ages and be used to improve cognitive processes. Those trained to multitask scored higher apparently because they were able to work on their skills and deal with the interferences that occurred during completion of the tasks (Anguera et al., 2013). Multitasking led to decreased consequences, improved attention, and improved working memory. In the present study, participants who scored higher than expected may have already been efficient multitaskers. Those who scored lower than expected may not regularly engage in multitasking behaviour and did not receive enough exposure to multitasking environments. Many university students multitask daily and therefore routinely engage in the behaviour. They are more flexible in multitasking and prioritizing tasks, thus forcing them to develop strategies to increase their efficiency (Courage et al., 2015). Furthermore, Anguera et al.'s (2013) findings revealed that multitasking ability began to decline as early as at the age of twenty years. Most participants in the present study were under twenty years old, which could be another possible explanation of the null effect. Individuals over twenty years old were shown to have a decline in their ability to multitask (Anguera et al., 2013).

The primary limitations of this study were the participants' fields of study. The control group scored lower than expected, possibly because of the diversity of students who signed up for the study. The participants had backgrounds in various subjects. However, more Foods and

Nutrition than Psychology students participated in the study. In addition, sixty percent of the participants had never taken a biology course neither in high school nor university. Therefore, with minimal knowledge on biology, participants may have had difficulty in understanding terms and concepts used in the passage. Associating biology with pessimistic feelings also may have significantly affected scores because optimistic feelings towards a task decreases interruptions, task switching and increases overall performance (Courage et al., 2015). In the event of replication, this study should be restricted only to students who have a background in biology and there should be less variation in participants' programs.

Most literature supports multitasking as being ineffective among the general population. Nonetheless, multitasking can promote creativity because when individuals "take a break" from the complex task and switch to an easier task they are inspired to think and reflect on their work (Courage et al., 2015). Gamers who constantly switched between completing different tasks were found to be more efficient task switchers and had faster reaction times with accuracy (Courage et al., 2015). As a result, individuals who regularly multitask would show increased performance when required to complete two tasks simultaneously (Anguera et al., 2013). Overall, multitasking is effective only while performing simple tasks since there is less cognitive load (Adler & Benbunan-Fich, 2014; Kahneman, 1973). Further research could explain if the consequences of multitasking are applied universally and among people with different cultural backgrounds.

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Appendix A

Project Title: Multitasking in university students

Researcher: Maryum Khan

Course: Psychology 4842e Honors Thesis, Brescia University College

Faculty supervisor: Dr. Anne Barnfield, School of Behavioural and Social Sciences, Brescia University College

Letter of Information

1. Invitation to Participate

You are being invited to participate in this research study about the effects of media multitasking on learning because you are a student in Psychology 1000 at Brescia University College.

2. Purpose of this Letter

The purpose of this letter is to provide you with information required for you to make an informed decision regarding participation in this research.

3. Purpose of this Study

The purpose of this study is to determine the effects of media similarity on learning.

4. Inclusion Criteria

All individuals in Psychology 1000 at Brescia University College are eligible to participate in this study

5. Study Procedures

If you agree to participate, you will be asked to fill a short questionnaire. After completion of the questionnaires, you will be asked to watch a 10 minute G-rated documentary while reading a passage on microbiology. Once the documentary is over, you will be given a set of 8 multiple choice questions to answer with unlimited time. It is anticipated that the entire study will take 30 minutes, over one session. The study will be conducted in the Psychology Undergraduate Research Laboratory at Brescia. There will be a total of 36 participants in this study.

6. Possible Risks and Harms

There are no known or anticipated risks or discomforts associated with participating in this study.

7. Possible Benefits

You may not directly benefit from participating in this study but information gathered may provide benefits to society as a whole which include further understanding of multitasking in university students.

8. Compensation

You will be compensated with one credit for your participation in this study. If you do not complete the entire study you will still earn these credits.

9. Voluntary Participation

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your future academic status.

10. Confidentiality

All data collected will remain confidential and accessible only to me and my faculty supervisor. If the results are published, your name will not be used.

11. Contacts for Further Information

If you require any further information regarding this research project or your participation in the study you may contact Maryum Khan (phone number: 519-615-0352, e-mail: mkhan696@uwo.ca) or my faculty supervisor, Dr. Barnfield (phone number: 519-432-8353, ext. 28246, e-mail: abarnfie@uwo.ca)

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Psychology Honours Thesis Coordinator at 519-432-8353 x28120, email: jsutton7@uwo.ca.

12. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please contact Maryum Khan.

This letter is yours to keep for future reference.

Appendix B

Questionnaires

Part I: Demographics

1. Age: _____

2. Gender: Male____ Female____ Other____

3. Is English your native language?

Yes____ No____

4. If not, what is your level of proficiency in English?

Low____ Medium____ High____

3. What is your home faculty?

4. What year of your undergraduate study are you currently in?

_____ Year

5. Major(s):

Part II: Academic Information

6. Approximately how many hours per DAY do you spend studying?

_____ hours/day

7. Describe how you spend your free time when you are not studying?

8. Have you previously taken/are currently taking a biology course?

Yes, please specify the course(s): _____

No

Part III: Computer and Internet Use

9. Do you own a **computer** (Check one)?

- Yes
- No

10a. If yes, approximately how many hours per DAY do you spend using the computer (i.e. online AND offline) on a 'typical' day?

_____ hours/day

10b. For what activities and for what percentage of the total time do you spend using a computer (online AND offline) on a 'typical' day?

- For School _____% of the time
- For Paid Work _____% of the time
- For Extra Curricular Activities _____% of the time
- For Watching media (e.g. YouTube, Netflix) _____% of the time
- For Social _____% of the time
- For Other Things _____% of the time

If "other things", what things?

11. Do you have **Internet** access (Check one)?

- Yes
- No

12a. If yes, approximately how many hours per DAY do you spend on the Internet/Online on a 'typical' day?

_____ hours/day

12b. For what activities and for what percentage of the total time do you spend on the Internet/Online on a 'typical' day?

- For School _____% of the time
- For Paid Work _____% of the time
- For Extra Curricular Activities _____% of the time
- For Watching media (i.e. YouTube, Netflix) _____% of the time
- For Social _____% of the time
- For Other Things _____% of the time

If "other things", what things?

Part IV: Multitasking

13. Do you often multitask (i.e. Do you ACTIVELY do more than one thing at a time with the computer? NOTE: This does not include things like just listening to music in the background as you would a radio

- Yes
- No

14. I find multitasking easy.

- Strongly Disagree
- Disagree
- No Opinion
- Agree
- Strongly Agree

15. I am capable of effectively multitasking

- Strongly Disagree
- Disagree
- No Opinion
- Agree
- Strongly Agree

16. Multitasking does not interfere with the main task/activity in which I am engaged

- Strongly Disagree
- Disagree
- No Opinion
- Agree
- Strongly Agree

Appendix C

Documentaries

Documentary related to passage:

“Mysterious Microbes – Full Episode

Part of documentary shown: 0:00-12:00

<https://www.youtube.com/watch?v=c7hsp0dENEA>

Documentary unrelated to passage:

“Dolphins Breaking the Code – Full Episode”

Part of documentary shown: 0:00-12:00

<https://www.youtube.com/watch?v=KTShFMIFFBc>

Appendix D

Questions regarding the microbiology passage

Questions

1. According to the passage, _____ is critical to regulating life on Earth
 - a) Pathogens
 - b) Animals
 - c) Microbiome
 - d) Water
2. _____ cause diseases like plague, malaria, and smallpox
 - a) Pathogens
 - b) Bacteria
 - c) Viruses
 - d) Organisms
3. Which of the following best defines intraterrestrials?
 - a) Microbes living in sediment and rock
 - b) Microbes living outside the Earth or its atmosphere
 - c) Microbes living underwater
 - d) Microbes living on Earth
4. Which of the following is one of the activities soil microorganisms perform?
 - a) carry out 20% of all biochemical reactions
 - b) provide up to 50% of the oxygen gas we breathe and many other organisms use to stay alive by performing photosynthesis
 - c) represent a source for many of today's antibiotics
 - d) affect the chemical composition of the atmosphere
5. Given what you have just read, which of the following statement is true?
 - a) Viruses play an important role in the global cycling of nutrients and elements
 - b) Fungi are the most abundant infectious agents on Earth
 - c) The Earth's subsurface plays a significant role in forming raindrops and snowflakes.
 - d) The human gut microbiome doesn't determine the health of an individual
6. Based on the passage, a microbe can be best defined as:
 - a) An organism that grows best in an oxygen-reduced environment
 - b) The population of microorganisms that colonize various parts of the human body and do not cause disease in a healthy individual
 - c) An organism that can live in an environment that offers very low levels of nutrients
 - d) Is a microscopic form of life including bacterial, archaeal, fungal, and protistan cells

Appendix E

Debriefing information

The impact of media multitasking on learning

The study you have just participated in investigates whether the degree of relatedness of media while studying has an effect in test scores. Specifically, the current study consisted of three conditions: control (no video while completing the reading comprehension task), related video (documentary shown was related to the passage in the reading comprehension task), and unrelated video (documentary shown was unrelated to the passage). Those in the unrelated and related video conditions were asked to complete the reading comprehension task while a video was playing in the background. The purpose was to determine how these documentaries affected test scores on the reading comprehension task and whether the relatedness of the video had any effect.

It is hypothesized that those who watched the documentary related to the passage had higher test scores than those who watched the unrelated documentary. Due to the similarities between the passage and documentary, it is assumed that participants will be able to easily ignore the documentary while completing the task and will also be able to more readily recall what they read in the passage.

Thank you for participating today. If you have any further questions please contact:

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For further reading:

Lin, L., Lee, J., & Robertson, T. (2011). Reading While Watching Video: The Effect of Video Content on Reading Comprehension and Media Multitasking Ability. *Journal of Educational Computing Research*, 45(2), 183-201.