12-2014

# Combating the Motivational Interference Potential of Technological Distractions During Academic Tasks: The Role of Academic Delay of Gratification

Abraham E. Flanigan
*University of Nebraska-Lincoln*, abrahamflanigan@gmail.com

# Combating the Motivational Interference Potential of Technological Distractions During Academic Tasks: The Role of Academic Delay of Gratification

by

Abraham E. Flanigan

A THESIS

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Arts

Major: Educational Psychology

Under the Supervision of Professor Kenneth A. Kiewra

Lincoln, Nebraska

December, 2014

# COMBATING THE MOTIVATIONAL INTERFERENCE POTENTIAL OF TECHNOLOGICAL DISTRACTIONS DURING ACADEMIC TASKS: THE ROLE OF ACADEMIC DELAY OF GRATIFICATION

Abraham Edward Flanigan, M.A.

University of Nebraska, 2014

Adviser: Kenneth A. Kiewra

The presence of technological distractions during homework and study diminishes students' ability to self-regulate effectively, a phenomenon known as motivational interference. To date, no studies have explored the relationship between college students' delay of gratification tendencies and motivational interference. Do students with greater delay of gratification tendencies experience less motivational interference from a potential distraction? The present study explored this question by comparing students' academic delay of gratification tendencies with their experiences of motivational interference. Participants self-reported their delay of gratification tendencies then completed an academic task while confronted with a computer distractor. Afterward, participants self-reported their motivational interference scores. Regression analyses indicated that delay of gratification scores did not predict motivational interference scores. However, students self-reported encountering numerous technological distractions and employing self-regulation strategies as they work on homework or study outside the classroom. Self-report responses supported prior research related to the number of technological distractions that students encounter outside of the classroom and suggest that university students often study or complete homework in the presence of distractions.

**Acknowledgements**

To my parents, Mike and Georgia Flanigan, thank you for your endless love and support during the writing of this manuscript. Without the two of you, I may have never been able to get it finished.

To my advisor, Dr. Kenneth A. Kiewra, thank you for the insight, guidance, and countless revision suggestions you provided during the writing of this manuscript. I look forward to the coming years as you continue to help me grow as an academic (and golfer).

To my friend and officemate, Markeya Peteranetz, thank you for the encouragement you have provided me since the first day we began our graduate school adventure together. I look forward to many more years of friendship and collaboration.

Finally, I would like to acknowledge Dr. Wayne A. Babchuk. Thank you for your enthusiasm for pursuing research and openness to my ideas. I anxiously wait to see where our future pursuits will lead us.

## Table of Contents

## List of Tables and Figures

# Combating the Motivational Interference Potential of Technological Distractions During Academic Tasks: The Role of Academic Delay of Gratification

The benefits of studying and completing homework assignments have been widely studied over several decades within educational psychology literature (e.g., Ramdass & Zimmerman, 2011; Rohwer, 1984). Specifically, researchers have associated studying and homework completion with increased achievement in the classroom, time management skills, academic self-efficacy, self-regulation of learning, and more (Bembenutty, 2009; Cooper, Robinson, & Patall, 2006; Stoeger & Ziegler, 2008). However, recent literature suggests that college students are encountering a growing number of distractions outside of the classroom as they attempt to complete homework or study (e.g., Bembenutty, 2011; Hofer, Kuhnle, Kilian, Marta, & Fries, 2011).

The presence of distractions creates more problems for college students than simply reducing their homework completion or study time. Distractions negatively impact students' grade point averages, homework performance, time spent on homework, and academic self-efficacy (Bembenutty & White, 2013; Fries & Dietz, 2007; Junco & Cotton, 2012). Additionally, distractions diminish students' academic motivation and ability to self-regulate their learning processes effectively, a phenomenon known as motivational interference (Fries & Dietz, 2006). To understand the relationship between technological distractions and motivational interference, consider the following example:

> Megan, a college freshman, is attempting to finish her midterm biology paper. As she types, Megan's cellphone is within arm's reach, creating the temptation to check it for text messages and to glance at her Facebook page. This temptation reduces the amount of time and effort Megan dedicates to the paper by

consistently pulling her off task. As a result, she takes nearly twice as long as necessary to finish the paper and the quality of her writing suffers. The presence of the cellphone created a state of motivational interference for Megan and negatively impacted her writing.

Within this example, there are several key variables. First, Megan's midterm biology paper represented her *academic task*. Second, her cellphone represented the *technological distraction* that was competing for her time and attention. Due to its presence, Megan felt less motivated to stay on task and had a difficult time focusing on her paper. This is the third variable, *motivational interference*. The presence of the cellphone diminished her motivation to work on the paper and interfered with her ability to self-regulate her learning effectively. Fourth, *self-regulation of learning*, critical for combating the motivational interference potential of a distraction, has been defined as a process through which students organize and manage cognition, behaviors, and environment to overcome obstacles and reach academic goals (Zimmerman, 2000). The presence of her cellphone made it difficult to stay on task and pursue her writing goals. Instead, as a result of this state of motivational interference, Megan was unable to delay gratification from the cellphone, unable to self-regulate, and unable to produce a paper up to her capabilities.

College students face potentially distracting situations like Megan's on a regular basis that place them at increased risk for motivational interference and negative academic outcomes (Dietz & Schmid, 2008; Junco & Cotton, 2011). To combat against these pitfalls, college students should delay the immediate gratification that distractions offer until they are finished with their task. The tendency to delay gratification from

leisure alternatives to an academic task is called academic delay of gratification (Bembenutty & Karabenick, 1998). Returning to the example, when Megan reached for her cell phone while writing her paper, she was demonstrating an inability to delay gratification until she was finished writing.

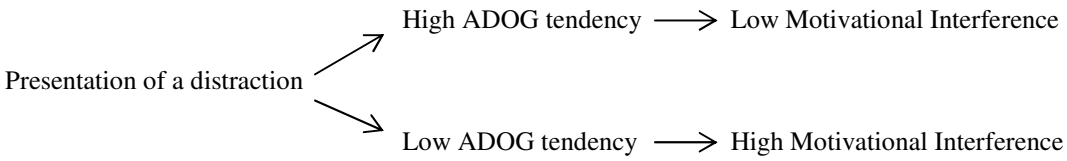
To date, no studies have explored the relationship between college students' delay of gratification tendencies and the amount of motivational interference they experience when faced with a potential distraction. The present study explored this relationship. Participants were instructed to read a document and answer questions about what they read. While working on this task, each participant was provided with a personal computer. Participants were told they could use the computer for leisure purposes, but were encouraged to continue working on their task until they were finished. Participants naturally selected themselves into groups based on whether or not they were able to delay gratification from the computer. After this learning/distraction task, participants completed post-surveys related to motivational interference experienced, self-regulated strategy use, motivational beliefs, and the impact technological distractions have on their typical homework and studying experiences.

## Literature Review

The existing literature largely explores the relationship between the presence of distractions, their motivational interference potential, and the resulting impact on variables related to self-regulation and academic achievement. Findings from these studies reveal that when students enter into a state of motivational interference, their ability to self-regulate and achieve is diminished (e.g., Fries & Dietz, 2007; Fries, Dietz, & Schmid, 2008). Based on these findings, it appears that presenting students with a

distraction results in a state of motivational interference and diminished self-regulation. However, no studies in any academic database I explored have explored the mediating influence that students' academic delay of gratification (ADOG) tendencies might have on the motivational interference potential of distractions. Rather than assuming a direct relationship between the presentation of a distraction and entering into a state of motivational interference, the present study explored how students' ADOG tendencies predicted their motivational interference when presented with a distraction. To explore this relationship, the present study used the ADOG model shown in Figure 1 to predict students' motivational interference scores:

*Figure 1* – Relationship between ADOG tendencies and Motivational Interference




This model proposes that ADOG tendencies mediate the motivational interference potential of a distraction. ADOG tendencies are measured using the 10 item Academic Delay of Gratification Scale (Bembenutty & Karabenick, 1998). For each of the 10 items, participants indicate their preference for an (a) immediately available leisure activity versus (b) working on an academic task. Participants respond to each item using a four-point Likert-type scale ranging from 1 = Definitely choose A, 2 = Probably choose A, 3 = Probably choose B, and 4 = Definitely choose B. Composite scores are created by summing response codes across the 10 items, with higher scores indicating a greater tendency to postpone gratification from immediately available leisure alternatives.

Research has found students high in ADOG tendencies report placing more importance on their academic tasks than leisure alternatives and use more self-regulation

strategies than students low in ADOG tendencies (Bembenutty, 2008). Self-regulation of learning is associated with increased homework and study completion (e.g., Bembenutty, 2009) and with decreased motivational interference (e.g., Fries, Dietz, & Schmid, 2008). As a result, this model predicts an inverse relationship between ADOG and motivational interference based on ADOG's association with self-regulation. This model is based on findings related to the presence of distractions, motivational interference, self-regulation, and academic delay of gratification. The following sections summarize research related to each of these constructs.

**The Impact of Technological Distractions**

During the past decade, researchers have explored how the presence of technological devices and leisure activities impact college students' homework and studying experiences in and out of the classroom. To understand just how far-reaching technological activities have become, consider that 74% of people over 18 years old have online social media accounts ("Social Networking Fact Sheet", 2014). The largest of these social media outlets, Facebook, reports having over 1 billion registered users ("Facebook Statistics", 2014). However, social media represents just one of many technological activities. Junco and Cole-Avent (2008) found that several different technological activities and devices are commonly used by college students: social networking websites, blogs, instant messaging, and cell phones.

Among these devices and activities, cell phones and social networking sites have received extensive research interest. Junco (2011) explored university students' Facebook use and how it relates to grades and study time outside of the classroom. Through self-report methodology, nearly 2,000 university students checked Facebook an average of six

times per day, spending 24 minutes on the site each time they accessed it, and devoting 106 minutes to the website each day. A linear regression analysis suggested that the amount of time students spend on Facebook and the number of times they access the site each day both negatively predict overall GPA. Facebook use has also been shown to decrease time spent studying (e.g., Junco, 2012).

The detriments to academic success caused by social media do not go unnoticed by college students. A recent qualitative study conducted by Flanigan and Babchuk (2014) explored how students perceive social media use to impact their homework and studying experiences. Open-ended interviews with 10 undergraduate students at a large Midwestern university revealed that students perceive social media use to have a negative impact on (a) the amount of information retained during study sessions, (b) amount time dedicated to homework and studying, and (c) course grades.

Aside from checking Facebook and other forms of social media, college students often use their cell phones to send and receive text messages. Young adults aged 18-24 send an average of 67 text messages per day and receive over 1,800 texts a month, many of which are sent and received while students are working on homework or are studying outside the classroom (Cocotas, 2013). However, the sending and receiving of text messages during homework and study sessions is associated with a host of negative outcomes, including: taking longer to complete assignments (Bowman, Levine, Waite, & Gendron, 2010), lower GPAs (Jacobsen & Forste, 2011), and more disruptions during homework sessions (Yarmey, 2011).

Distractions also impact students' in-class learning. Nearly 800 students across six different universities indicated that most (65%) use digital devices multiple times

during class (McCoy, 2014). Many of these students (23%) reported using digital devices 11 or more times during a typical class. Participants reported texting, web surfing, emailing, and playing games on their digital devices during class. Use of digital devices during class came at a cost. Most participants identified several negative outcomes resulting from their use of digital devices, including: not paying attention (90%), missing instruction (80%), and losing grade points (25%). These findings suggest that students use digital devices during class and pay an academic price as a result.

This academic price was explored further in a study by Kuznekoff and Titsworth (2013) in which 47 undergraduate participants were presented with a 12-minute video lecture and asked to take notes while watching. Participants were placed into one of three treatment groups (control, low-distraction, and high-distraction) based on the presence or absence of a cell phone distraction. Participants in the control group did not have a cell phone present. Participants in the low-distraction group had their cell phones present and received an automated text message every minute. Participants in the high-distraction group also had their cell phones present and received two automated text messages every minute. This methodology allowed researchers to explore how cell phone distractions impacted note taking (number of details recorded) and achievement (multiple choice and free recall tests). Results indicated that cell phone distractions led to fewer notes and lower achievement than no cell phone distraction.

In conclusion, students regularly access technology during academic activities in and out of the classroom. Such access diminishes academic achievement, time spent on homework and studying, and ability to learn from in-class lectures. For students like Megan, the presence of cell phones, laptops, iPads, and other technological devices

diminishes the quality of their educational experience. To understand why these devices are problematic for students, it is essential to understand the motivational interference potential inherent in these devices.

**Motivational Interference**

The presence of a leisure alternative (e.g., television, friends nearby, social media outlets) as students pursue an academic task can impair their ability to self-regulate effectively. This phenomenon is called motivational interference (Fries & Dietz, 2006) and was illustrated by Megan's diminished motivation and ability to self-regulate the writing of her biology paper because of the presence of her cell phone and her desire for immediate gratification.

Motivational interference is associated with, or responsible for, numerous academic pitfalls, including a decrease in: motivation to perform well on a task, the use of deep processing strategies, achievement, and the use self-regulated learning strategies (Fries & Dietz, 2007; Fries, Dietz, & Schmid, 2008). To help students avoid these pitfalls, it is important to understand how motivational interference develops and is avoided.

To explore the origins of motivational interference, Fries and Dietz (2007) had participants read a text about medical diseases while exposed to popular music videos. There were four groups that varied with respect to level of exposure to the music videos. One group (the "Pre-Exposure" group) watched the music videos first and then read the medical text. This group served as a baseline because motivational interference was thought to have been negated by viewing the videos before reading. A second group (the "Psychologically Present" group) did not have physical access to the music videos.

Instead, participants were informed they would be able to view the music videos after they finished reading. In this sense, participants were psychologically aware of the leisure activity, but did not have physical access to it. In the third group (the "Physically Present" group), participants were provided access to the music videos while reading the text. They could access the music videos by pressing buttons on the computer screen from which they read the medical text. The buttons represented visual cues to remind them of the music videos. However, they were instructed not to use the buttons and told that multitasking between the videos and the text was not allowed. In the last group (the "Physical Access" group), conditions were identical to those for the third group except that participants were allowed to switch back and forth between the music videos and medical text. This four-group design allowed researchers to explore the impact of motivational interference when it was both physically and psychologically present.

After completing the experimental session, participants in all four groups completed achievement tests assessing their understanding of the medical texts and completed self-report measures related to their (a) intrinsic motivation to read the medical texts, (b) motivation to perform well on the achievement tests, and (c) motivational interference while reading the texts. Finally, participants completed a learning assessment consisting of items that required shallow (i.e., "What form of plague is transferred by droplet infection?") and deep (i.e., "Why are there more cases of tetanus infection in the summer than in the winter time?") processing strategies. Results pinpointed motivational interference's origins and drawbacks.

First, the degree to which the music videos were available did not differentially influence motivational interference. Instead, music videos that were either physically or

psychologically available elicited motivational interference and decreased performance on the learning task relative to the baseline group. Second, based on the participants' self-report responses, presence of the music videos (both physically and psychologically) diminished motivation to perform well on the learning task relative to the baseline group. The temptation to engage in a leisure activity (regardless of its presence) decreased motivation to read and comprehend the texts. Finally, participants who waited to view the music videos (the "Physically Present" and "Psychologically Present" groups) performed lower on the learning assessment requiring deep levels of processing than those who did not have to wait, though no difference occurred for items requiring shallow processing. This last finding suggests that participants who waited to view the music videos engaged in shallower processing while reading the texts than those who did not have to wait.

In summary, Fries and Dietz (2007) demonstrated how motivational interference can arise from either a physically present or a psychologically present leisure alternative to an academic task. Additionally, their findings indicate that motivational interference negatively impacts performance motivation, academic achievement, and use of deep processing strategies. Clearly, the presence of an attractive leisure alternative to a homework task elicits motivational interference within university students. With this in mind, an important issue is to understand which types of distractions create the greatest amount of motivational interference.

To address this issue, Fries, Dietz, and Schmid (2008) used self-report methodology to explore how the valence of two competing leisure and academic activities impacts students' abilities to self-regulate their learning process. Roughly 700 participants were presented with two hypothetical scenarios in which a school activity

(e.g., finishing a reading assignment) and a leisure alternative (e.g., watching television) were in conflict with one another. Participants were first asked to imagine choosing the school activity and reporting how well they could self-regulate effectively given the presence of the leisure alternative. Second, participants were asked to imagine choosing the leisure activity instead of the academic one and reported what their mood and distractibility levels would be while engaged in the leisure activity. For each scenario, participants reported the valence of each of the competing activities.

Results showed that learning and leisure activity valences impacted participants' reported motivational interference. For example, participants highly motivated to complete the learning activity experienced less motivational interference and reported a greater ability to self-regulate learning than participants who reported feeling less motivated by the learning activity. However, even if the leisure activity was not pursued, participants reported that it would still elicit motivational interference. Participants who reported pursuing the learning activity while placing a high value on the leisure alternative reported higher levels of motivational interference than when no leisure alternative was presented. Thus, even if a leisure alternative is not pursued, its presence still contributes to a state of motivational interference if a student values it enough. These findings suggest that even if Megan had not used her phone to send text messages or check Facebook, its mere presence would have been enough to place her in a state of motivational interference.

In conclusion, motivational interference hinders college students' academic success by diminishing their task motivation, use of deep processing strategies, and academic achievement. Moreover, motivational interference permeates into students'

learning experiences whether the potential distraction is physically or psychologically present. However, motivational interference is not an insurmountable obstacle. Rather, through self-regulation, students can take control over their learning processes, create an environment conducive to learning, minimize the potential for motivational interference to occur, and use effective learning strategies (e.g., Bjork, Dunlosky, & Kornell, 2013; Zimmerman, 2000).

**Self-Regulated Learning**

Self-regulation of learning is a process through which students organize and manage their cognition, behaviors, and environment to overcome obstacles and reach academic goals (Zimmerman, 2000). Self-regulated learners minimize distractions, organize an effective studying or homework environment, establish learning goals, and regulate their learning process by monitoring and evaluating their progress (Zimmerman, 2000). To overcome the temptation of technologically-based leisure activities, self-regulated students might create an effective learning environment (i.e., leave their cellphone at home) and identify learning strategies that minimize the temptation to get off-task (i.e., actively take notes while reading a textbook) and the potential for motivational interference.

To understand how a college student would self-regulate during homework and study, consider Zimmerman's (2000) three-phase model. The first phase is the forethought phase, a time when students plan how to complete an academic task by identifying appropriate learning strategies and activating sources of motivation to pursue the task (Zimmerman, 2000). Returning to the Megan example presented earlier, before Megan attempted to write a few pages for her term paper, she might decide how to

organize the paper, figure out how to minimize the temptation to send text messages, and call to mind sources of internal or external motivation to work on the paper and delay texting.

Next is the performance phase, when students apply their learning strategies toward task completion. During this time, students monitor their efforts to ensure they are staying on task and making progress (Zimmerman, 2000). For Megan, the performance phase of working on her term paper might entail writing the paper based on the outline she created, implementing her plan to minimize the temptation to send text messages, and taking periodic breaks to stay fresh and ensure adequate progress is being made towards paper completion.

In the final phase of Zimmerman's (2000) model, the self-reflection phase, students reflect on their experiences. During this time, self-regulated students ask themselves questions such as, "Did I reach my goals?", "What could I have done better?", or "How do I feel about my performance?" Through self-reflection, students identify weaknesses and improve learning strategies. During reflection, Megan might reflect on whether or not she wrote a compelling argument, if distractions had derailed progress toward her writing goals, and what could be done differently in future writing sessions to be more productive. The outcome of the self-reflection stage is that students are able to assess the strengths and weaknesses of their learning routines. Overall, it is through this process of planning, executing, and reflecting upon learning strategies that students can identify strengths and weaknesses in their learning routine and make progress toward a more autonomous, self-regulated self. By employing Zimmerman's

(2000) three-phase model, Megan and other students can self-regulate their learning process and minimize the opportunity for potential distractions to derail their success.

The use of self-regulated learning behaviors is associated with important academic outcomes such as increased homework completion rates (Bembenutty, 2009; Bembenutty & White, 2012), academic achievement (Mega, Ronconi, & De Beni, 2013; Schmitz & Perels, 2011), academic self-efficacy (Bembenutty & White, 2012; Kitsantas & Zimmerman, 2009), use of effective learning strategies (Heikkila & Lonka, 2006; Zimmerman & Martinez-Ponz, 1986), and more. However, research has shown that students differ in their ability to self-regulate learning process effectively (e.g., Bjork, Dunlosky, & Kornell, 2013). One variable that has been used to explore this difference is students' delay of gratification tendencies (Bembenutty, 2009). Technological distractions create the temptation for students to get off task and obtain the immediate gratification cell phones, laptops, iPads, and other technological devices offer. The postponement of immediately available distractions is called academic delay of gratification (Bembenutty & Karabenick, 1998). Students who postpone immediate gratification from distractions experience higher levels of homework/study completion and academic achievement than those who do not postpone immediate gratification (Bembenutty, 2010). The following section describes how academic delay of gratification has been studied and the benefits associated with delaying gratification.

**Academic Delay of Gratification**

Although college students often find themselves distracted by technological devices, this does not mean they always give into this temptation. Instead, many students overcome this temptation through the use of self-regulation strategies. According to

Bembenutty and Karabenick (1998), academic delay of gratification refers to students' tendencies to delay immediate gratification (e.g., an enjoyable leisure activity) in favor of staying on task to achieve temporally distant gratification (e.g., deciding not to watch Netflix in favor of studying to do well on an upcoming quiz). To make sense of this definition, consider Megan's situation. As she worked on her biology midterm paper, the presence of her cellphone created the temptation to get off task. Megan enjoys sending and receiving text messages, and doing so provides her with immediate gratification. On the other hand, completing her essay and receiving a good grade represent the temporally distant gratifiers. After weighing her two options (finishing the paper or texting), Megan was unable to delay gratification, which resulted in taking more time to complete the paper and receiving a lower grade.

If Megan had been able to overcome the temptation to use her cell phone, she would have been able to complete her paper and presumably receive a high score on it. Studies have revealed that delaying immediate gratification leads to academic benefits (e.g., Bembenutty, 2009; Bembenutty & Karabenick, 1998). For example, Bembenutty (2010) surveyed 58 university students in an introductory collegiate math course to assess their motivational beliefs, use of self-regulation strategies, and delay of gratification tendencies. Bembenutty explored the relationship between these constructs and the dependent variables of academic self-efficacy, outcome expectancy, final course grades, and frequency of homework completion. Several relationships were found. First, use of self-regulated learning strategies was positively associated with homework completion ($r$ = .58), academic self-efficacy ($r$ = .40), and final course grade ($r$ = .41). Second, delay of gratification was associated with homework completion ($r$ = .44), use of self-regulated

learning strategies ($r$ = .48), and academic self-efficacy ($r$ = .42). These similar findings suggest that students who possess a tendency to delay immediate gratification demonstrate greater self-regulation and experience gains in their homework completion and academic self-efficacy.

Although technological distractions can tempt college students, Bembenutty and Karabenick (2004) suggested that students who demonstrate a greater tendency to delay immediate gratification are those who place more importance on future academic rewards. This position received empirical support when Bembenutty (2009) surveyed 113 university students and found a significant linear relationship between perceived importance of an academic task and delay of gratification ($r$ = .51).

Additional studies involving academic delay of gratification used similar self-report methodology and uncovered benefits of delaying gratification from distractions. For example, Bembenutty (2009) found academic delay of gratification related to intrinsic and extrinsic motivation, self-efficacy for learning, and time and study management. Peetsma, Schuitema, and Van Der Veen (2012) found a positive relationship between academic delay of gratification and future time perspective. This finding was aligned with a previous report by Bembenutty and Karabenick (2004) that proposed an association between delay of gratification tendencies and beliefs about the importance of future goals. The relationships delay of gratification shares with motivation, self-efficacy, future time perspective, and time and study management highlight how delaying gratification from distractions aids student behavior, motivation, and learning outcomes.

## Purpose Statement

The reviewed literature demonstrates the negative impacts that distractions create. In particular, the presence of distractions during homework and study sessions is associated with decreases in time spent on task, GPA, intrinsic motivation, and academic self-efficacy and an increase in motivational interference. To minimize these negative impacts, students should self-regulate to delay immediate gratification and, thereby, overcome these problems. The purpose of the present study was to explore the relationship between the academic delay of gratification tendencies of college students and the amount of motivational interference they experience. Participants were instructed to read a handout related to Mayer's (2009) multimedia learning principles and answer several questions about what they had read. As they read and responded to questions, participants had access to a personal computer to use for leisure purposes. Participants were surveyed about the motivational interference they experienced during this session, their delay of gratification tendencies, their general use of self-regulation strategies, and the distractions they typically face outside of the classroom.

The following research questions guided this study:

1) How are academic delay of gratification tendencies and motivational interference related?
2) How do students' experiences with motivational interference relate to their self-regulation tendencies and motivational beliefs?
3) What kinds of technological distractions do students typically face outside of the classroom as they study or complete homework?
4) Which self-regulation strategies do students use outside of the classroom to

minimize the negative impact of distractions?

These questions were designed for several purposes. First, no previous studies have explored the relationship between students' academic delay of gratification tendencies and their experience of motivational interference when presented with a distractor. The present study sought to fill this gap. Previous research has found that self-regulation is positively associated with delay of gratification tendencies (Bembenutty & Karabenick, 2004) and negatively associated with motivational interference (Fries et al., 2008). Because previous studies found an inverse relationship between self-regulation and motivational interference, it was predicted that academic delay of gratification and motivational interference would be inversely related as well. Second, the present study investigated the relationships motivational interference has with self-regulation and motivation. Previous studies have found motivational interference levels inversely related to motivation and self-regulation (e.g., Fries & Dietz, 2007; Fries et al., 2009). By exploring this relationship, the present study sought to provide support for previous findings related to the pervasive nature of motivational interference. Last, self-report methodology was used to investigate the types of technological distractions university students encounter outside of the classroom and the self-regulation strategies they use to overcome the drawbacks associated with the presence of distractions.

## Method

### Participants and Design

Fifty-nine students at a large, public, Midwestern state university participated in this research. All participants were enrolled in an upper-level educational psychology course geared toward pre-service teachers. Participants were predominantly

upperclassmen (24 seniors, 28 juniors), White (*N*= 54), female (*N* = 44), and high achievers (cumulative GPA of 3.5-4.0 on a 4.0 scale, *N*= 55). Additionally, over 90% of the participants anticipated receiving a grade of 'A" in the upper-level educational psychology course.

To explore the relationships motivational interference has with delay of gratification, self-regulation strategies, and motivational beliefs, quasi-experimental methodology was used. This meant that all participants were placed into one group and confronted with the same computer distractor. Data collection took place in groups of 4 to 12 participants in a university computer lab.

**Materials**

Six self-report measures assessed participants' (a) demographics, (b) academic delay of gratification tendencies, (c) motivational beliefs, (d) self-regulation strategy use, (e) motivational interference during the distraction phase, and (f) experiences with technological distractions during homework and study outside of the classroom setting. For a review of the reliability coefficients of each measure, see Table 1:

Table 1

*Reliability Coefficients*

| Measure | Number of Items | Cronbach's α |
|---|---|---|
| ADOGS[a] | 10 | .685 |
| Motivational Interference Scale | 14 | .662 |
| MSLQ[b] | | |
| Task Value | 6 | .898 |
| Control of Learning Beliefs | 4 | .718 |
| Self-Efficacy for Learning | 8 | .875 |
| Metacognitive Self-Regulation | 12 | .820 |
| Time and Study Environment | 8 | .515 |
| Effort Regulation | 4 | .627 |

[a]Academic Delay of Gratification Scale; [b]Motivated Strategies for Learning Questionnaire

***Demographic survey.*** A brief forced-choice demographic survey was developed to obtain information about participants' gender, ethnicity, grade level, cumulative GPA, and expected course grade in the educational psychology course.

***Academic Delay of Gratification Scale (ADOGS).*** The 10-item ADOGS developed by Bembenutty (1998) measured participants' academic delay of gratification tendencies in relation to an educational psychology course. In previous studies (e.g., Bembenutty, 1998), the ADOGS demonstrated a Cronbach $\alpha = .77$, which is considered an acceptable level of internal consistency (Gliem & Gliem, 2003). For the present study, the directions for the ADOGS were slightly modified by asking participants to examine their delay of gratification preference in relation to the educational psychology course in which they were currently enrolled.

For each of the 10 items, participants were instructed to indicate their preference for an immediately available leisure activity versus a delayed alternative. A sample item is: "A: Watch your favorite programs on television and then work on homework or study versus B: Postpone watching television until after you have worked on homework or studied." Participants responded to each item using a four-point Likert-type scale ranging from 1 = Definitely choose A, 2 = Probably choose A, 3 = Probably choose B, and 4 = Definitely choose B. Composite scores were created by summing response codes across the 10 items, with higher scores indicating a greater tendency to postpone gratification from immediately available leisure alternatives. See Appendix A for the complete scale.

***Motivational Interference Scale.*** The Motivational Interference during Studying scale adopted from Hofer, Kuhnle, Kilian, Marta, and Fries (2011) is a 14-item measure that explores students' motivational interference experiences during study sessions. A

Cronbach's alpha level greater than 0.80 has been obtained for this scale in previous studies (Hofer et al., 2011; Hofer, Schmid, Fries, Dietz, Clausen, & Reinders, 2007).

Participants were asked to respond to each of the 14 items using a four-point Likert-type scale ranging from 0 (not at all true) to 3 (completely true). Sample items for this scale include: "I worked on my task superficially in order to be done sooner and use the computer," "I worked on my task thoroughly," and "While working on my task, I felt distracted by the computer." Composite scores were created by summing response codes across the 14 items. Higher scores indicated greater motivational interference. See Appendix B for the complete scale.

***Motivated Strategies for Learning Questionnaire (MSLQ).*** In its original format, the MSLQ is an 81-item, 15 subscale measure that assesses students' motivation levels and learning strategy use in light of a particular course (Pintrich, Smith, Garcia, & McKeachie, 1993). The original measure consists of six motivation subscales and nine learning strategy subscales. The present study used three of the original motivation subscales (task value, control of learning beliefs, and self-efficacy for learning and performance) and three of the original learning strategy subscales (metacognitive self-regulation, time and study environment, and effort regulation). Each subscale has demonstrated a Cronbach's alpha level of at least 0.68 (Pintrich, Smith, Garcia, & McKeachie, 1993). This abridged version resulted in a 42-item measure. Each item used a seven-point Likert-type scale ranging from 1 (not at all true of me) to 7 (very true of me). The mean response value for each subscale was calculated for each participant. Higher means represented higher levels of the motivational beliefs or greater use of self-regulation strategies. See Appendix C for the complete scale.

***Academic Task*.** Participants were provided with a four-page, 1,486 word document related to Mayer's (2009) instructional design principles for multimedia learning. The document, created for this study, covered information related to the multimedia, spatial contiguity, and redundancy principles. Following the text were six questions related to the three principles. The first three questions asked participants to identify whether or not an example of instructional design aligned with Mayer's (2009) principles. The final three questions each required participants to identify which instructional design principle was being described in an example.

***Computer Distractor.*** Participants were seated in front of a Microsoft Windows desktop computer with a 17" monitor and 1280 x 1024 screen resolution. This computer provided participants with access to the Internet and to games (e.g., Solitaire, Hearts, and Minesweeper) that had been previously loaded onto the computer.

***Post-survey*.** A brief post-survey was developed to collect data related to participants' (a) use of the computer distractor (e.g., "How many minutes during the half hour session did you spend using the computer?"), (b) types of technological distractions they typically face outside of the classroom (e.g. "While studying or working on a homework task, which types of technological devices do you most commonly find yourself distracted by?"), (c) self-regulation strategies commonly used to minimize the impact of these distractions (e.g., "What strategies do you typically use to eliminate or minimize distractions while you are working on homework or studying outside of the classroom?"), and (d) how negative an impact technological distractions have on their homework and studying experiences. The first three items were open-ended and required a written response; the last item was forced-choice and was answered using a Likert-type

scale ranging from 1 (small impact) to 10 (major impact). See Appendix D for the complete survey.

**Procedure**

Data collection took place in a campus computer lab where participants attended one one-hour session. Participant groups ranged in size from 4 to 12 participants, although each participant was seated at his or her own computer and instructed not to interact with each other during the session. Each session was divided into three phases. In the pre-distractor phase, participants completed the demographic survey and ADOG scale. During the distractor phase, participants were provided the document to study, questions related to the document, and confronted with the computer distractor. During this time, participants had 30 minutes to read the document and answer the questions while simultaneously having access to the computer for leisure use. During the post-distractor phase, participants completed the motivational interference scale, motivated strategies for learning questionnaire, and a brief post-survey related to their experience. Afterward, they were debriefed and dismissed.

## Results

The primary purpose of the present study was to explore how motivational interference levels related to academic delay of gratification tendencies, motivational beliefs, and self-regulation strategies. Findings pertaining to these relationships are presented relative to the four research questions that guided this study:

1) How are academic delay of gratification tendencies and motivational interference related?

2) How do students' experiences with motivational interference relate to their self-regulation tendencies and motivational beliefs?
3) What kinds of technological distractions do students typically face outside of the classroom as they study or complete homework?
4) Which self-regulation strategies do students use outside of the classroom to minimize the negative impact of distractions?

***How are delay of gratification tendencies and motivational interference related?***

A linear regression analysis was conducted to investigate whether a significant amount of the variability in participants' motivational interference scores was accounted for by academic delay of gratification (ADOG) scores. See Table 2 for regression coefficients and standard error estimates.

Table 2
*Linear regression analysis summary of ADOG predicting motivational interference*

| DV | IV | *B* | *SE B* |
|---|---|---|---|
| M.I. | ADOG | -.276 | .157 |

*Note:* $R^2$=.053; $F$ = 3.084, $p > .05$

Results of the linear regression were non-significant, $R^2$=.053, $F(1,55) = 3.084$, $p > .05$. Thus, participants' scores on the delay of gratification scale cannot be used to predict their scores on the motivational interference scale. Although the model did not reach the established levels of significance, it did approach significance, $p = .085$. Additionally, the direction of the linear regression model's slope suggests that as delay of gratification scores increase, motivational interference levels decrease. The linear regression model for the relationship between motivational interference and academic delay of gratification was:

$$\text{Predicted Motivational Interference} = 16.3 - .276X_{(\text{ADOG}).}$$

This non-significant finding suggests that delay of gratification and motivational interference are unrelated. A closer look at the data, however, suggests that the distractor used in the present study was not tempting enough to pull students off-task. When responding to the question, "To what extent were you tempted to use the computer while working on the academic task?" participants' mean response was just 3.06 on the 1 (not true at all) to 10 (a lot) scale. If the computer distractor had been more tempting to participants, then its motivational interference potential would have been greater. This would have allowed the relationship between motivational interference and delay of gratification to be explored more thoroughly.

***How do students' experiences with motivational interference relate to their self-regulation tendencies and motivational beliefs?***

To explore the relationship that motivational interference has with students' self-regulation tendencies and motivational beliefs, a multiple regression analysis was conducted. Participants' scores on the Motivated Strategies for Learning Questionnaire's self-regulation and motivation subscales were used as predictors of motivational interference in the multiple regression equation. See Table 3 for regression coefficients and standard error estimates.

Table 3
*Multiple regression analysis summary of motivational beliefs and learning strategies predicting motivational interference*

| DV | IV | *B* | *SE B* |
|---|---|---|---|
| M.I. | Task Value | -.104 | .144 |
| | Control of Learning* | .499 | .225 |
| | Self-Efficacy | .025 | .179 |
| | Metacognitive Self-Regulation | -.100 | .073 |
| | Time and Study Environment Regulation | -.029 | .152 |
| | Effort Regulation | -.069 | .247 |

*Note:* $R^2$=.145; $F = 1.444$, $p > .05$
* indicates a significant relationship, $p < .05$

Multiple regression analysis indicated that the full regression model did not significantly predict motivational interference scores, $R^2$=.145, $F(6,51) = 1.444$, $p > .05$. However, the control of learning beliefs subscale did significantly predict the motivational interference levels. Therefore, a simple regression model was tested using the control of learning beliefs subscale as the only predictor of motivational interference (see Table 4):

Table 4
*Linear regression analysis summary of control of learning beliefs predicting motivational interference*

| DV | IV | *B* | *SE B* |
|---|---|---|---|
| M.I. | Control of Learning Beliefs | .481 | .219 |

*Note:* $R^2$=.079; $F = 4.798$, $p < .05$

This model was significant, $R^2$=.079, $F(1,56) = 4.798$, $p = .033$, and suggested that participants who believed they were in control of their learning outcomes experienced lower levels of motivational interference than those who believed their learning outcomes were outside their control.

***What kinds of technological distractions do students typically face outside of the classroom as they study or complete homework?***

Although participants were not tempted by the presence of the computer distractor, survey results indicated that students are commonly distracted by technology when studying or completing homework outside of experimental conditions. Among these technological distractions, students identified cell phones (86%), laptops (66%), social media (51%), and television (22%) as the biggest distractions. Smaller numbers of participants also identified iPads (12%), music players (8%), and video games (3%) as sources of distraction. Furthermore, when asked to rate the magnitude (1 = not at all, 10 =

a lot) of how negatively these distractions impact their homework and study experiences, university students indicated they perceive more than a moderate detriment ($M = 6.7$, $SD = 1.9$).

***Which self-regulation strategies do university students use outside of the classroom to minimize the negative impact of distractions?***

When asked in the post-survey to describe the strategies they use to minimize the impact of distractions, responses indicated that participants engage in the planning component of Zimmerman's (2000) forethought phase of self-regulated learning. Before beginning a homework or study session, more than 60% of participants indicated that they arrange their study environment to minimize the presence of distractions. While planning their study environment, 25% ($N = 15$) put their cellphone or laptop out of reach, 20% ($N = 12$) put their cellphone on silent, and 17% ($N = 10$) work in a place where no television is present. Additionally, 22% ($N = 13$) indicated that they set goals for their study session and reward meeting these goals with a break to use their cellphone or social media (e.g., one student reported, "I will work consistently for 45 minutes. Once I do, I will take a five minute break to check my cellphone."). Once these preparations have been put into place, participants reported that they enter into the performance phase of Zimmerman's (2000) model where they implement their plan for learning and begin to study or complete assignments. Contrary to the three-phase model, no participants reported use of any self-reflection strategies.

## Discussion

Results provided mixed support for the existing literature related to technological distractions. First, the computer distractor did not create a state of motivational

interference for participants. This finding was not in line with prior research that has found technological distractions to create motivational interference and negatively impact students' academic achievement, self-regulation, and motivation (e.g., Bembenutty, 2009; Fries & Dietz, 2007; Fries, Dietz, & Schmid, 2008). Although this non-significant finding suggests that the presence of a potential technological distraction does not elicit motivational interference, other results do not fully support this conclusion. Rather, participants indicated that the nature of the technological distraction in this study (a public computer) hindered its motivational interference potential. If the computer distractor had been more tempting to participants, then the relationships that motivational interference has with academic delay of gratification, self-regulation, and motivational beliefs could have been observed.

Second, participants indicated numerous technological distractions (e.g., cell phones, computers, and social media) that make it difficult for them to study or complete homework outside of the classroom. Moreover, participants perceived the presence of technological distractions to have a stronger-than-moderate detriment on their homework and studying experiences. These responses support previous research that espouses how disruptive distractions can be to students' homework, studying, and academic success (e.g., Fries & Dietz, 2007; Junco, 2011; Kuznekoff & Titsworth, 2013). To reduce the negative impact of distractions, participants identified several self-regulation strategies, including: organizing an effective homework/studying environment, developing study goals to minimize the temptation to get off task, and intentionally placing their technological devices out of reach. Each of these strategies is in line with Zimmerman's (2000) three-phase model of self-regulated learning and has increased homework

completion, achievement, and academic self-efficacy (Bembenutty, 2009; Cooper, Robinson, & Patall, 2006; Junco & Cotton, 2012). Cumulatively, the findings from the present study suggest that not all potential distractions elicit motivational interference, but college students are aware of the pitfalls caused by technological distractions and use self-regulation strategies to compensate.

**Research Limitations and Recommendations**

The present study had several limitations, but each limitation is an avenue for future research. First, the intended distractor for this study was a public computer. Because this computer was not personalized for each participant, it was less tempting than one's own computer. In the words of one participant, "This computer isn't my computer, so it would have taken effort to open the things I normally have bookmarked." To overcome this limitation, future studies should explore the motivational interference potential of students' own technological devices, such as their own laptop or cell phone. Relatedly, because only the computer distractor was presented, the motivational interference potential of other distractions (i.e., cell phones, friends, and television) remained unexplored. Future studies would benefit from exploring the motivational interference potential of cell phones, television, iPads, and other technological devices.

Next, participants' demographics suggested that they were a high-achieving, motivated group of students. As a result, they may have been less prone to giving into temptation than a more representative sample of the student body. Future studies should include a more diverse array of participants in terms of GPA and major.

Finally, participants were allowed to naturally select themselves into groups based on whether or not they could delay gratification from the computer distractor. However,

the computer distractor was not sufficiently attractive and the vast majority of participants did not use it. Rather than rely on natural selection of groups, future studies would benefit from partitioning participants into control and experimental groups based on the presence of a sufficiently tempting distraction.

**Conclusion**

Results supported prior research related to the number of technological devices that students like Megan encounter outside of the classroom. Although the presence of a distractor did not elicit motivational interference in this rather contrived case, college students indicated how prevalent and disruptive technological devices are to their actual homework and studying experiences. Consistent with self-regulation literature, participants reported using self-regulation strategies to minimize the negative impacts of distractions. Megan and the rest of today's college students will continue to face technological distractions on a near daily basis. By using self-regulation strategies to overcome the pitfalls associated with technological distractions, students like Megan can minimize the negative impact technological distractions have on the quantity and quality of their homework and studying.

## References

Bednall, T.C. & Kehoe, E.J. (2011). Effects of self-regulatory instructional aids on self-directed study. *Instructional Science, 39*(2), 205-226.

Bembenutty, H. (2011). Academic delay of gratification and academic achievement. *New Directions for Teaching and Learning*, *2011*(126), 55-65. doi: 10.1002/d.444

Bembenutty, H. (2008). Academic delay of gratification and expectancy-value. *Personality and Individual Differences, 44*, 193-202.

Bembenutty, H. (2009). Academic delay of gratification, self-regulation of learning, gender differences, and expectancy value. *Personality and Individual Differences, 46*, 347-352.

Bembenutty, H. (2010). Homework completion: The role of self-efficacy, delay of gratification, and self-regulatory processes. *The International Journal of Educational and Psychological Assessment, 6*(1), 1-17.

Bembenutty, H. (2009). Self-regulation of homework completion. *Psychology Journal, 6*(4), 138-153.

Bembenutty, H. (1999). Sustaining motivation and academic goals: The role of academic delay of gratification. *Learning and Individual Differences, 11*(3), 233-257.

Bembenutty, H. (2009). Teaching effectiveness, course evaluation, and academic performance: The role of academic delay of gratification. *Journal of Advanced Academics, 20*, 326-355.

Bembenutty, H. (2009). Test anxiety and academic delay of gratification. *College Student Journal,43*(1), 10-21.

Bembenutty, H., & Karabenick, S. A. (1998). Academic delay of gratification. *Learning and Individual Differences*, *10*(4), 329-346.

Bembenutty, H. & Karabenick, S.A. (2004). Inherent association between academic delay of gratification, future time perspective, and self-regulated learning. *Educational Psychology Review, 16*(1), 35-57.

Bembenutty, H. & White, M. (2012). Academic performance and satisfaction with homework completion among college students. *Learning and Individual Differences*, http://dx.doi.org/10.1016/j.lindif.2012.10.013

Bjork, R.A., Dunlosky, J., & Kornell, N. (2013). Self-regulated learning: Beliefs, techniques, and illusions. *Annual Review of Psychology, 64*, 417-444.

Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. *Computers & Education*, *54*(4), 927-931.

Cocotas, A. (2013). *Chart of the day: Kids send a mind boggling number of texts every month*. Retrieved from http://www.businessinsider.com/chart-of-the-day-number-of-texts-sent-2013-3

Cooper, H., Robinson, J.C., & Patall, E.A. (2006). Does homework improve academic achievement? A synthesis of research, 1987-2003. *Review of Educational Psychology, 76*, 1-62.

Cooper, J. E., Horn, S., & Strahan, D. B. (2005). If only they would do their homework: promoting self-regulation in high school english classes. *The High School Journal*, *88*(3), 10-25.

Facebook statistics. (2014). Retrieved September 15, 2014 from http://www.statisticbrain.com/facebook-statistics/

Flanigan, A.E. & Babchuk, W.A. (2014). Social media as "motivational interference": A phenomenological study of student strategies for academic success. In L. Risley, K. Barnes, J. Daws, R. Lilly, & M. Glowacki-Dudka. *Proceedings of the 33rd National Research-to-Practice (R2P) Conference in Adult and Higher Education* at Ball State University, 19-20 September (p. 92-98).

Fries, S. & Dietz, F. (2007). Learning in the face of temptation: The case of motivational interference. *The Journal of Experimental Education*, *76*(1), 93-112.

Fries, S., Dietz, F., & Schmid, S. (2008). Motivational interference in learning: The impact of leisure alternatives on subsequent self-regulation. *Contemporary Educational Psychology, 33*, 119-133. doi: 10.1016/j.cedpsych.2007.10.001

Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Proceedings from Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education. Retrieved from https://scholarworks.iupui.edu/bitstream/handle/1805/344/Gliem%20&%20Gliem.pdf?s

Heikkila, A. & Lonka, K. (2006). Studying in higher education: Students' approaches to learning, self-regulation, and cognitive strategies. *Studies in Higher Education, 31*(1), 99-117.

Hofer, M., Kuhnle, C., Kilian, B., Marta, E., & Fries, S. (2011). Motivational interference in school leisure conflict and learning outcomes: The differential effects of two value conceptions. *Learning and Instruction, 21*, 301-316.

Hofer, M., Schmid, S., Fries, S., Dietz, F., Clausen, M., & Reinders, H. (2007). Individual values, motivational conflicts, and learning for school. *Learning and Instruction, 17*, 17-28.

Jacobsen, W.C. & Forste, R. (2011). The wired generation: Academic and social outcomes of electronic media use among university students. *Cyberpsychology, Behavior, and Social Networking, 14*(5), 275-280. doi: 10.1089/cyber.2010.0135

Junco, R. (2013). Comparing actual and self-reported measures of Facebook use. *Computers in Human Behavior, 29,* 626-631.

Junco, R. (2011). Too much face and not enough books: The relationship between multiple indices of Facebook use and academic performance. *Computers in Human Behavior*, doi: 10.1016/j.chb.2011.08.026

Junco, R. & Cole-Avent, G.A. (2008). An introduction to technologies commonly used by college students. *New Directions for Student Services, 124,* 3-17. doi: 10.1002/ss.292

Junco, R. & Cotton, S.R. (2012). No A 4 U: The relationship between multitasking and academic performance. *Computers & Education, 59,* 505-514.

Kuznekoff, J. H., & Titsworth, S. (2013). The impact of mobile phone usage on student learning. *Communication Education*, *62*(3), 233-252.

Mayer, R.E. (2009). Multimedia learning (2nd ed.). New York: NY: Cambridge University Press.

McCoy, B.R. (2013). Digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. *Journal of Media Education, 4*(4), 5-14.

Mega, C., Ronconi, L., & De Beni, R. (2013). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology,* 1-11. doi: 10.1037/a0033546

Peetsma, T. Schuitema, J., & Van Der Veen, I. (2012). A longitudinal study on time perspectives: Relations with academic delay of gratification and learning environment. *Japanese Psychological Research*, *54*(3), 241-252.

Pintrich, P.R. & De Groot, E.V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40.

Pintrich, P.R., Smith, D.A.F., Garcia, T., & McKeachie, W.J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801-813.

Ramdass, D. & Zimmerman, B.J. (2011). Developing self-regulation skills: The important role of homework. *Journal of Advanced Academics, 22(*2), 194-218.

Rohwer, Jr., W.D. (1984). An invitation to an educational psychology of studying. *Educational Psychologist, 19*(1), 1-14.

Schunk, D. H., & Zimmerman, B. J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly*, *23*(1), 7-25.

Schmitz, B., & Perels, F. (2011). Self-monitoring of self-regulation during math homework behaviour using standardized diaries. *Metacognition and Learning*, *6*(3), 255-273.

Social networking fact sheet. (2014). Retrieved September 15, 2014 from http://www.pewinternet.org/fact-sheets/social-networking-fact-sheet/

Stoeger, H., & Ziegler, A. (2008). Evaluation of a classroom based training to improve self-regulation in time management tasks during homework activities with fourth graders. *Metacognition and Learning, 3,* 207-230.

Van Etten, S., Pressley, M., McInerney, D.M., & Liem, A.D. (2008). College seniors' theory of their academic motivation. *Journal of Educational Psychology, 100*(4), 812-828.

Yarmey, K. (2011). Student information literacy in the mobile environment. *Educause Quarterly*, *34*(1). Retrieved from http://www.educause.edu/ero/article/student-information-literacy-mobile-environment?time=1304757902

Zimmerman, B.J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, Pintrich, P.R., & Zeidner, M. (Eds.). *Handbook of self-regulation* (13-39). San Diego, CA: Academic Press.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into practice*, *41*(2), 64-70.

Zimmerman, B.J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*(1), 3-17.

Zimmerman, B.J. & Schunk, D.H. (Eds.) (2001). *Self-regulated learning and academic achievement*: *Theoretical perspectives* (2nd ed.). New York, NY: Routledge.

# Appendix A

## Academic Delay of Gratification Scale

This survey contains 10 situations that students sometimes face when working on their EDPS 362 or 457 courses. Here are a series of choices between two alternative courses of action (A and B).

After you have read a pair of statements, indicate which course of action you would be more likely to choose and the strength of that choice. Do this by circling the response that would most accurately reflect your decision.

**1.** A. Go to your favorite movie and then work on homework or study.
B. Postpone going to the movie until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**2.** A. Hang out with friends and then work on homework or study.
B. Postpone hanging out with friends until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**3.** A. Go partying with your friends instead of working on homework or studying.
B. Postpone partying with friends until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**4.** A. Work in a place with many pleasant distractions while working on homework or studying.
B. Work in an isolated place with no distractions while working on homework or studying.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**5.** A. Watch your favorite programs on television and then work on homework or study.
B. Postpone watching television until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**6.** A. Spend time surfing the Internet and then work on homework or study.
B. Postpone surfing the Internet until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**7.** A. Spend time talking to friends on the phone or instant messaging and then work on homework or study.
B. Postpone talking to friends on the phone or instant messaging until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**8.** A. Spend time playing video games and then work on homework or study.
B. Postpone playing video games until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**9.** A. Spend time playing recreational sports and then work on homework or study.
B. Postpone playing recreational sports until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

**10.** A. Spend time shopping for new things and then work on homework or study.
B. Postpone shopping until after you have worked on homework or studied.

Definitely choose A  Probably choose A  Probably choose B  Definitely choose B

## Appendix B

## Motivational Interference Scale

1. I worked on my task superficially in order to be done sooner and use the computer.

0 1 2 3
Not at all True  Completely True

2. I felt completely absorbed in my task so that I wasn't thinking about anything else.

0 1 2 3
Not at all True  Completely True

3. While working on my task, I had the feeling that I was missing out on something fun or important.

0 1 2 3
Not at all True  Completely True

4. I felt edgy while working on my task because there are so many nice things in life other than working on an academic task.

0 1 2 3
Not at all True  Completely True

5. I was willing to work on my task until I was completely finished even if it took a lot of effort.

0 1 2 3
Not at all True  Completely True

6. I worked on my task thoroughly.

0 1 2 3
Not at all True  Completely True

7. I began to work on my task but quickly switched to using the computer.

0 1 2 3
Not at all True  Completely True

8. I switched back and forth between working on my task and using the computer.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

9. I gave up on my task early because I didn't understand how to do it.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

10. While working on my task, I felt distracted by the computer.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

11. I wasn't able to concentrate properly on my task because I kept thinking about what else I could be doing.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

12. It was hard for me to keep working on my task until the end.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

13. I tried to do everything on my task as well as possible.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

14. I got into a bad mood because I sat at my desk knowing that I could be using the computer for leisure.

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all True | | | Completely True |

## Appendix C

## Motivated Strategies for Learning Questionnaire (MSLQ)

*Directions: In order to participate in this study, you were recruited out of either EDPS 362 or EDPS 457. While filling out this survey, please respond to each item as it relates to the EDPS 362 or EDPS 457 course you were recruited from. When responding to the following items, please use the following scale:*

| Not true at all | | | | | | Very true |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

1) I think I will be able to use what I learn in this course in other courses.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|

2) It is important for me to learn the course material in this class.

1 2 3 4 5 6 7

3) I am very interested in the content area of this course.

1 2 3 4 5 6 7

4) I think the course material for this class is useful for me to learn.

1 2 3 4 5 6 7

5) I like the subject matter of this course.

1 2 3 4 5 6 7

6) Understanding the subject matter of this course is very important to me.

1 2 3 4 5 6 7

7) If I study in appropriate ways, then I will be able to learn the material in this course.

1 2 3 4 5 6 7

8) It is my own fault if I don't learn the material in this course.

1 2 3 4 5 6 7

9) If I try hard enough, then I will understand the course material.

1 2 3 4 5 6 7

10) If I don't understand the course material, it is because I didn't try hard enough.

1 2 3 4 5 6 7

11) I believe I will receive an excellent grade in this class.

1 2 3 4 5 6 7

12) I'm certain I can understand the most difficult material presented in the readings for this course.

1 2 3 4 5 6 7

13) I'm confident I can understand the basic concepts taught in this course.

1 2 3 4 5 6 7

14) I'm confident I can understand the most complex material presented by the instructor in this course.

1 2 3 4 5 6 7

15) I'm confident I can do an excellent job on the assignments and tests in this course.

1 2 3 4 5 6 7

16) I expect to do well in this class.

1 2 3 4 5 6 7

17) I'm certain I can master the skills being taught in this class.

1 2 3 4 5 6 7

18) Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

1 2 3 4 5 6 7

19) During class time I often miss important points because I'm thinking of other things.

1 2 3 4 5 6 7

20) When reading for this course, I make up questions to help me focus on my reading.

1 2 3 4 5 6 7

21) When I am confused about something I'm reading for this class, I go back and try to figure it out.

1 2 3 4 5 6 7

22) If course materials are difficult to understand, I change the way I read the material.

1 2 3 4 5 6 7

23) Before I study new course material thoroughly, I often skim it to see how it is organized.

1 2 3 4 5 6 7

24) I ask myself questions to make sure I understand the material I have been studying in this class.

1 2 3 4 5 6 7

25) I try to change the way I study in order to fit the course requirements and the instructor's teaching style.

1 2 3 4 5 6 7

26) I often find that I have been reading for this class but don't know what it was all about.

1 2 3 4 5 6 7

27) I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.

1 2 3 4 5 6 7

28) When studying for this course I try to determine which concepts I don't understand well.

1 2 3 4 5 6 7

29) When I study for this class, I set goals for myself in order to direct my activities in each study period.

1 2 3 4 5 6 7

30) If I get confused taking notes in class, I make sure to sort it out afterwards.

1 2 3 4 5 6 7

31) I usually study in a place where I can concentrate on my course work.

1 2 3 4 5 6 7

32) I make good use of my study time for this course.

1 2 3 4 5 6 7

33) I find it hard to stick to a study schedule.

1 2 3 4 5 6 7

34) I have a regular place set aside for studying.

1 2 3 4 5 6 7

35) I make sure that I keep up with the weekly readings and assignments for this course.

1 2 3 4 5 6 7

36) I attend class regularly.

1 2 3 4 5 6 7

37) I often find that I don't spend very much time on this course because of other activities.

1 2 3 4 5 6 7

38) I rarely find time to review my notes or readings before an exam.

1 2 3 4 5 6 7

39) I often feel lazy or bored when I study for this class and I quit before I finish what I planned to do.

1 2 3 4 5 6 7

40) I work hard to do well in this class even if I don't like what we are doing.

1 2 3 4 5 6 7

41) When course work is difficult, I give up or only study the easy parts.

1 2 3 4 5 6 7

42) Even when course materials are dull and uninteresting, I manage to keep working until I'm finished.

1 2 3 4 5 6 7

# Appendix D

## Post-Learning Survey

***Directions:*** For questions 1-3, please circle the most appropriate responses. Your responses for these questions are related to your computer usage while working on the cognitive load task.

1. To what extent were you tempted to use the computer while working on the cognitive load task?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Not at all | | | | Moderately | | | | | A lot |

2. Did you use the computer?

   YES NO

   *If yes…*

   How many minutes after sitting down and starting to work on the task did you use the computer for the first time?

   0-5 6-10 11-15 16-20 21-25 26-30

   How many minutes during the half hour session did you spend using the computer?

   0-5 6-10 11-15 16-20 21-25 26-30

3. Which of the following best represents your computer usage during today's session?

   A) I did not use the computer at all

   B) I used the computer off and on while I was working on my task

   C) I waited to use the computer until after I finished my task

   D) I used the computer before starting on my task, but did not use it while working

***Directions***: Questions 4-6 relate to your general experiences while studying or working on a homework assignment outside of class.

4. What strategies do you typically use to eliminate or minimize distractions while you are working on homework or studying outside of class?

5. While studying or working on a homework task, which types of technological devices (e.g., cell phone, iPod, laptop) do you most commonly find yourself distracted by?

6. When you are working on a homework assignment or trying to study outside of class time, how negative of an impact do technological distractions (e.g., cell phone, iPod, laptop) have on your ability to focus and get homework assignments or studying done?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| Small Impact | | | | Moderate | | | | | Major Impact |