ABSTRACT

CURRIE, ANNA VILLANI. Student Use and Misuse of Personal Technological Devices in the Higher Education Classroom. (Under the direction of Dr. Diane Chapman.)

A quantitative research study was conducted with 120 undergraduate higher education students at a large metropolitan university using a self-reporting online survey to measure student use and misuse of personal technological devices (PTDs) during instruction. Data regarding time spent using PTDs on course related and non-course related material during class was gathered along with basic demographics: age, gender, level of undergraduate study, grade point average (GPA). In addition, levels of engagement, deficient self-regulation (DSR), media system dependency (MSD), and PTD dependency were determined. Analyses were made using descriptive statistics, correlations, and regressions. Findings indicated that many higher education students are not 100% engaged in the class instruction but rather distracted by PTDs and by classmates that use PTDs during instruction. Sixty five percent (78) of students in the study reported that they did not use PTDs solely for course related material during instruction. In fact, when asked specifically, 77.5% (93) of students in the study reported that they used PTDs for non-course related material during class instruction, including accessing emails, texting, social media, gaming, or watching movies. The most significant analysis from this study indicated that a unit change in student level of DSR explained 30.8% of the change in the mean score of student PTD dependency.

Keywords: Internet use, Internet behavior, student use of technology, student behavior, distraction in the classroom, engagement, deficient self-regulation, media system dependency, technology dependency.
Student Use and Misuse of Personal Technological Devices in the Higher Education Classroom

by
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DEDICATION

This work is dedicated to my family for their support and encouragement throughout this process. This work is also dedicated to instructors of students who battle on-going classroom distractions while attempting to offer students an opportunity to learn and become more educated on various subjects to enhance their lives.
BIOGRAPHY

Ms. Currie is a lateral entry certified Career and Technical Business Education Teacher at Northwest School of the Arts with Charlotte Mecklenburg Schools. She has two grown children, a great husband, and takes care of a chocolate Labrador retriever, a Beagle, and two cats. She received a Bachelor of Science Degree in Home Economics in the field of Interior Design with an Art Minor from the University of North Carolina at Greensboro. She received her Master of Business Administration Degree from Western Carolina University. She is licensed as a National Board Certified Teacher and North Carolina Real Estate Broker. Ms. Currie has a passion to work with students of all ages and the arts while maintaining a balance of family, work, play, education, and spiritual endeavors.
ACKNOWLEDGEMENTS

I would first like to acknowledge my husband, Charlie, who has supported this journey 100 percent from day one. He kept the lights on for me so I would not trip and fall when I wandered into the bedroom countless nights from putting in a full day’s work teaching middle school students then burning the night oil to complete assignments. Thank you.

Next, I would like to thank my dissertation chair, Dr. Diane Chapman, for her direction, feedback, and patience as I learned how to create and complete a doctoral dissertation. She was very insightful, thorough, and professional in every aspect of this process. Thank you.

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Last, but not least, I would like to thank God for being my spiritual partner while I figure things out, ask for guidance, and pray for a better understanding of where this journey is taking me. Thank you.

I hope and pray that the work completed here will help instructors and administration gain greater insight and understanding to be able to offer students a better learning environment.
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CHAPTER ONE
OVERVIEW OF RESEARCH STUDY

Introduction

In the new era of bring your own device (BYOD), most 21st century higher education students will attend classes equipped with personal technological devices (PTDs) such as smart phones, computers, tablets, etc. (Kjos, Miesner, & Chesnut, 2010). For purposes of this research study, PTD may be considered to be any personal technological device that is utilized by students and may or may not be connected to the Internet or phone services.

In 2013, Educause Center for Analysis and Research (ECAR) conducted a study that included 112,585 respondents across 13 countries. Results from the study revealed that student ownership of PTDs grew significantly; smart phones and tablets grew the most for academics from 2012 to 2013. The study indicated that 90% of higher education students owned a laptop while 40% of students owned a desktop. Of those students studied, 77% of the younger students owned a smart phone while 74% of the older students owned a smart phone; 27% of the younger students owned a smaller tablet while 34% of the older students owned a smaller tablet. In addition, most every student owned at least one to two Internet capable devices; 30% of these students owned four or more Internet capable devices (Dahlstrom, Walker, & Dziuban, 2013).

Although PTDs can be an advantage to student learning, such as communicating, note-taking, accessing course files, or looking up course topics (Annan-Coultas, 2012), sometimes PTDs can be a distraction (Bjorklund & Rehling, 2009; Campbell, 2006; Sana,
Weston, & Cepeda, 2013; Wood et al., 2011; Young, 2006). As ownership has increased, bringing PTDs into the classroom has become a phenomenon of which the instructor must manage to ensure an uncompromised learning environment is maintained (Stoner & Fincham, 2012). Researchers have indicated that the distracted learner is less engaged and, therefore, does not learn from the material or activity that is presented during class (Fried, 2008; LaRose, Lin, & Eastin, 2003; Panek, 2012; Sana et al., 2013; Wood et al., 2011). For example, Kjos et al. (2010) reported that 74% of instructors witnessed inappropriate or unprofessional student use of technological devices in higher education classes involving text messaging, e-mailing, or viewing unrelated websites (p. 2). When students were asked, as many as 50% reported they had viewed non-course related websites during class (p. 2). Kraushaar and Novak (2010) reported that students accessed non-course related material 42% of class time. Furthermore, according to a study by Lauricella and Kay (2010), over 70% of students spent up to 50% of class sending non-academic email messages. Fifty-six percent of students exchanged instant messages up to 50% of the time during class, thirty-one percent of students spent over 50% of class time instant messaging. Just over one third of students played games up to 50% of the time in-class. Finally, just 10% of students watched movies up to 50% of in-class time. (p. 158)

Unsurprisingly, there are significant consequences for the distracted learner, such as insufficient processing of the lesson or miscommunication of expectations, which ultimately results in lower student outcomes (Fried, 2008; Hembrooke & Gay, 2003; Kjos et al., 2010; Sana et al., 2013).
The following sections of this chapter will address the nature of the problem that was researched, theoretical basis for the research problem, purpose of the research problem, and research questions. For purposes of this document, the term, *misuse of PTDs*, was considered as a form of off task behavior generally defined as when the higher education student is not engaged or on task but rather utilizing one’s PTD and engaged in *non-course* related material during class instruction (Fried, 2008; Young, 2006).

**Nature of Problem**

Digital technology has been a part of many homes and classrooms since the late 1980s (Kukulska-Hulme, 2005) and therefore, traditional higher education students of today have been raised in a digital environment. Students come to class fully connected to the ubiquitous computing world and harbor different learning expectations than their predecessors (p. 2). According to Rosen (2010), “Students are wired 24/7 and are the early adopters of all new technologies …students are multi-taskers to the nth degree and are bored when asked to uni-task…students are socializing constantly via technologies” (p. 203). With constant digital connectivity, according to Carr (2011), technology is re-shaping our behavior and the way our minds work. Moreover, as the landscape of the higher education classroom changes, specifically student behavior in the classroom, instructors must adapt their delivery of knowledge in the classroom in order to fulfill the changing students’ needs and maintain student engagement (Stoner & Fincham, 2012).

Research has indicated that student engagement is a major determining factor for student success (Boekaerts & Corno, 2005). Particularly, when there is a high level of interaction taking place between the student and the instructor in the classroom, there will be
a high level of student engagement (Boekaerts & Como, 2005; Kuh & Hu, 2001; Lundberg & Schreiner, 2004; Rendon, 2002, 2006). Conversely, if the student is distracted and not engaged, then interaction between the student and instructor is compromised and consequently, student success may be reduced (Fried, 2008; Hembrooke & Gay, 2003; Wood et al., 2011). In essence, distractions will decrease student engagement levels and student success.

As students enter the classroom, the students’ PTDs become an additional variable that affects the learning environment (Kukulska-Hulme & Traxler, 2005). With unlimited Internet access, unlimited cell phone usage, and other PTDs, students are ambushed with distractions. Managing the influx of the various PTDs in the classroom is of utmost concern for instructors due to probable distraction. As a result, instructors must proactively work to manage the learning environment to ensure learning is taking place despite these distractions. This can be a difficult task for the instructor. Therefore, in order for learning to take place, it is necessary for instructors to be skilled in maintaining an appropriate, distraction free, learning environment for students to remain engaged in the classroom.

Moreover, a distracted student that is Internet surfing can be undermining his or her ability to critically think. According to Carr (2011), Internet surfing has its own implications. Carr believed that Internet surfing actively discourages long term memory, critical thinking, and may help one lose higher order thinking skills. He believed that the PTD can undermine the ability to critically think if it becomes a distraction. Carr further wrote about computer technology in general stating that if we “outsource memory, (our) culture withers” (p. 197). The instructor must be constantly aware of technological
distractions and the implications of PTD usage for the student in the classroom. Clearly, the essence of classroom instruction can be compromised by distraction.

There are different beliefs regarding the management of PTDs in the higher education classroom. For instance, Wurst, Smarkola, and Gaffney (2008) found that ubiquitous use of laptops in higher education did not increase the level of constructivist activities or student achievement. On the other hand, Spies (2010) stated that the millennial generation is better trained to multi-task than any other generation and believed that students should be allowed to do so during class instruction. Thomas and McGee (2012) speculated that PTDs are not the cause of student misuse and claimed that professors should be modeling appropriate behavior. Thomas and McGee argued that it is the responsibility of students and faculty to maintain active engagement while Fink (2010) suggested that it is the responsibility of faculty and administration to ensure students conduct themselves appropriately in the learning environment and not distract others or themselves by using PTDs for non-course related material during class instruction.

Some instructors and institutions have actually banned PTDs in the classroom or Internet access in order to maintain a learning environment free of distractions (Fink, 2010; Young, 2006). For example, according to Allen (2007), one college professor placed on her syllabi “…if you're using a laptop for something off-topic, it is considered an absence” (p. 32). Obviously, depending upon which belief system adopted by the instructor or institution of higher education, policies concerning PTDs in the classroom will vary. Because of these inconsistencies and the fact that this is a new phenomenon in the classroom, a problem has become evident. The next section will outline the problem to be studied.
Problem Statement

Researchers have indicated that students who use PTDs in the classroom utilize non-course related websites/software during class instruction (Fried, 2008; LaRose et al., 2003; Lee & Perry, 2004; Panek, 2012; Sana et al., 2013). Decreased engagement between student and course material, student and instructor, and student to student within a course have been found to negatively impact student outcomes (Fried, 2008; Hembrooke & Gay, 2003; Wood et al., 2011). Consequently, if students in higher education are allowed to use PTDs in the classroom for non-course related material, then, student engagement will significantly decrease resulting in a negative impact on student learning and outcomes (Fried, 2008; LaRose et al., 2003; Lee & Perry, 2004; Panek, 2012; Sana et al., 2013; Wood et al., 2011).

Furthermore, there has been little research conducted with theoretical support to determine why and how digital distractions affect student engagement and learning in the classroom in order for the instructor to best manage digital distractions (Adams, 2006; Campbell, 2006; Fried, 2008).

Researchers have suggested that there is a need for a practical classroom instructional model that will help higher education instructors implement effective classroom strategy to better manage digital distractions in the higher education classroom (Annan-Coutlas, 2012; Bjorklund & Rehling, 2009; Fried, 2008; Nordstrom, Bartels, & Bucy, 2009; Young, 2006). Fried (2008) specifically suggested that researchers study

First, why does laptop use interfere with learning? Is it distraction caused by incoming information, is it cognitive overload caused by juggling too much information, or is it simply the lighted text moving across the screen? Once
researchers and educators better understand why laptop use (distraction) has a negative effect on learning, more strategic solutions can be developed. (p. 912)

It is unclear as to what degree digital distractions affect learning during instruction. A theory-based strategy to help manage digital distractions is warranted.

In summary, the problem is that students utilize PTDs in the higher education classroom and are distracted which, in turn, compromises student learning and engagement (Fried, 2008; LaRose et al., 2003; Lee & Perry, 2004; Panek, 2012; Sana et al., 2013; Wood et al., 2011). To date, there is no study that has offered a theoretical basis for this specific behavior, misuse of PTDs in the classroom during instruction. Additionally, there is no theory-based, practical, instructional classroom model for instructors to utilize that incorporates theory and gives the instructor a tool with which to better manage the use of PTDs in the classroom (Annan-Coultas, 2012; Bjorklund & Rehling, 2009; Fried, 2008; Nordstrom, Bartels, & Bucy, 2009; Young, 2006). The following section outlines the theoretical framework of this study.

**Theoretical Framework**

PTDs are tools for mass communication and DeFleur and Ball-Rokeach (1989) believed that, in order to understand the components of mass communication, one must be able to understand what exposure to mass communication does to people (p. 29). Therefore, this research will focus on two specific social cognitive theories to better understand the driving forces as to why and how students are distracted and engaged in off task behavior with their PTDs during instruction.
According to LaRose, Mastro, and Eastin (2001), “Social-cognitive theory explains behaviors in terms of reciprocal causation among individuals, their environments, and their behaviors...The triadic causal mechanism is mediated by symbolizing capabilities that transform sensory experiences into cognitive models that guide actions” (p. 397). While researching this issue, two social cognitive theories became evident as plausible theoretical reasons behind the behavior of student distraction within the classroom while utilizing PTDs. The two theories are deficient self-regulation theory (DSR) and media system dependency theory (MSD). By studying a theoretical basis for this student behavior, instructors and administration of higher education students may gain insight to make effective decisions regarding the use of PTDs in the classroom in order to maintain a better learning enviornment. If it can be determined that levels of DSR and MSD are indicators of probable student distraction, then instructors and administration can adjust their learning environments to allow for greater student success. Theoretical background and reasoning for relating DSR theory and MSD theory in this study are described in the next two sections.

**DSR Theory**

Deficient self-regulation (DSR) theory was first identified by Bandura (1991) and later modified by LaRose et al. (2003). DSR theory may be defined as “…a state in which conscious self-control is relatively diminished” and is a precursor to habit formation (LaRose et al., 2003, p. 232-233). DSR theory has been used to study students with attention deficit/hyper activity disorder (ADHD), student instant message (IM) use, online consumer behavior, and problematic Internet use (PIU), etc. (Biederman et al.; Caplan, 2010; LaRose & Eastin, 2002; 2012; Lee & Perry, 2004). DSR theory indicates that the action of using PTDs
for non-course related material in the classroom is, in fact, a behavior of lack of self-control or lack of self-regulation.

In support for relating DSR theory to the use of PTDs for non-course related material in the classroom, Tokunaga (2012) stated that

DSR stemming from novelty perceptions of a technology may be a theoretically defensible explanation why deregulation occurs among the population of normal Internet users, whose media use falls temporarily out of their control, from which most of the research on DSR is drawn… (p. 107)

Furthermore, Panek (2012) studied self-control for university students and suggested that “levels of self-control are a more accurate indicator of the amount of SNS (social network system) use and online video use than users’ stated reasons for using the Internet” (p. 61). By studying the levels of DSR of higher education students, faculty and administration will be able to determine a best strategy to manage PTD usage in the classroom during instruction.

MSD Theory

Given that PTDs are tools that deliver media, media consumption is the key issue in the phenomenon being studied. Media system dependency (MSD) theory was first identified by Ball-Rokeach in 1974 (Grant, 1991). According to Ball-Rokeach, Power, Guthrie, and Waring (1990), MSD theory is

the extent to which attainment of an individual’s goals is contingent upon access to the information resources of the media system, relative to the extent to which
attainment of media system goals is contingent upon the resources controlled by individuals. (p. 250)

MSD theory has been used to explain many types of media dependency such as television shopping, news media, and Internet dependencies (Grant, Guthrie, & Ball-Rokeach, 1991; Hindman, 2004; Mafe & Blas, 2006). MSD theory indicates that the relationship between the higher education student and PTDs is a power relationship where media dependency prevails. In support of relating MSD theory to the use of PTDs for non-course related material in the classroom, LaRose et al. (2003) stated, “Following classical conditioning processes, these self-reactive incentives (self-regulation) motivate media consumption behavior that becomes a conditioned response to dysphoric mood states” (p. 233). By studying the levels of MSD of higher education students, faculty and administration will be able to determine a best strategy to manage PTD usage in the classroom during instruction.

Summary

DSR and MSD theories were selected as the theoretical basis of this study for several reasons. First, analysis of DSR offers an explanation of one’s behavior that will allow the student to maintain a sense of responsibility and ownership for the behavior. Second, analysis of MSD offers an explanation of why specific student behavior, utilization of non-course material during class instruction, is evident in this issue. Third, concurrent analysis of both theories helps faculty and administration gain a greater understanding of reasons behind the student behavior being studied. In addition, synthesis of the theoretical framework, as applied to this issue, allows faculty and administration to maintain a sense of respect and
greater understanding for higher education students and ultimately implement meaningful changes.

DSR and MSD theories posit that significant deficient self-regulation behavior and media system dependency will influence student behavior in the classroom when students are allowed to utilize PTDs for non-course material because of the distractability of PTDs in general. Therefore, DSR and MSD theories were applied as the theoretical basis of the behavior that was studied: student use of PTDs for course related and non-course related material in the higher education classroom. By providing significant theory-based research on this issue, instructors may be able to offer appropriate classroom strategy to better manage the learning environment. The conceptual framework in Figure 1 portrays the phenomenon being studied in relation to theoretical application.

**Conceptual Framework**

The conceptual framework in Figure 1 illustrates the relationship between class instruction, students in the traditional classroom, PTD usage, levels of DSR and MSD, and student outcomes. It is possible that some students may only access course related material during instruction; some students may only access non-course related material during instruction; while other students may access both course related material and non-course related material during instruction. In a traditional classroom, instruction is presented to students. Students’ DSR and MSD levels are measured. Students who use PTDs during instruction may use PTDs for course related purposes and/or may use PTDs for non-course related material. It is possible that those students who use PTDs for non-course related
material during instruction may show higher levels of DSR and/or MSD which, in turn, affect
student outcomes: grade point average (GPA), engagement levels, and/or PTD dependency.
Figure 1 Conceptual framework for student PTD use in higher education classrooms.

By understanding the relationship between classroom instruction, student behavior, and the theoretical basis for PTD behavior within the classroom in relation to student outcomes, faculty and administration will be able to facilitate a better learning environment.
**Purpose of the Study**

According to Knowles (1977), adults are self-directed and internally motivated. Adults deserve respect and want to see relevance to their own lives. However, variables exist that influence the self-directedness of adult students when using PTDs in the higher education classroom (Bjorklund & Rehling, 2009; Campbell, 2006; Fried, 2008; Lee & Perry, 2004; Sana et al., 2013; Wood et al., 2011; Young, 2006). Therefore, this study examined the degree of the use of PTDs in the higher education classroom for course related and *non-course* related material as related to grade point average (GPA), engagement level, and PTD dependency while analyzing two possible theoretical reasons as to *why* adult students access *non-course* related material during class instruction. Furthermore, upon determining possible theoretical reasons as to *why* adult students utilize *non-course* related material during class instruction, this research provided evidence and support for the need to begin to develop a best practice classroom model of student use of PTDs in the higher education classroom for faculty and administration. More specifically, the purpose of this study was to examine the use of PTDs during class instruction by students in higher education and their effects on GPA, student engagement, and PTD dependency as related to the social cognitive theoretical frameworks of deficient self-regulation (DSR) and media system dependency (MSD). It is important to know how to best manage student PTD use during class instruction while maintaining a sense of respect for the adult student and the learning environment. Therefore, it was also the purpose of this study, using appropriate research techniques and given there was sufficient data, to recommend practical strategy for
instructors and administration of students in higher education how to best manage student PTD use during class instruction.

**Significance of Study**

*Dependence* is defined as the act of expressing addictive behavior toward a particular activity where DSR is evident (Lee & Perry, 2004). It is possible that students who use PTDs for *non-course* related material during class instruction may be those students who are considered as having significant *dependence* upon social media (MSD) and the Internet (IA).

According to LaRose et al. (2003), “Internet addiction can be redefined as deficient self-regulation. The so-called symptoms of Internet addiction from prior research may, in fact, be indicators of deficient self-regulation of Internet usage that contribute to habit formation” (p. 244). Therefore, one may conclude that Internet *dependence* is a symptom of deficient self-regulation.

Studies have revealed that students in higher education are more susceptible to becoming *dependent* upon PTDs for various reasons (Chak & Leung, 2004; Hall & Parsons, 2001; Niemz, Griffiths, & Banyard, 2005; Young, 2012). According to Chak and Leung (2004), there are specific variables that make the college environment an easy place to become *dependent* upon PTDs. The authors wrote that

College students are a population of special concern, vulnerable to Internet addiction. (They have)...free and unlimited Internet access, huge blocks of unstructured time, newly experienced freedom from parental control, no monitoring or censoring of what they say or do online, full encouragement from faculty and administrators,
adolescent training in similar activities, desire to escape college stressors, social intimidation and alienation… (p. 560)

PTD dependency has been an issue of concern since the introduction of PTDs. The dependency upon PTDs affects students in various ways. For example, Tokunaga (2012) stated that “impairment in the form of falling academic grades (Egli & Meyers, 1984) and social skills deficiencies (Zimbardo, 1982) resulted from video game addiction” (p. 20). Therefore, it was significant that college students be included in this study regarding dependence upon PTDs.

Moreover, given the lack of sufficient research that relates theory to the issue of digital distractions in the classroom and given that there is no blueprint for classroom management for the best use of PTDs in the higher education classroom, a research study was needed to fill this gap (Annan-Coultas, 2012; Campbell, 2006; Fried, 2008; Lauricella & Kay, 2010; Lee & Perry, (2004); Panek, 2012; Young, 2006). More specifically, to date, there has not been sufficient research regarding the phenomenon of uncontrolled influx of PTDs in the classroom as related to DSR and MSD theoretical frameworks and how to best handle this phenomenon in order to maintain an appropriate, uncompromised learning environment (Annan-Coultas, 2012; Bjorklund & Rehling, 2009; Fried, 2008; Nordstrom et al., 2009; Sana et al., 2013; Tagsold, 2012; Young, 2006). Although, some attempts have been made to suggest strategy and solutions for this issue (Kjos et al., 2010; Lee & Young, 2001; Nordstrom et al., 2009; Tagsold, 2012; Young, 2006), no real effective instructional model with supporting theoretical evidence has been developed for practical use. Therefore, it was important to investigate the degree of student use of PTDs for non-course related
material in the higher education classroom as related to theory and student outcomes in order
to develop meaningful learning environments free of distractions which enhance student
outcomes. Ultimately, by utilizing data from this study, higher education faculty and
administration may determine whether there is a need or not to incorporate policies and
protocol on the use of PTDs during class instruction. In addition, a model for best practices
on the use of PTDs in the classroom might be developed in the future to further enhance the
classroom environment. The next section offers research questions for this study.

**Research Questions**

Given that studies have indicated that higher education students access *non-course*
related websites and perform *non-course* related tasks on their PTDs during class instruction
(Fried, 2008; LaRose et al., 2003; Lee & Perry, 2004; Panek, 2012; Sana et al., 2013), the
degree of which students access *non-course* related tasks during class instruction was
determined first to set a basis for analyzing other variables. The relationship between media
and the user is very dynamic and dependent upon the degree of the dependency and type of
media used. According to Panek (2012), “Students who are low in self-control are apt to
spend more time using leisure media…” (p. 61). Grant (1996) stated that

The focus of media system dependency relationships does not change across levels of
analysis, but the goals and resources engendering dependency relationships vary by
the unit of analysis. At the personal level, the (MSD) theory is concerned with the
types and patterns of dependency that individuals have with the media system in
general and specific media in particular. (p. 201)

Moreover,
Media addictions are a type of behavioral addiction (Marks, 1990) in which there is no external chemical substance involved. By this definition, addicted media consumers feel compelled to consume media despite potentially negative consequences that make continued use appear irrational or out of control even in their own eyes. (LaRose et al., 2003, 226)

High levels of DSR, MSD, and/or PTD dependency may be possible reasons for student use of PTDs for non-course related material during class instruction. In order to estimate overall behavior, these levels were measured separately by including specific questions on the student survey that utilized a Likert-type scale of graduated responses (Sproull, 1995) then analyzed in relation to student use of PTDs in the classroom. Therefore, to substantiate possible reasons for higher education students accessing non-course related websites and performing non-course related tasks on their PTDs during class instruction, the following research questions were offered.

In order to determine an overall indication of the relationship of student use of PTDs in the classroom during instruction and the level of each DSR, MSD, and PTD dependency levels, the following research questions one through three were proposed respectively:

**RQ#1**: What is the relationship between student personal technological device use for course related material in the classroom and the level of student deficient self-regulation during instruction?

**RQ#2**: What is the relationship between student personal technological device use for course related material in the classroom and the level of student media system dependency during instruction?
RQ#3: What is the relationship between student personal technological device use for course related material in the classroom and the level of student personal technological device dependency during instruction?

In order to determine the relationship between students that access non-course related material during instruction and each DSR, MSD, and PTD dependency levels, the following research questions four through five were proposed respectively:

RQ#4: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student deficient self-regulation during instruction?

RQ#5: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student media system dependency during instruction?

RQ#6: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student personal technological device dependency during instruction?

In summary, there were three possible reasons for student use of non-course related material during instruction which needed to be researched: high levels of DSR, MSD, and/or PTD dependency. Levels of DSR, MSD, and PTD dependency were measured individually and then correlated to student PTD use in the classroom and also to student use of PTDs for non-course related material in the classroom. Table 1 offers an organized view of how these reasons were measured for each research question numbered one through six.
Table 1

**Summary of Measurements**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>DSR Level</th>
<th>MSD Level</th>
<th>PTD Dependency Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of student PTD use for course related material in the classroom</td>
<td>Level of DSR was measured using Likert Scale 1-7 and correlated with amount of student PTD use for course related material in the classroom.</td>
<td>Level of MSD was measured using Likert Scale 1-5 and correlated with amount of student PTD use for course related material in the classroom.</td>
<td>Level of PTD dependency was measured using Likert Scale 1-5 and correlated with amount of student PTD use for course related material in the classroom.</td>
</tr>
<tr>
<td>Amount of student PTD use for non-course related material in the classroom</td>
<td>Level of DSR was measured using Likert Scale 1-7 and correlated with amount of student PTD use for non-course related material in the classroom.</td>
<td>Level of MSD was measured using Likert Scale 1-5 and correlated with amount of student PTD use for non-course related material in the classroom.</td>
<td>Level of PTD dependency was measured using Likert Scale 1-5 and correlated with amount of student PTD use for non-course related material in the classroom.</td>
</tr>
</tbody>
</table>

Three possible outcomes (GPA, engagement level, and PTD dependency) may be affected by demographic variables, student deficient self-regulation level, and student media system dependency level. In order to analyze whether demographic variables, student level of DSR, and student level of MSD affect student outcomes (GPA, engagement level, and PTD dependency), the following research questions numbered seven through nine were proposed respectively:
RQ#7: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in GPA?

RQ#8: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in engagement level?

RQ#9: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in PTD dependency?

Kjos et al. (2010) advocated that faculty and administration formally attend to the issue of students accessing non-course material during class instruction. Tagsold (2012) advocated for instructors to include highly engaging activities and discussion within the classroom so that students would not be easily distracted. Therefore, by analyzing the above nine research questions, understanding and knowledge may be gained. Suggested strategy for classroom management and protocol for the best management of PTDs in the classroom may then be developed to assist faculty and administration ensure that the learning environment is not compromised. The next sections address assumptions, limitations, delimitations, and definitions of terms for this study.

Assumptions and Limitations

Dusick (2014) stated that

Assumptions are those things we take for granted in the study; (they are) statements by the researcher that certain elements of the research are understood to be true…

Limitations are those elements over which the researcher has no control. In most instances, any assumption you make becomes a limitation. Delimitations are those elements the researcher can control. (para. 1, 3)
In order to clarify and document the elements of this study, the following assumptions, limitations, and delimitations are listed below:

Given that there is established classroom protocol for most higher education classrooms, the following assumptions may be made regarding basic expectations of students and staff:

*Assumption:* There exists a social norm that students are expected to pay attention and be engaged with the course material during class instruction.

*Assumption:* Instructors and administration are motivated to help students develop critical thinking skills and engage in the course material.

Given that most instructors highly encourage or mandate the use of PTDs for class instruction (Dahlstrom, 2012), the following assumptions may be made regarding the ownership and use of PTDs:

*Assumption:* Students own and are allowed to bring PTDs into most traditional classrooms during instruction (Kjos et al., 2010).

*Assumption:* Internet services are generally accessible at all times in the classroom.

A transfer of information occurs when PTDs are utilized which is where the energy of this study was focused. Consequently, there is a power relationship between information procurement and the user (Ball-Rokeach, 1998). The following assumption may be made regarding the power relationship:

*Assumption:* Information procurement is a power source (Brookfield, 2001; Foucault, 1982).
Given that student engagement is necessary for learning to take place (Boekaerts & Corno, 2005), the following assumptions and limitations may be stated regarding student engagement:

**Assumption:** Student outcomes are directly related to student engagement with the course material (Lam & Tong, 2012).

**Assumption:** “…Students who self-regulate their learning are engaged actively and constructively in a process of meaning generation and that they adapt their thoughts, feelings, and actions as needed to affect their learning and motivation” (Boekaerts & Corno, 2005, p. 201).

**Limitation:** Students are distracted by PTDs during class instruction and are using PTDs for non-course related material during class instruction (Fried, 2008; LaRose et al., 2003; Panek, 2012; Sana et al., 2013).

**Delimitations**

**Population:** The population for which this study was made is higher education students, specifically college-aged undergraduate students.

**Time:** Student data regarding the time spent on course related material and non-course related material during class instruction was gathered for this study.

**Instrument:** An integrated self-reporting survey utilizing a combination of questions from student engagement, DSR, MSD, and Internet dependency instruments was created for this study.

Some terms that were used in this study may need clarification. Therefore, the following terms with their definitions were used in this study:
Definitions of Terms

Addiction: “a repetitive habit that increases the risk of disease and/or associated personal and social problems…often experienced subjectively as “loss of control” (that) continues despite volitional attempts to abstain or moderate use” (Marlatt, Baer, Donovan, & Kivlahan, 1988, p. 224).

Deficient self-regulation (DSR): a lack of regulating one’s self in regard to particular activities such as watching television or playing computer games (LaRose et al., 2003).

Dependence: the act of expressing addictive behavior toward a particular activity where DSR is evident (Lee & Perry, 2004).

Flow: “flow experience represents a distinct state of consciousness that integrates high but effortless concentration, intrinsic motivation, loss of awareness of self and time, facile response to challenge, and feelings of competence and freedom” (English, 2007).

Media Habits: “…the result of cognitive processes or willful acts that seemingly (can) not explain the irrational and out-of-control aspects of media addictions” (LaRose et al., 2003, p. 226).

Media system dependency theory (MSD): a power relationship between media and user (Ball-Rokeach, 1998).

Misuse of PTDs: a form of off task behavior generally defined as when the student is not engaged or on task but rather utilizing one’s PTD and engaged in non-course related material during class instruction (Fried, 2008; Young, 2006).
**Self-regulation theory (SR):** A social cognitive theory that explains the behavior of those who cannot seem to regulate themselves (Bandura, 1991).

**Social cognitive theory:** Human behavior explained in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences (Bandura, 1991).

**Student engagement:** On task behavior, the actual time that student is participating in assigned class activities or lecture (Lam & Tong, 2012; Rodrigo, Baker, & Rossi, 2012).

**Teacher clarity:** The ability of the instructor to clarify lesson content in such a way that students are engaged and fully understand stated objectives and content (Mazer, 2013).

**Teacher immediacy:** The ability of the instructor to engage students by offering a classroom climate that is appealing to the students and holds their interest (Mazer, 2013).

**Use of PTDs:** Utilizing PTDs in the classroom as a class resource or tool (Annan-Coultas, 2012).

### Chapter Summary

Chapter one described issues related to higher education undergraduate students’ use of PTDs in the tradition classroom and their effects within the learning environment. The nature of the problem, theoretical basis, purpose of this research study, and research questions were proposed. DSR and MSD theories were suggested as a theoretical framework to better understand motivations for student use of PTDs for non-course related material in the classroom. The following chapter presents a survey of literature regarding the following
topics while specifically focusing on use of PTDs for *non-course* related material in the higher education classroom: technology use and effectiveness, use of PTDs for *non-course* related material during instruction, DSR theory, MSD theory, and PTD dependency.
This chapter offers a review of literature on the general use of technology and effectiveness in the higher education classroom, misuse of PTDs, DSR theory, MSD theory, and PTD dependency follows. This review focuses on the use of personal technological devices for non-course related material in the traditional higher education classroom. Related research is limited and varied due to the newness of this phenomenon and constant technological changes which began in the 1990s.

**Technology Use and Effectiveness in the Higher Education Classroom**

Technology in the classroom is an elaborate system of communication, data storage, mathematical, research, and word processing capabilities. Over the last 30 years, the educational field has embarked upon integrating technology into the classroom by immersing millions of dollars into its system. Researchers indicated that over half a billion dollars are spent each year on classroom technology in higher education (Weston, 2012). Most institutions of higher education require students to use technology while enrolled (Dahlstrom, 2012). According to Bauerlein (2009), “Teachers and students received laptops, teachers underwent professional development, and technical support was ongoing” (p. 121). Emphasis has been placed upon the concept that there could not be enough technology and, if one had more technology, learning would increase. Obviously, the value of technology in the classroom depends upon how effective the tool is utilized within the classroom in order to ensure that learning is taking place.
The research literature, concerning the use and effectiveness of technology in the classroom, varied greatly from integration, efficacy, software, hardware, to faculty adoption, and so forth. Schmid et al. (2009) completed a preliminary meta-analysis of 231 research studies which included 25,497 total students (from over 6000 potential studies since 1990) regarding achievement effects of computer-based technology use in traditional higher education classrooms. The authors reported that “just using technology does not necessarily impact positively on student performance. The effectiveness of tool and strategy use is differential—it works under certain conditions, and doesn’t under others” (p. 97).

Preliminary findings indicated that “…in spite of advances in computer hardware, software, and especially the presence of the Internet, the impact of such tools on learning achievement has not dramatically changed over the period (1990-2010) covered by this meta-analysis” (p. 103). The authors argued that “…more engaging technology applications (i.e., those that support thinking and doing) outperform less engaging applications related to receiving and internalizing content” (p. 105).

According to the Texas Center for Educational Research, “The availability of laptops did not lead to significantly greater opportunities for students to experience intellectually challenging lessons or do more challenging school work” (Bauerlein, 2009, p. 122). Bauerlein further wrote that millions of dollars have been invested by the federal government but “…the most popular and respected technologies in reading and math education produced no significant differences (in student achievement)” (p. 123). In fact, a New York State school eventually phased out their one to one laptop program because “there was literally no evidence it had any impact on student achievement” (p. 124). From a different perspective,
Wurst et al. (2008) conducted a longitudinal study with 10 faculty members and 87 honors students in an undergraduate honors program and found that ubiquitous use of laptops in higher education did not increase the level of constructivist activities or student achievement. The authors stated, “Honors students with laptops reported statistically significantly less satisfaction with their education compared to honors students with no laptops” (p. 1766).

Laptops have been the most popular addition to the classroom over the last 20 years and continue to remain the popular PTD for student use with the smart phone not far behind (Dahlstrom, 2012). Oh and Gwizdka (2011) conducted a mixed method study of laptop use in one higher education classroom with 37 students. The authors’ findings indicated that multi-tasking was the predominant activity during instruction. Yet, multi-tasking is not always a good thing. Kraushaar and Novak (2010) found that students engage in non-course material 42% of the time and understate this engagement in self-reports. Wood et al. (2011) conducted a study on multi-tasking in the university setting using three control groups over 3 consecutive lectures with 145 participants. The authors found that “attempting to attend to lectures and engage digital technologies for off task activities can have a detrimental impact on learning” (p. 365). According to Annan-Coultas (2012), use of technology in the classroom has become a critical part of the learning environment. Students “…frequently use laptops for communicating, note-taking, accessing course files in the learning management system, looking up course concepts, and off-task purposes” (p. 37). Lam and Tong’s (2012) study revealed “…that use of digital devices (in higher education classrooms) was effective in enhancing motivation, the conduct of meaningful course-related interactions, active exploration of online information, and participation rates” yet some students reported
considerable distraction while instructors reported distress over maintaining attention (p. 393).

Despite all the bells and whistles that technology affords the learning environment, the value of technology can only be measured on how much learning has occurred and whether knowledge is later applied. Similarly, the action of reading a book does not justify increased learning if learning does not occur and the knowledge is not applied. Bauerlein (2009) suggested that “one of the basics of learning: the acquisition of language” is undermined with the influx of too much technology (p. 126). Apparently, the millennial generation is reading less and comprehending even less because of the influx of computer technology (Bauerlein, 2009; Carr, 2011).

According to Neimz et al. (2005), higher education students are immersed in technology but student behavior is skewed toward constant connection versus learning. The authors conducted a study of 371 college students which revealed that as much as 18.3% of the students were “…pathological Internet users, whose excessive use of the Internet was causing academic, social, and interpersonal problems” (p. 562). A few years later, Rosen (2010) discussed in his book, Rewired, how students’ brains are being “rewired” due to constant connectivity and the plasticity of our brain. Carr (2011) affirmed this behavior in his book, The Shallows.

Wood et al. (2011) acknowledged in their study of the impact of multi-tasking with digital technologies that Knowledge of the detrimental impact (of the use of technology in the classroom) on learning has important implications for educators and policy makers especially since
digital technologies have become standard teaching and learning tools at all levels of education. In order to maximize the educational benefits associated with technology, we must also fully identify, understand, and overcome potential shortcomings resulting from inappropriate use of technology in the classroom. (p. 373)

In summary, various researchers have attempted to offer an understanding of the different underlying factors of the use and effectiveness of technology in the classroom. The research literature aggregately advocates that thoughtful and meaningful strategy must be implemented by faculty and administration when embracing technology in the classroom in order for technology to be effective and learning to occur. Although higher education institutions have embraced the influx of technology in the classroom, the resulting side effect of off task behavior while using PTDs during instruction is of utmost concern.

**Use of PTDs for Non-course Related Material during Instruction**

In the last several years, many professors have complained about distracted students who use PTDs for non-course related material during class instruction (Allen, 2007; Kjos et al., 2010; Young, 2006). These complaints have not gone unheard. The integration of technology in the classroom has become a tremendous change agent but not without significant consequences. For example, Campbell (2006) studied student perceptions of mobile phones ringing in the classroom and found that phone ringing is a problem. The author also found that students support formal policies restricting mobile phones in college classrooms.
A significant study on the subject of use of PTDs for non-course related material occurred in 2008. Fried (2008) reported that laptops in the classroom distracted students and showed a correlation of decreased student outcomes. Fried stated that

Results showed that students who used laptops in class spent considerable time multitasking and that the laptop use posed a significant distraction to both users and fellow students... The level of laptop use was negatively related to several measures of student learning, including self-reported understanding of course material and overall course performance. (p. 906)

Fried further stated that of the students studied,

64.3% reported using their laptops in at least one class period; those who used laptops used them during 48.7% of the class periods on average... Users reported that they multitasked (did things other than take lecture notes) for an average of 17 min. out of each 75 min. class period. Of the students who reported their laptop uses during lectures (n = 78), 81% reported that they checked email during the lectures, 68% reported that they used instant messaging, 43% reported surfing the net, 25% reported playing games, and 35% reported doing ‘other’ activities… The results of the regression analysis clearly showed that success in the class was negatively related to the level of laptop use. (p. 910-911)

According to Fried (2008), “Faculty who do not use laptops in an integrated way should consider ways to limit or control their use, or at least inform students about their pitfalls and attempt to limit the distraction laptops pose to other students” (p. 912). Students have been allowed to peruse their phones, laptops, or other PTDs without limitations within
many classrooms (Fried, 2008). Bugeja (2008) commented, “The new technologies that now keep us constantly connected also keep us constantly distracted. Educators know that wireless technology has disrupted the classroom, with students browsing (and even buying) online during lectures” (p. 68).

Many instructors are not trained or skilled to manage technology within the classroom in an efficient way to sustain student engagement (Fried, 2008; Sana et al., 2013; Young, 2006). Consequently, instructors and institutions have begun to implement policy and look at new ways to engage students to help manage the issue of distracted students (Allen, 2007; Fink, 2010; Young, 2006). For example, the University of Wisconsin-Madison developed two online, one-page publications to advise faculty and students on how to conduct oneself in the wireless classroom (University of Wisconsin-Madison, 2011).

Hembrooke and Gay (2003) completed an experimental study of higher education student outcomes which focused on multi-tasking skills, utilizing the theoretical framework of Broadbent’s theory of selective attention. In their study some students were allowed to keep their laptops open during class lecture while other students were not allowed to keep their laptops open during class lecture. The authors found that long term memory is significantly impaired when allowed to misuse laptops in the classroom during lecture. Lauricella and Kay (2010) developed an instrument called the Laptop Effectiveness Scale (LES) to study laptop effectiveness in the classroom. The LES was somewhat limited but began to take an in-depth look at this phenomenon. Results from 177 respondents showed that
most students spent over 50% of class time either taking notes (74%) or engaging in academic activities (68%). Over 70% of students spent up to 50% of class time sending non-academic email messages. Fifty-six percent of students exchanged instant messages up to 50% of the time during class, thirty-one percent of students spent over 50% of class time instant messaging. Just over one third of students played games up to 50% of the time in-class. Finally, just 10% of students watched movies up to 50% of in-class time. (p. 158)

Tagsold (2012), in her qualitative study of student distraction for high school students, found that distraction and reduced attention were drawbacks in the one to one (students with PTDs) environment. Tagsold postulated that reasoning for this behavior is “Students may be experiencing so much distraction in one to one initiatives due to tempering online activities as hot (i.e. Facebook) and others as cool (in-class assignment)” (p. 24). Junco (2012) found that, “In a natural setting and when left unguided, students will use Facebook in ways that are both positively and negatively related to their engagement, studying, and on-campus involvement” (p. 170). Hembrooke and Gay (2003) speculated that “sustained distraction, regardless of content relevance, appears to be the nemesis of the multitasker” (p. 59). Wood et al. (2011) studied digital distraction in the classroom and found significant detrimental impact on learning outcomes. Annan-Coultas (2012) also found that distraction was the most common detriment for laptop use in the classroom. In addition, Sana et al. (2013) found that learners who multitasked during class and learners who were in-view of multitaskers had reduced comprehension of lecture material. The
authors also stated that “Multitasking impairs both simple factual learning and complex application learning to the same degree” (p. 19).

More recently, Gupta and Irwin (2014) conducted an experiment with 150 higher education students using purposeful Facebook distractions and “…found that goal-relevant Facebook intrusions significantly reduced high interest lecture comprehension…” (p. 1). Additionally, Thorton, Faires, Robbins, and Rollins (2014) found that the “mere presence of a cell phone may be distracting” (p. 1).

Conclusively, only a few limited studies using various methods have been conducted to determine the extent of misuse of PTDs in the higher education classroom and the motivation behind this phenomenon. A chronological summary of the research data is as follows:

1. Hembrooke and Gay (2003) studied the effects of multitasking in learning environments using an experimental quantitative method with 44 students in relation to Broadbent’s theory of selective attention. The authors found that “the sustained distraction, regardless of content relevance, appears to be the nemesis of the multitasker” (p. 59).

2. Lee and Perry (2004) offered a quantitative study focusing on instant messaging in the higher education classroom relating DSR and gratification theory. The authors found that “as a respondent's self-assessed self-regulation worsened, intensity of preoccupation increased” (p. 414).
(3) Campbell (2006) studied mobile phone use in the higher education classroom using quantitative methods while comparing older students with younger students stating that mobile phones are a distraction.

(4) Fried (2008) performed a quantitative study of laptop use in the classroom with 137 students and found that laptop use in the classroom negatively affects student learning and suggested future study to be given toward how and why laptops are distracting.

(5) Bjorklund and Rehling (2009) performed a quantitative survey of 3,616 university students on student perceptions of classroom incivility behaviors most likely to interfere with learning which included digital distractions. Findings showed that allowing a cell phone to ring and text messaging were rated among the most frequent behaviors of classroom incivility.

(6) Nordstrom et al. (2009) completed a quantitative study with 593 higher education students regarding predictors of classroom incivility of which included technology use. The authors found that students with consumerism, narcissistic tendencies were more likely to accept uncivil behaviors and more likely to engage in those behaviors.

(7) Fink (2010) discussed, rather dramatically, the issue of using PTDs in the higher education classroom and why they were banned at his institution.

(8) Gerow, Galluch, and Thatcher (2010) studied cyber-slacking in the classroom using field theory as a basis for understanding the phenomenon and found that “…social norms, multitasking, and cognitive absorption directly and positively influence intent to cyber-slack” (p. 17).
(9) Kjos et al. (2010) performed a quantitative study and found that students did use PTDs for *non-course* related material but did not address the degree to which this behavior occurred during class time.

(10) Kraushaar and Novak (2010) performed an exploratory study of 97 students using self-reporting surveys and spyware software (with 41 of the 97 students). The authors found that students accessed *non-course* related material during class 42% of the time and, according to the spyware results, students under stated self-reports.

(11) Lauricella and Kay (2010) studied effectiveness of laptop use with 177 students and created a Laptop Effectiveness Scale (LES).

(12) Wood et al. (2011) performed a controlled study with 145 students and found that students who engaged in digital technology during lectures have a significant detrimental impact on learning outcomes as compared to those students who did not engage in digital technology during lectures.

(13) Annan-Coultas (2012) performed a qualitative study of student perceptions of use of laptops within the classroom with 231 students and found that all students have been off task at some time during class instruction and perceive that digital distractions affect their learning environment.

(14) Fernandez and Matt (2012) performed a qualitative survey on student perceptions of PTD usage in the classroom and found that students clearly perceived the interruptive potential of technology in the classroom.

(15) Lepp, Barkley, and Karpinski (2013) conducted a study with 496 students and found that “cell phone use/texting was negatively related to GPA and positively related to
anxiety; in turn, GPA was positively related to SWL (satisfaction with life) while anxiety was negatively related to SWL” (p. 343).

(16) Sana et al. (2013) completed a quantitative experimental study with a small sample size (38 students) to study “whether multitasking on a laptop would hinder learning as measured by performance on a comprehension test” (p. 7). Sana et al. determined that learners who multitasked during class had reduced comprehension of lecture material; learners in-view of multitaskers also had reduced comprehension of lecture material; and multitasking or being seated around multitaskers impedes classroom learning. Sana et al. argued that “multitasking impairs both simple factual learning and complex application learning to the same degree” (p. 19).

(17) Gupta and Irwin (2014) conducted an experimental study with 150 students using Facebook and determined that Facebook distractions decreased learning during classroom instruction.

(18) Thorton et al. (2014) conducted an experimental study of 101 students and found that the mere presence of cell phones were distracting during classroom instruction.

Overall, the research body indicates that there is an issue with the use of PTDs during instruction. More specifically, researchers suggested that there exists an issue of student use of PTDs for non-course related material and multi-tasking during instruction. Most of the studies consisted of self-reporting methods which can be a problem because researchers have indicated that students under report their use of PTDs during instruction. It is apparent that concern for student learning was evident; however, there seemed to be a lack of research consistency and awareness for understanding the issue. Furthermore, very little research
exists regarding effective classroom models for managing technology use in the higher education classroom. Apparently, because student use of technology in the classroom changes at a rapid rate and there are many elements to consider, researchers are having difficulty keeping up with these changes.

**Deficient Self-Regulation Theory**

One possible reason for student use of PTDs for *non-course* related material during class instruction in the higher education classroom may be higher deficient self-regulation (DSR) levels. Self-regulation theory (SR) was first identified by Bandura (1991) as a social cognitive theory in order to explain behavior of those who could not seem to regulate themselves. Bandura posited that self-regulation mechanism operates through three basic principles: self-observation, judgment of one's behavior, and self-reaction (p. 248). Bandura wrote that “most human behavior, being purposive, is regulated by forethought” (p. 248). He stated that self-efficacy plays a major role in self-regulation. Bandura further wrote,

People’s beliefs in their efficacy influence the choices they make, their aspirations, how much effort they mobilize in a given endeavor, how long they persevere in the face of difficulties and setbacks, whether their thought patterns are self-hindering or self-aiding, the amount of stress they experience in coping with taxing environmental demands, and their vulnerability to depression. (p. 257)

Deficient self-regulation theory has its roots in Katz’s 1949 theory of uses and gratification as related to one’s needs, self-efficacy component, belief system, and a self-reactive system (Bandura, 1991). Bandura’s self-regulation theory took Katz’s theory of uses and gratification a step further by infusing other variables for decision making (LaRose &
Eastin, 2004). LaRose et al. (2003) applied Bandura’s theory of self-regulation to another level by incorporating the deficiency component. LaRose et al. offered “a new theoretical model of unregulated media use that analyzed the symptoms of the so-called ‘media addictions’ as indications of a deficiency in self-regulation (after Bandura, 1991) that leads to habit formation and, perhaps in extreme cases, to pathology” (p. 227). LaRose et al. further stated that “habit formation is accompanied by decreased attention to self-monitoring; making it less likely that self-reactive incentives will be consciously applied to moderate the behavior” (p. 234). The authors proposed that

…repeated use of the media to relieve dysphoric moods can lead to deficient self-regulation as the media consumer economizes on the mental energy required to make decisions about repeated behavior. As self-regulation becomes less vigilant, the media behavior in question becomes automatic and habitual… (p. 244)

Therefore, DSR may be considered as a contributory force to the use of PTDs for non-course related material in the classroom. However, it should be noted that according to LaRose et al.,

…deficient self-regulation is not an all-or-nothing condition, in which one is either classified as “normal” or “addicted.” Rather, in social-cognitive theory it is possible to have varying degrees of deficient self-regulation and normal media consumers may experience lapses in self-regulation just as addicted ones do. Also, however, heavily addicted users may be able to restore self-regulation, at least temporarily, and indeed that pattern is implicit in the “relapse” symptoms associated with media (and also other) addictions. Thus, the indicators of so-called “media addictions” may be
reinterpreted as markers of deficient self-regulation and the process of addiction as the struggle to maintain effective self-regulation over problematic media behavior. Among those who do not meet the diagnostic criteria for pathological dependence, a more proper term would be unregulated media behavior or, more simply, “media habits,” rather than addictive media behavior. (p. 233)

Ley and Young (2001) used theory building methodology to offer instructional principles for self-regulation in the classroom which can be used to help manage deficient self-regulation and support the development of a practical model for use of PTDs in the higher education classroom. The authors suggested “…four instructional principles that designers should consider to provide support for self-regulation” (p. 93). The four principles are “preparing and structuring the learning environment, organizing and transforming instructional materials, keeping records and monitoring progress, and evaluating performance against a standard” (p. 94). It is possible that these four principles may be used in conjunction with an analysis of DSR levels in the classroom to help manage PTD use in the classroom.

Lee and Perry (2004) studied student instant message use in an ubiquitous computing environment and the effects of deficient self-regulation with 409 college students. Applying quantitative methodology as related to gratification theory, the authors used the American Psychiatric Association DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) criteria. “Results showed that as a respondent's self-assessed self-regulation worsened, intensity of preoccupation increased…More than one quarter (greater than 25%) said at least some of the time it was difficult to stop instant messaging sessions” (p. 414).
Using DSR as a framework, Caplan (2010) performed a study that tested an updated cognitive-behavioral model of generalized problematic Internet use and reported results of a confirmatory analysis of the Generalized Problematic Internet Use Scale 2 (GPIUS2).

Results indicated that a preference for online social interaction (POSI) and use of the Internet for mood regulation predict deficient self-regulation of Internet use (i.e., compulsive Internet use and a cognitive preoccupation with the Internet). In turn, deficient self-regulation was a significant predictor of the extent to which one’s Internet use led to negative outcomes. Results indicated the model fit the data well and variables in the model accounted for 27% of the variance in mood regulation scores, 65% of variance in participants’ deficient self-regulation scores, and 61% of variance in the negative outcome scores. (p. 1089) ...Deficient self-regulation was specified as a second-order factor determining two first-order factors, cognitive preoccupation and compulsive Internet use. (p. 1094)

More recently, Panek (2012) studied technology use in undergraduates and found that levels of self-control are a more accurate indicator of the amount of technology and Internet use. The author stated that “students who are low in self-control are apt to spend more time using leisure media” (p. 61). Tokunaga (2012) studied “the role of perceived novelty in the development of the deficient self-regulation of Internet use and media habits” (p. 1). Using controlled, longitudinal, experimental methodology, the purpose of the study was to expand understanding of deficient self-regulation of Internet use and media habit development in relation to flow. Questionnaires were given to 105 college students on anxiety, loneliness, depression, boredom proneness, self-reactive outcome expectation, novelty, flow, DSR,
Internet use, and media habits. Findings indicated that “the manifestation of DSR in later stages of technology use increases the likelihood of forming media habits” (p. 14). Tokunaga further wrote,

Perceived novelty, however, first motivates a state called flow, which then translates into DSR. Psychosocial problems, chronic boredom, and high self-reactive outcome expectations may strengthen the relationship between novelty perceptions and flow, particularly when novelty rises in the initial stages of technology use. (p. 27)

Concluding, DSR has been related to various types of behavior where media use is prevalent. It is possible that a higher level of deficient self-regulation may contribute to student use of PTDs for non-course related material during class instruction which could, in turn, cause the student to be less engaged in the instruction taking place thus affecting student outcomes. By analyzing the levels of DSR of students that use PTDs in the classroom during instruction, instructors and administration may offer a better learning environment.

**Media System Dependency Theory**

Another possible reason for student use of PTDs for non-course related material in the higher education classroom during instruction may be higher media system dependency (MSD) levels. MSD theory has been applied in various studies ever since various media entered social arenas many years ago. The premise of the theory is the same but media has changed over the years.

According to Grant et al. (1991),

The earliest statement of Ball-Rokeach's media system dependency theory was made in a paper titled “The Information Perspective” (1974), which called for a shift from
persuasion-centered conceptions of the media to a view of the media as an information system. (p. 775)

The authors stated that it was Ball-Rokeach’s 1974 work that gave MSD its name and recognition. Ball-Rokeach (1985) discussed the origins of MSD and defined MSD as “…a relationship in which the capacity of individuals to attain their goals is contingent upon the information resources of the media system--those resources being the capacity to (a) create and gather, (b) process, and (c) disseminate information” (p. 487). Ball-Rokeach further discussed the essence of one’s dependent relationship with media and stated that “dependency, thus, should change not only as goals change, but also as the resources of the media system change, or as structural dependencies change, or as perceptions of the utility of media resources change” (p. 495).

Grant et al. (1991) wrote that “Media system dependency theory see individuals as having personal goals of seeking to understand, to orient themselves to, and play in the world…” (p. 779). The authors further stated that “media system dependency is typically operationalized as a single variable measuring the overall degree to which an individual relies upon a medium to fulfill personal goals” (p. 780). Grant et al. found that Individuals who already have a strong dependency relationship with a new media genre, such as television shopping, in turn develop parasocial relationships with television personalities….The model suggests that dependency constitutes a relationship with the medium rather than merely a cause or effect of exposure in a linear model... (which) could model the sense of “addiction”... . (p. 793-794)
MSD theory can be applied to any issue that is conveyed through media. For instance, Ball-Rokeach et al. (1990) applied MSD theory to value-framing abortion in the United States in order to understand “...that change in the value-frame of media coverage and public discourse may be understood, at least in part, as an outcome of change in contestants’ MSD relations” (p. 249). Ball-Rokeach et al. wrote that “when…actors within the media system decide what questions will be asked, how they will be ‘value-framed,’ and how they may be responded to, then the media system is participating quite literally in the creation of public opinion” (p. 267). The authors further wrote, “A value frame is defined as the criterion by which people, events, and issues are evaluated” (p. 255). The MSD relation is defined as: The extent to which attainment of an individual’s, group’s, organization’s, or system’s goals is contingent upon access to the information resources of the media system, relative to the extent to which attainment of media system goals is contingent upon the resources controlled by individuals, groups, organizations, or other systems, respectively. (p. 250)

According to Ball-Rokeach (1998), MSD acquired its roots in 1956 from Katz’s work on social psychological framework of media effects while utilizing his 1949 theory on uses and gratification. Ball-Rokeach systematically compared MSD theory and uses and gratification theory but then took MSD behavior one step further by adding the concept of influence from the macro level as opposed to understanding uses and gratification theory at the micro level. The author wrote, “The basic idea was that individuals’ group associations were important determinants of their perceptual, attitudinal, and behavioral characteristics” (p. 7). Ball-Rokeach further stated that Shibutani’s work in 1966 suggested “…two basic
conclusions-reality was constructed and reality had to be constructed in order for people to 
act with meaning…media are available and central to reality construction” (p. 10). The 
author also stated that Emerson’s power-dependency theory from the 1960s plays a huge part 
in determining that MSD is a “theory of media power” (p. 13). She wrote, “The fact that 
media are central in personal knowledge construction is, in a large part but not entirely, a 
function of their centrality in social knowledge construction” (p. 15).

LaRose et al. (2003) studied unregulated Internet usage with 465 college students 
using quantitative methodology. Results indicated that “a path analysis demonstrated that 
depression and media habits formed to alleviate depressed moods undermined self-
regulation and led to increased Internet usage” (p. 225). The authors wrote,

Media additions are a type of behavioral addiction (Marks, 1990) in which there is no 
external chemical substance involved. By this definition, addicted media consumers 
feel compelled to consume media despite potentially negative consequences that 
make continued use appear irrational or out of control even in their own eyes. (p. 
226)

LaRose et al. argued that “habit formation is accompanied by decreased attention to self-
monitoring, making it less likely that self-reactive incentives will be consciously applied to moderate the behavior” (p. 234). The authors related media addiction to DSR. In other 
words, MSD is a form of DSR. In the same manner, LaRose et al. stated that “…‘Internet 
addiction’ can be redefined as deficient self-regulation” (p. 243).

LaRose and Eastin (2004) performed a quantitative study on media dependency as 
related to uses and gratification theory. The authors found that uses and gratification theory
was not supportive of Internet media usage because the theory was mainly two dimensional. Therefore, the authors suggested that perhaps Internet usage has many dimensions.

Hindman (2004) studied MSD in relation to the public support for the press and the US President. Hindman found that after a system interruption such as the 9/11 disaster, media system dependency is intensified while support for the press and president increases. Later, Mafe and Blas (2006) researched MSD utilizing Grant’s 1996 media dependency scale on 450 students (age 14 and older) to study Internet dependency. The study was purposefully performed to foster increased media dependency for online purchases. Findings indicated that “Internet agents should exploit the dimensions Internet offers to increase individual dependency and message effectiveness” (p. 380). Apparently, there are many external variables that can influence MSD.

It is apparent that MSD has been established as a valid system of dependency but only studied in limited formats. By understanding the underlying concept of MSD, it is possible that media system dependency contributes to the use of PTDs for non-course related material in the classroom by higher education students during instruction. By analyzing the levels of MSD of students that use PTDs in the classroom during instruction, instructors and administration may offer a better learning environment.

**Personal Technological Device Dependency**

A third possible reason for student use of PTDs for non-course related material during class instruction in the higher education classroom may be higher PTD dependency levels. Computers became a household item in the 1980s yet serious research on computer addiction did not materialize until the 1990s. Computer addiction had been suspected by the
US General Surgeon as early as 1982 as stated in an article “Surgeon General sees danger in video games” (Reed, 2000, p. 63). A progression of research prevailed and slowly computer addiction became a viable physical and psychological phenomenon that must be dealt with throughout society.

In 1996, the study of computer addiction came to the forefront when Dr. Kimberly Young made a presentation to the American Psychological Association (APA) and compared the issue to gambling addiction (Young, 1996). In her study she used a similar questionnaire that was used to diagnose gambling addiction. According to Young, the symptoms and consequences paralleled each other and the recovery and treatment procedures were similar. During the early 2000s, Dr. Kimberly Young became the most cited researcher on Internet addiction and started a real fight against the dependency disorder. Young currently maintains a website entitled www.netaddiction.com that helps define the issue and offers education and counseling for people in need. Subsequently, several clinics have emerged all over the world dealing solely with computer addiction. Young also developed the Internet Addiction Scale (IAS) to help determine Internet addiction levels. Khazaal et al. (2008) studied the validity of the IAS and found a significant positive correlation between IAS scores and the daily duration of Internet use.

Over the years, several studies have been conducted to try and categorize the issue in a particular pathway, i.e. pathological disorder, compulsive disorder, dependency, or behavioral addiction, etc. At first it was suggested that this behavior may be better classified as an impulse control disorder rather than an addiction (Young, 1996). Some researchers initially discounted the existence of computer addiction and concluded that it is not a
scientific concept but rather a socially produced concept (Beard & Wolf, 2001; Reed, 2000; Shotton, 1989). For example, Beard and Wolf (2001) proposed that the issue was more of an impulse control disorder versus addiction and further speculated whether Internet addiction even existed. Yet, in the same year, Tsai and Lin (2001) reported regression analysis results that indicated “…(people) who used the Internet more frequently…tended to have more compulsive behavior of using the Internet, and they would feel depressed if it was restricted” (p. 374-375). Over the next few years, researchers continued to vacillate between varying definitions and analysis. Currently though, researchers have come to accept the concept of computer addiction and consider the behavior as a dependency relationship (LaRose et al., 2003; Lee & Perry, 2004).

As mentioned previously, LaRose et al. (2003) stated that Internet addiction can be redefined as deficient self-regulation…Deficient self-regulation emerged not as an all-or-nothing phenomenon that distinguished addicts from non-addicts but as a continuous variable that was systematically related to consumption even among those who fell short of the threshold for a diagnosis of Internet addiction. (p. 243)

LaRose et al. further stated

Drawing on social-cognitive theory, we proposed that the repeated use of the media to relieve dysphoric moods can lead to deficient self-regulation as the media consumer economizes on the mental energy required to make decisions about repeated behavior. As self-regulation becomes less vigilant, the media behavior in question becomes
automatic and habitual; indeed, the loss of self-control is one of the recognized preconditions for automatic, habitual behavior (Bargh & Gollwitzer, 1994). (p. 244)

As mentioned in Chapter One, studies indicated that college-aged students are more susceptible to Internet dependency than any other population (Hall & Parsons, 2001; Hansen, 2002; Niemz et al., 2005; Young, 2012). According to Hansen (2002), “The online behavior of institutional users is particularly vulnerable to categorization as pathological” (p. 235). This was evidenced by the development of a “Problematic Internet Usage Scale” in 2007 to help determine if college students were engaging in unhealthy use of the Internet (Ceyhan, Ceyhan, & Gurcan, 2007). In their study, data were collected from 1658 university students where it was determined that “negative consequences of the Internet accounted for 25.36% of the variance, …social benefit/social comfort accounted for 14.62% of the variance, and …excessive usage explained 8.98% of the variance” (p. 411). Conclusively, “…problematic Internet use (PIU) may damage individuals’ relations with their environments and hinder their success” (p. 411). Kim (2008) analyzed the treatment method used for Internet addicted university students and their self-esteem. “The findings of this study indicated that the…group counseling program for Internet addiction college students was an effective intervention for reducing their Internet addiction disorder and enhancing their self-esteem especially related to Internet addiction disorder” (p. 8).

In conclusion, Internet dependency has become more accepted in the psychological educational fields as a viable issue for concern specifically for college-aged students. It is possible that PTD dependency facilitates conflict between desire to use the technology and acceptable classroom behavior in higher education whereby deficient self-regulation and
media system dependency are evident. By analyzing the levels of PTD dependency of students that use PTDs in the classroom during instruction, instructors and administration may offer a better learning environment.

**Chapter Summary**

The most relevant literature was presented regarding the use and effectiveness of technology in the higher education classroom, misuse of PTDs in the higher education classroom, deficient self-regulation (DSR) theory, media system dependency (MSD) theory, and PTD dependency as they related to the topic of misuse of PTDs in the higher education classroom. A relationship was established between DSR, MSD, and PTD dependency. Although deficiency self-regulation, media system dependency, and PTD dependency were listed separately, the researcher acknowledges that it is possible PTD dependency may be a subset of MSD and MSD may be a subset of DSR. The following chapter describes the research design and methodology of how the analysis on this issue was conducted in order to answer the research questions.
CHAPTER THREE
METHODOLOGY

The following sections describe the methodology of how this study was conducted in order to answer the proposed research questions as referenced in Chapter One. The basic research design and audience consideration, research questions with hypotheses, population, sample, instrumentation, data collection, and ethical and political considerations are specified. All procedures were approved by the North Carolina State University’s (NCSU) Institution Review Board (IRB) prior to administration.

Research Design and Audience Consideration

This research study was conducted with higher education undergraduate students, 18 years and over. The research design utilized a quantitative methods approach consisting of non-experimental, cross sectional, and quantitative data collection. According to Creswell (2009), quantitative research design method “is a means for testing objective theories by examining the relationship among variables” (p. 4). Quantitative design is appropriate for this study in order to document statistical levels of student DSR and MSD in relation to student PTD use in the classroom. Quantitative design is also appropriate to document whether levels of DSR or MSD explain GPA, engagement level, and/or PTD dependency. A quantitative design provides valid statistical data that can be used as a resource and help support the decision needs of faculty and administration to implement meaningful learning environments.
A student self-report survey format was offered to provide a numeric description of the trends, attitudes, or opinions of the student population regarding student behavior of PTD use in the classroom (Creswell, 2009). The purpose of utilizing a non-experimental, cross-sectional format was to facilitate timely analysis and render a snapshot view of student behavior (Creswell, 2009).

**Data Collection Overview**

A student, self-reporting survey was created to include basic demographics, student use of PTDs, and four pre-existing instruments in order to make generalizations regarding the population for the overall intent of the research questions (Creswell, 2009). The survey was administered online via SurveyMonkey to meet data gathering needs in a timely and accurate manner. SurveyMonkey is an online reputable survey service that offers their software in various formats. SurveyMonkey allows the user to create surveys online, conduct data analysis within a professional, secure platform, and can be integrated with SPSS statistical software. After sufficient data was gathered online, the survey data was exported into SPSS for further analysis.

Permission to solicit instructors of large face-to-face (f2f) traditional classrooms at a nearby institution of higher education was requested and granted from their Office of Research for Fall semester 2014. A pilot test was executed to ensure survey validity. Instructors of large f2f traditional higher education classrooms were solicited to forward the survey link to their students. The first instructor that responded was used for the pilot test whose class consisted of 24 students. Of the five students that responded, no significant issues were discovered in the pilot test. The data from the pilot test and subsequent research
study were collected using appropriate protocol as approved by NCSU’s IRB to ensure consistency, confidentiality, and reliable data procurement (Sproull, 1995). Additional specifics of the instrument are described in the section titled “Instrumentation.”

**Audience**

Special attention was made during this study to consider the viewpoint of the audience of higher education faculty and administration in order to address their needs and interests. Upon analysis of this data, faculty and administration of higher education institutions may be able to create a better learning environment where the use of PTDs during instruction might be maximized. Ultimately, recommendations for classroom strategy and protocol are offered in the last chapter as a future resource for best practice and implications for instructors of higher education to better manage the use of PTDs in the classroom during instruction.

**Population**

The statistical data gathered were generalized for the population of higher education undergraduate students, age 18 and over, who take traditional undergraduate courses on a typical campus with traditional, large, f2f classroom delivery. More specifically, the population consists of undergraduate students who are allowed to obtain and utilize PTDs in the traditional f2f classroom during class instruction. The sampling objective was to achieve a representative sample of higher education undergraduate students who use PTDs for course related and *non-course* related material in the classroom during instruction.
Sample

In order to secure a large number of respondents who participate in a traditional, f2f classroom environment, a cluster sampling method was appropriate. Cluster sampling is “a sampling method in which the sampling unit is a group of population elements rather than a single element” (Sproull, 1995, p. 120). Cluster sampling of classrooms was secured by accessing a list of instructors from a large higher education institution who offered traditional, f2f classroom instruction to 20 or more students. A smaller class size would possibly affect the student behavior being studied due to a more intimate setting, and therefore, was not included in this study. The department heads were contacted first by the Office of Research stating permission was granted to forward the student survey to their students. In order to secure a large number of clusters, an initial invitation to participate was generated to instructors via department heads. The instructor list was secured by accessing the university’s website, department heads were contacted, and a follow up request was sent via email a month later to all probable instructors of large traditional f2f classrooms. The large university is located in a metropolitan city in the Southeast United States which includes a diverse set of students.

In the student survey, data collection of continuous variables and categorical variables was proposed. Bartlett, Kotrlik, and Higgins (2001) suggested “before proceeding with sample size calculations, assuming continuous data, the researcher should determine if a categorical variable will play a primary role in data analysis. If so, the categorical sample size formulas should be used” (p. 46). According to Bartlett et al. (2001), most continuous data may be sampled with a .03 margin of error. In order to determine an appropriate sample
size for continuous data with a margin error = .03, alpha = .05, and $t = 1.96$, a minimum returned sample size of 119 respondents will serve as an adequate sample to obtain a 95% confidence level and make generalizations about the population. Additionally, most categorical data may be sampled with a .05 margin of error. In order to determine an appropriate sample size for categorical data with a margin of error = .05, $p = .50$, and $t = 1.96$, a minimum returned sample size of 370 respondents will serve as an adequate representative sample to obtain a 95% confidence level and make generalizations about the population (Bartlett et al, 2001, p. 48).

As mentioned above, in order to achieve the minimum number of respondents, 31 instructors of large traditional, f2f classrooms were contacted over a two month period to initiate cluster sampling. To ensure that data collected was, in fact, consistent with a traditional classroom of at least 20 students in which students were allowed to use PTDs during instruction, the instructors were given a data packet that described the parameters of the study with the survey questions (see Appendix 3). Four instructors from the disciplines of Psychology, Special Education, and Liberal Studies responded which generated 130 respondents from 470 students over a 2 month span during the semester. Ten submissions were deleted from the study prior to analysis due to incomplete responses leaving 120 valid and completed responses. Re-sampling occurred by sending reminders via instructors until the minimum sample size of 119 for a continuous variable was achieved.

According to Agresti and Finlay (2009), “Non-response bias occurs when some sampled subjects cannot be reached or refuse to participate or fail to answer some questions” (p. 21). It is dangerous to make an inference to a larger population if the non-response bias is
large. A response rate of 25.5% was calculated (total # of valid responses / # of total students contacted). Non-response bias was controlled by comparing early and late respondents.

Students were motivated to respond per their instructor’s request by an offer to be included in a random drawing for $50 Amazon.com gift card. At the end of the survey questions, respondents were given the option to access a separate survey link for the drawing to submit personal contact data after posting their anonymous responses. Of the 130 respondents, 70 students elected to participate in the random drawing. A random drawing was made using a computerized random number generator on http://www.random.org/, a site affiliated with the School of Computer Science and Statistics at Trinity College, Dublin in Ireland which states to be “a true random number service” (Haahr, 2014). Respondent number 21 was selected by the computerized random number generator to win the $50 Amazon.com gift card and subsequently notified.

Specific care was made to secure traditional classes in order to obtain consistent results and infer upon the population of higher education students in large f2f traditional classroom environments by asking only professors of large f2f traditional classrooms to participate. Special care was made to ensure confidentiality by allowing the professor to forward the survey link and invite their students to participate. Students then accessed SurveyMonkey anonymously. The research questions and respective hypotheses for this study are detailed in the next section.

**Research Questions with Hypotheses**

The following research questions were analyzed with respective hypotheses. In order to determine an overall indication of the relationship of student use of PTDs in the classroom
during instruction and levels of DSR, MSD, and PTD dependency, the following research questions one through three with hypotheses were proposed respectively:

**RQ#1: What is the relationship between student personal technological device use for course related material in the classroom and the level of student deficient self-regulation during instruction?**

**H₀:** There will be no significant linear relationship between student PTD use of course related material and student level of deficient self-regulation.

**H₁:** There will be a significant negative linear relationship between student PTD use of course related material and student level of deficient self-regulation.

**Variables:** Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of deficient self-regulation.

**RQ#2: What is the relationship between student personal technological device use for course related material in the classroom and the level of student media system dependency during instruction?**

**H₀:** There will be no significant linear relationship between student PTD use of course related material and student level of media system dependency.

**H₁:** There will be a significant negative linear relationship between student PTD use of course related material and student level of media system dependency.

**Variables:** Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of media system dependency.
RQ#3: What is the relationship between student personal technological device use for course related material in the classroom and the level of student personal technological device dependency during instruction?

H₀: There will be no significant linear relationship between student PTD use of course related material and student level of PTD dependency.

Hₐ: There will be a significant negative linear relationship between student PTD use of course related material and student level of PTD dependency.

Variables: Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of PTD dependency.

In order to determine the relationship between students that access non-course related material during instruction and each DSR, MSD, and PTD dependency levels, the following research questions four through six with hypotheses were proposed respectively:

RQ#4: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student deficient self-regulation during instruction?

H₀: There will be no significant linear relationship between student PTD use of non-course related material and student level of deficient self-regulation.

Hₐ: There will be a significant positive linear relationship between student PTD use of non-course related material and student level of deficient self-regulation.

Variables: Percentage of time during class instruction that higher education students use PTDs for non-course related material.
Student level of deficient self-regulation.

**RQ#5:** What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student media system dependency during instruction?

**H₀:** There will be no significant linear relationship between student PTD use of non-course related material and student level of media system dependency.

**H₁:** There will be a significant positive linear relationship between student PTD use of non-course related material and student level of media system dependency.

**Variables:** Percentage of time during class instruction that higher education students use PTDs for non-course related material.

Student level of media system dependency.

**RQ#6:** What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student personal technological device dependency during instruction?

**H₀:** There will be no significant linear relationship between student PTD use of non-course related material and student level of PTD dependency.

**H₁:** There will be a significant positive linear relationship between PTD use of non-course related material and student level of PTD dependency.

**Variables:** Percentage of time during class instruction that higher education students use PTDs for non-course related material.

Student level of PTD dependency.
In order to analyze whether demographic variables, student level of DSR, and student level of MSD affect student outcomes (GPA, engagement level, and PTD dependency), the following research questions numbered seven through nine were proposed respectively:

**RQ#7: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student GPA?**

- **H₀**: The demographic variables, student level of DSR, or student level of MSD will *not* explain a significant amount of the variance in student GPA.
- **H₁**: The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student GPA.

**Variables:**
- Independent-Age, gender, level of undergraduate study
- Independent-Student level of DSR
- Independent-Student level of MSD
- Dependent-Student GPA

**RQ#8: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student engagement level?**

- **H₀**: The demographic variables, student level of DSR, or student level of MSD will *not* explain a significant amount of the variance in student engagement level.
- **H₁**: The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student engagement level.

**Variables:**
- Independent-Age, gender, level of undergraduate study
- Independent-Student level of DSR
- Independent-Student level of MSD
Dependent-Student engagement level

RQ#9: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student PTD dependency?

H₀: The demographic variables, student level of DSR, or student level of MSD will not explain a significant amount of the variance in student PTD dependency.

H₁: The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student PTD dependency.

Variables: Independent-Age, gender, level of undergraduate study

Independent-Student level of DSR

Independent-Student level of MSD

Dependent-Student PTD dependency level

Instrumentation

In order to facilitate a cross-sectional design and collect information in an economical, efficient manner, a student survey was created and was presented via SurveyMonkey. Upon requesting permission from the instructors, delivery of the student instrument was made available via the instructor. An online link utilizing SurveyMonkey was shared by each instructor. Informed consent was obtained during student’s initial access to SurveyMonkey (see Appendix 2). By using an online survey format, anonymity and consistency was ensured. Instrument validity and reliability was calculated during data analysis. The student survey was created to gather data regarding basic demographics, technology use during class instruction, and questions from four, previously used, reliable
instruments relating to engagement level, and levels of DSR, MSD, and PTD dependency (see Appendix 1). The next few paragraphs describe each section of the survey.

Basic demographic data of all participants were obtained through appropriate survey questions. Demographic questions were used to determine if any gender, age, or level of undergraduate study considerations affected student use of PTDs during classroom instruction. More specifically, a gender question was asked to determine if any consistent differences occurred as related to gender. An age question was asked to determine if the sample was skewed toward a specific age category. Student level of undergraduate study was asked to determine whether sample was considered to be a representative sample of all undergraduate students. In addition, student GPA was asked to analyze GPA outcome relationships.

The next few questions on the survey addressed specific technology used in the classroom and helped determine any trends that affected student use of PTDs during classroom instruction. Questions about the frequency of student use of PTDs for course related material and student use of PTDs for non-course related material during classroom instruction were included to help faculty and administration become more aware of PTD usage in the classroom.

Finally, the balance of the student survey was developed by integrating questions from four reliable existing instruments on student engagement, DSR, MSD, and PTD dependency. The authors of each instrument gave the researcher permission via email to integrate their assessment in this study. Student engagement questions were used to validate actual engagement is taking place during instruction. The engagement survey was taken
from Mazer’s Engagement Scale (Mazer, 2013). The DSR and habit strength assessment was taken from LaRose and Eastin’s DSR and Habit Strength Scale (LaRose & Eastin, 2004). The MSD assessment, with some minor modifications (with author’s permission) to bring the wording up to date for today’s technology use, was taken from Grant’s Media Dependency Scale (Grant, 1996). The PTD dependency assessment was taken from Kimberly Young’s Internet Addiction Scale (IAS) (Young, 2012). Ultimately, by determining DSR, MSD, and PTD dependency levels, instructors and administration may be able to assess students and better manage PTDs in the classroom thus increasing the potential for greater student outcomes. The following four paragraphs describe each of the instruments that were integrated in the student survey.

Mazer’s Engagement Scale (2013) measures the level of student engagement with a seven point Likert Scale from never to very often. The scale was found to be reliable with a Cronbach’s Alpha = .77 to .92 in Mazer’s analysis (p. 132). Permission to use the scale was granted by the author via email. Minor adjustments were made for easy readability and consistency.

LaRose and Eastin’s (2004) DSR and Habit Strength Scale measures the level of deficient self-regulation and habit strength in a given activity. The scale uses a seven point Likert Scale from very unlikely to very likely with a Cronbach’s Alpha score of .66 in LaRose and Eastin’s analysis (p. 369). Permission to use the scale has been granted by R. LaRose via email. Minor adjustments were made for easy readability and consistency.

Grant’s Media Dependency Scale (1996) measures the level of media system dependency and uses a five point Likert Scale from not at all helpful to extremely helpful (p.
208). The reliability measure of Cronbach’s Alpha was .92-.93 for Grant’s analysis. Permission to use the scale with modification to bring the wording up to date for today’s technology use was granted via email.

Young’s Internet Addition Scale (IAS) measures the degree of which the Internet affects different aspects of one’s daily life (Young, 2012). Young’s measurement has been tested over time and confirmed for reliability and validity in 2008 with Cronbach’s alpha = 0.93. The scale has been modified over the years and currently uses a five point Likert Scale from never to always (Know Mo, 2012). The assessment is widely used, has been translated into many languages, and is available for both adolescents and adults. Permission was granted by the author via email to use the IAS.

In total, the student online survey instrument consisted of 28 short answer questions and took around 20 minutes to complete (see Appendix 1). Specifically, 85% (102) of respondents reported that they completed the survey in 10-20 minutes, 13.3% (16) reported completing the survey in 21-30 minutes, and 1.7% (2) reported completing the survey in 21-30 minutes. Delivery of the instrument is explained in the next section.

**Data Collection Logistics**

First, to assure survey validity, a pilot test was run with a single class of 24 students using the first instructor that responded to the initial request. Five students responded with no apparent problems with access or completion of the survey. The pilot test took 20 minutes or less to complete. Once survey validity was assured, other instructors were identified to allow their students to participate in the study by forwarding the SurveyMonkey link to their students. Because there were no issues, pilot test data was included in the final
dataset. All data gathered in SurveyMonkey was exported into SPSS 18 statistical software. Calculations were run to determine descriptive statistics, correlations, relationships, variance, dependence levels, and reliability measures. Specific statistical tests were determined in relation to each specific research question.

As mentioned before, anonymity was of utmost concern to obtain unbiased responses. Therefore, the initial survey was constructed for anonymous responses by allowing the instructor to forward the survey link to their students. No identifying data was asked of the respondent within the main survey. Motivation for student response was generated by including an option to participate in a random drawing. At the end of the anonymous survey, participants were offered the option to link to a separate survey for contact information and be included in a random drawing for an Amazon.com $50 gift card. Upon completion of data collection, the researcher, with a witness, used a computer generated random selection method to select a respondent to receive the $50 Amazon.com gift card. Only the winning respondent was contacted by the researcher to receive the gift card. The next section addresses ethical and political considerations of this research project.

**Ethical and Political Considerations**

When developing a research project, it is important to anticipate ethical issues that might likely arise during the process (Creswell, 2009). The survey questions posed and methodology were reviewed and approved by the North Carolina State University (NCSU) Institutional Review Board (IRB). As mentioned above, student data collection was obtained anonymously through an online survey format, SurveyMonkey. The survey link was forwarded to the student via the instructor with sufficient information to allow the respondent
to make a knowledgeable decision for participation. Therefore, no direct connection between the researcher and the respondents was made. Informed consent was secured upon initial access to the student survey. Consequently, free and informed consent, anonymity, confidentiality, and right to privacy were assured (Sproull, 1995).

Analysis of student use and misuse of PTDs in the classroom was made in consideration of the student’s right to choice but also in consideration of whether that choice is violating other students’ right to an appropriate learning environment. Sensitivity to the students’ and instructors’ privacy was of utmost regard. In addition, confidentiality of the instructors will be maintained for any publication or correspondence. Issues that may be associated with insensitivity, disrespect, or indiscretion will be considered as a violation of others’ right to a higher standard within the classroom, including the professor.

Chapter Summary

Chapter three discussed the methodology of this study. The research design, audience, data collection process, population, and sample were described. Research questions that were answered in this study were presented with respective hypotheses. In addition, instrumentation, ethical issues, and political considerations were related. A quantitative method approach was used to study student use and misuse of PTDs in the higher education classroom in relation to DSR theory, MSD theory, and PTD dependency. Upon approval by NCSU’s IRB, cluster sampling of undergraduate higher education students through instructors at a higher education institution was secured. An online self-reporting student survey was administered via the instructor and SurveyMonkey. Quantifiable data were collected regarding levels of student misuse of PTDs in relation to DSR theory, MSD
theory, GPA, engagement level, and PTD dependency. Information about data analysis is offered in the following chapter.
CHAPTER FOUR
DATA ANALYSIS AND FINDINGS

Analysis of multiple variables requires rigorous examination and therefore, a wide range of techniques is warranted (Hair, Black, Babin, Anderson, & Tatham, 2006). Initial cleaning of the data was completed; descriptive analysis, correlations, and regressions were run. Upon data collection completion, the data in SurveyMonkey were analyzed for completion. A total of 130 respondents accessed the survey. Ten respondents’ data were determined to be incomplete. Therefore, their input was deleted within SurveyMonkey leaving 120 valid respondents. No analysis was made with the 10 incomplete responses. The data from the survey was exported from SurveyMonkey into SPSS 18 statistical software. The data in SPSS was then analyzed for integrity and cleanliness by determining the type of data transferred and whether responses were transferred accurately. The data appeared to be in great condition before analysis began.

Descriptive Analyses

Descriptive analyses, including frequency, mean, median, and standard deviation, were completed first to look at any major differences in output, completion of data entry, and reliability. Data were visually screened for any out of range values and whether sufficient variability existed to conduct correlations and regression analyses. Kurtosis and skewness were looked at with standard deviation to make sure data were normally distributed. The data in Tables 2 through 6 reflect descriptive statistics for each demographic variable. The data indicated that 57% (68) of respondents were aged 20-21 years, 81% (97) were female,
47% (56) were juniors, 31% (37) were seniors, with 64% (77) having a GPA greater than 3.0.

The data indicated that students’ GPA appeared to be normally distributed.

Table 2

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>19</td>
<td>15.8</td>
<td>15.8</td>
<td>15.8</td>
</tr>
<tr>
<td>20-21</td>
<td>68</td>
<td>56.7</td>
<td>56.7</td>
<td>72.5</td>
</tr>
<tr>
<td>22-23</td>
<td>22</td>
<td>18.3</td>
<td>18.3</td>
<td>90.8</td>
</tr>
<tr>
<td>24-25</td>
<td>3</td>
<td>02.5</td>
<td>02.5</td>
<td>93.3</td>
</tr>
<tr>
<td>26 or older</td>
<td>8</td>
<td>06.7</td>
<td>06.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>97</td>
<td>80.8</td>
<td>80.8</td>
<td>80.8</td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>19.2</td>
<td>19.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4

<table>
<thead>
<tr>
<th>Level of Undergraduate Study</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>9</td>
<td>07.5</td>
<td>07.5</td>
<td>07.5</td>
</tr>
<tr>
<td>Sophomore</td>
<td>18</td>
<td>15.0</td>
<td>15.0</td>
<td>22.5</td>
</tr>
<tr>
<td>Junior</td>
<td>56</td>
<td>46.7</td>
<td>46.7</td>
<td>69.2</td>
</tr>
<tr>
<td>Senior</td>
<td>37</td>
<td>30.8</td>
<td>30.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 5

<table>
<thead>
<tr>
<th>Current Grade Point Average (GPA)</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6 - 4.0</td>
<td>29</td>
<td>24.2</td>
<td>24.2</td>
<td>24.2</td>
</tr>
<tr>
<td>3.1 - 3.5</td>
<td>48</td>
<td>40.0</td>
<td>40.0</td>
<td>64.2</td>
</tr>
<tr>
<td>2.6 - 3.0</td>
<td>32</td>
<td>26.7</td>
<td>26.7</td>
<td>90.8</td>
</tr>
<tr>
<td>2.1 - 2.5</td>
<td>11</td>
<td>09.2</td>
<td>09.2</td>
<td>100.0</td>
</tr>
<tr>
<td>0.0 - 2.0</td>
<td>00</td>
<td>00.0</td>
<td>00.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 6

Demographics: Mean, Median, and Standard Deviation

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Level of undergraduate study</th>
<th>Current GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>Valid</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>2.28</td>
<td>1.19</td>
<td>3.00</td>
</tr>
<tr>
<td>Median</td>
<td>2.00</td>
<td>1.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>0.99</td>
<td>0.40</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.92</td>
</tr>
</tbody>
</table>

Students were asked which types of personal technological devices were used during class instruction. Some students may use more than one PTD therefore, the percentages are not cumulative. The data indicated that 55% (66) of students used a laptop, 17.5% (21) used an E-reader or tablet, 82.5% (99) used a smart phone, 5.8% (7) used a (non-smart) cell phone, 3.3% (4) used a gaming device, and 3.3% (4) used a music only device during instruction, while 5.8% (7) reported they did not use a PTD during instruction at all.
The data in Tables 7 through 10 reflect the frequency of student PTD usage during instruction for course related material and *non-course* related material and frequency of distraction during instruction by classmates who use PTDs for course related material and *non-course* related material respectively.

Table 7

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>42</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
</tr>
<tr>
<td>No</td>
<td>78</td>
<td>65.0</td>
<td>65.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

As displayed in Table 7, only 35% (42) of students used PTDs solely for course related material while 65% (78) did *not* use PTDs solely for course related material. Students who used PTDs solely for course related material reported that they mostly took notes, followed lesson Power Points, checked school email, or looked up related course data during class time. However, students also reported accessing some off task course related material such as taking a quiz, writing a paper, and checking a schedule.

Table 8

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>93</td>
<td>77.5</td>
<td>77.5</td>
<td>77.5</td>
</tr>
<tr>
<td>No</td>
<td>27</td>
<td>22.5</td>
<td>22.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
As displayed in Table 8, 77.5% (93) of respondents used PTDs for *non-course* related material during instruction while 22.5% (27) of respondents did *not* use PTDs for *non-course* related material during instruction. Using an open ended question, 67.5% (81) of respondents reported engaging in various *non-course* PTD activities during class instruction as follows: 60% (72) of respondents reported engaging in more than one *non-course* related activity during instruction; 50% (60) of respondents reported texting; 47% (56) of respondents reported checking emails; 34% (41) of respondents reported checking social media; 19% (23) of respondents were browsing the Internet, checking the news, or shopping online; 8% (10) of respondents were gaming; 6% (7) were completing other course work; while 2% (2) of respondents responded that they were watching a movie.

Table 9

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>24</td>
<td>20.0</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>No</td>
<td>96</td>
<td>80.0</td>
<td>80.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The data in Table 9 indicate that 20% (24) of the students were distracted by a classmate who used their PTD for course related material while 80% (96) of the students reported that they were *not* distracted by a classmate who used their PTD for course related material. Students that were distracted by a classmate during instruction reported that the
classmate was looking up Power Points or related course information, closing and opening different windows, or was taking notes.

Table 10

Over the past week, were you distracted by a classmate who used their PTD for *non-course* related material?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>60</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>60</td>
<td>50.0</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As shown in Table 10, 50% (60) of students reported that they were distracted by a classmate who used their PTD for *non-course* related material during instruction while 50% (60) of students reported that they were *not* distracted by a classmate who used their PTD for *non-course* related material during instruction. Students who were distracted by a classmate reported the following distractions: student on cell phone during instruction, students browsing other sites, on social media or Facebook, video game flashing, phones ringing, phones vibrating, students shopping online, listening to loud music, gaming, texting, watching a video, or checking email.

**Data Reliability Determination for Engagement, DSR, MSD, and PTD Dependency Scales**

Each of the question sets for engagement, DSR, MSD, and PTD dependency were separately used to create a mean scale score in order to determine student average levels for engagement, DSR, MSD, and PTD dependency. Cronbach’s Alpha is a reliability statistic
used to determine “…the degree of consistency between multiple measurements of a variable” (Hair et al., 2006, p. 137). A larger Cronbach’s Alpha represents greater internal consistency and reliability of the data analyzed. As seen below in Table 11, each of the four instruments (engagement, DSR, MSD, and PTD dependency) reflected a high Cronbach’s Alpha (> .80) and, therefore, indicated adequate internal consistency.

Table 11

<table>
<thead>
<tr>
<th>Instrument</th>
<th># Items in Scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach’s Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>7</td>
<td>04.94</td>
<td>0.88</td>
<td>0.871</td>
<td>17</td>
</tr>
<tr>
<td>DSR</td>
<td>7</td>
<td>03.04</td>
<td>1.02</td>
<td>0.841</td>
<td>10</td>
</tr>
<tr>
<td>MSD</td>
<td>5</td>
<td>03.46</td>
<td>0.69</td>
<td>0.902</td>
<td>18</td>
</tr>
<tr>
<td>PTD dependency</td>
<td>5</td>
<td>01.86</td>
<td>0.55</td>
<td>0.913</td>
<td>20</td>
</tr>
</tbody>
</table>

Histograms were run for each of the four instruments (engagement, DSR, MSD, and PTD dependency) to determine whether normal distribution was evident. Kurtosis and skewness were looked at with standard deviation to make sure data were normally distributed. Data using each instrument fell within a fairly normal distribution.

The majority of students in this study indicated an average engagement score of 4.94 (I “more than half of the time but not too often” am engaged in class activities.) with 68% (82) of students falling within a range of 4.06 to 5.82. The majority of students in this study indicated an average DSR score of 3.04 (I am often “somewhat unlikely” to not self-regulate my PTD usage.) with 68% (82) of students falling within a range of 2.02 to 4.06. The
majority of students in this study indicated an average MSD score of 3.46 (My PTD is between “somewhat helpful” and “mostly helpful” in my daily life.) with 68% (82) of students falling within a range of 2.77 to 4.15. And lastly, the majority of students in this study indicated an average PTD dependency score of 1.86 (I am “rarely” dependent upon my PTD.) with 68% (82) of students falling within a range of 1.31 to 2.41.

**Correlation Analysis**

Correlation analysis is used to analyze the strength of the relationship between two variables and indicates the direction of the relationship (Hair et al., 2006). Correlation analyses were appropriate to answer research questions one through three in order to determine if there was a relationship between students’ PTD use of course related material during instruction and the variables DSR, MSD, and PTD dependency respectively. The data in Table 12 reflect the Pearson Correlation ($r$) and significance level ($p \leq 0.05$) of the relationship.
### Table 12

**Correlations: Class Time on Course Related Material and DSR, MSD, PTD Dependency**

<table>
<thead>
<tr>
<th>% of time on course related material (0-100%)</th>
<th>DSR</th>
<th>MSD</th>
<th>PTD dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.014</td>
<td>-.098</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.879</td>
<td>.159</td>
<td>.289</td>
</tr>
<tr>
<td>n</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>DSR</td>
<td>1</td>
<td>.408**</td>
<td>.565**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>MSD</td>
<td>1</td>
<td>.246**</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.007</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>PTD Dependency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p ≤ 0.01

Research questions one through three were answered using the data from Table 12.

**RQ#1:** What is the relationship between student personal technological device use for course related material in the classroom and the level of student deficient self-regulation during instruction?

**H₀:** There will be no significant linear relationship between student PTD use of course related material and student level of deficient self-regulation.
Hₐ: There will be a significant negative linear relationship between student PTD use of course related material and student level of deficient self-regulation.

Variables: Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of deficient self-regulation.

The data in Table 12 indicate that the alternative hypothesis was not supported, as there was no significant linear relationship between student PTD use of course related material and student level of deficient self-regulation (r = .014, p = .879, n = 120).

RQ#2: What is the relationship between student personal technological device use for course related material in the classroom and the level of student media system dependency during instruction?

H₀: There will be no significant linear relationship between student PTD use of course related material and student level of media system dependency.

Hₐ: There will be a significant negative linear relationship between student PTD use of course related material and student level of media system dependency.

Variables: Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of media system dependency.

The data in Table 12 indicate that the alternative hypothesis was not supported, as there was no significant linear relationship between student PTD use of course related material and student level of media system dependency (r = .129, p = .159, n = 120).
RQ#3: What is the relationship between student personal technological device use for course related material in the classroom and the level of student personal technological device dependency during instruction?

H<sub>0</sub>: There will be no significant linear relationship between student PTD use of course related material and student level of PTD dependency.

H<sub>a</sub>: There will be a significant negative linear relationship between student PTD use of course related material and student level of PTD dependency.

Variables: Percentage of time during class instruction that higher education students use PTDs for course related material.

Student level of PTD dependency.

The data in Table 12 indicate that the alternative hypothesis was not supported, as there was no significant linear relationship between student PTD use of course related material and student level of PTD dependency ($r = -0.098$, $p = 0.289$, $n = 120$).

Correlation analyses were conducted to answer research questions four through six in order to determine the direction and strength of a relationship between student PTD use of non-course related material during instruction and the variables DSR, MSD, and PTD dependency respectively. The data in Table 13 reflect the Pearson Correlation ($r$) and significance level ($p \leq 0.05$) of the relationship:
Table 13

*Correlations:*

*Class Time on Non-course Related Material and DSR, MSD, PTD Dependency*

<table>
<thead>
<tr>
<th>% of time on non-course related material (0-100%)</th>
<th>DSR</th>
<th>MSD</th>
<th>PTD dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of time on non-course related material (0-100%)</td>
<td>Pearson Correlation</td>
<td>.187*</td>
<td>.180*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.040</td>
<td>.049</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>DSR</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.408**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>MSD</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.246**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.007</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>PTD dependency</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05

**p ≤ 0.01

**RQ#4: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student deficient self-regulation during instruction?**
H₀: There will be no significant linear relationship between student PTD use of non-course related material and student level of deficient self-regulation.

Hₐ: There will be a significant positive linear relationship between student PTD use of non-course related material and student level of deficient self-regulation.

Variables: Percentage of time during class instruction that higher education students use PTDs for non-course related material.

Student level of deficient self-regulation.

The data in Table 13 indicate that there was a significant positive linear relationship between student PTD use of non-course related material and student level of deficient self-regulation ($r = .187, p = .040, n = 120$). The analysis did not support the null hypothesis and therefore, the alternative hypothesis can be accepted.

RQ#5: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student media system dependency during instruction?

H₀: There will be no significant linear relationship between student PTD use of non-course related material and student level of media system dependency.

Hₐ: There will be a significant positive linear relationship between student PTD use of non-course related material and student level of media system dependency.

Variables: Percentage of time during class instruction that higher education students use PTDs for non-course related material.

Student level of media system dependency.
The data in Table 13 indicate that there was a significant positive linear relationship between student PTD use of non-course related material and student level of media system dependency \((r = .180, p = .049, n = 120)\). The analysis did not support the null hypothesis and therefore, the alternative hypothesis can be accepted.

**RQ#6: What is the relationship between student personal technological device use for non-course related material in the classroom and the level of student personal technological device dependency during instruction?**

\(H_0:\) There will be no significant linear relationship between student PTD use of non-course related material and student level of PTD dependency.

\(H_a:\) There will be a significant positive linear relationship between PTD use of non-course related material and student level of PTD dependency.

**Variables:** Percentage of time during class instruction that higher education students use PTDs for non-course related material.

Student level of PTD dependency.

The data in Table 13 indicate that there was a significant positive linear relationship between student PTD use of non-course related material and student level of PTD dependency \((r = .184, p = .045, n = 120)\). The analysis did not support the null hypothesis and therefore, the alternative hypothesis can be accepted.

**Regression Analysis**

Regression analysis is used to predict the value of a dependent variable given a specific independent variable (Agresti & Finlay, 2009). Ordinary least squares regression analysis was used to answer research questions seven through nine in order to determine
whether a change in demographic variables (age, gender, level of undergraduate study), student level of DSR, or student level of MSD would explain student GPA, student engagement level, or student PTD dependency level. Parameters of the regression analyses were entered with a 95% confidence level where \( p \leq 0.05 \). Each question was analyzed separately as stated below:

**RQ#7: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student GPA?**

**H\(_0\):** The demographic variables, student level of DSR, or student level of MSD will not explain a significant amount of the variance in student GPA.

**H\(_a\):** The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student GPA.

**Variables:**

- Independent: Age, gender, level of undergraduate study
- Independent: Student level of DSR
- Independent: Student level of MSD
- Dependent: Student GPA

**Table 14**

*Model Summary-GPA*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.284(^a)</td>
<td>0.081</td>
<td>0.040</td>
<td>.89704</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD
The data in Table 14 indicate that the model, with the independent variables of age, gender, level of undergraduate study, DSR, and MSD, explains 4% of the variance in GPA (adjusted $R^2 = 0.04$). Analysis of variance (ANOVA) is used to compare several means of groups (Agresti & Finlay, 2009). Using ANOVA, the data in Table 15 indicate that the amount of variance in GPA explained by the model was not statistically significant ($p = 0.083$).

Table 15

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>08.058</td>
<td>5</td>
<td>1.612</td>
<td>2.003</td>
<td>0.083</td>
</tr>
<tr>
<td>Residual</td>
<td>91.734</td>
<td>114</td>
<td>0.805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99.792</td>
<td>119</td>
<td>0.805</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD
b. Dependent Variable: GPA

Consequently, the analysis supported the null hypothesis, and therefore, the alternative hypothesis can be rejected. More specifically, because the $p$ value is greater than 0.05, the predictive regression line could not be determined with a 95% confidence. In this model, only 4% (adjusted $R^2 = 0.04$) of GPA could be predicted. Therefore, the demographic variables, student level of DSR, or student level of MSD does not explain a significant amount of the variance in student GPA. The data in Table 16 indicate the amount of variance in GPA that is explained when controlling for each independent variable. In
summary, the data indicate that the overall model does not explain a significant amount of variance in GPA, which means GPA cannot be predicted with this model.

Table 16

<table>
<thead>
<tr>
<th>Coefficients&lt;sup&gt;a&lt;/sup&gt;-GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| a. Dependent Variable: GPA |

**RQ#8: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student engagement level?**

**H<sub>0</sub>:** The demographic variables, student level of DSR, or student level of MSD will not explain a significant amount of the variance in student engagement level.

**H<sub>a</sub>:** The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student engagement level.

**Variables:** Independent-Age, gender, level of undergraduate study

Independent-Student level of DSR
Independent - Student level of MSD
Dependent - Student engagement level

Table 17

*Model Summary - Engagement Level*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.239&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.057</td>
<td>0.016</td>
<td>.87565</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD

The data in Table 17 indicate that the model, with the independent variables of age, gender, level of undergraduate study, DSR, and MSD, explains 1.6% of the variance in engagement level (adjusted $R^2 = 0.016$). Using ANOVA, the data in Table 18 indicate that the amount of variance in engagement level explained by the model was not statistically significant ($p = .234$).

Table 18

*ANOVA<sup>b</sup> - Engagement Level*

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig. &lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>05.319</td>
<td>5</td>
<td>1.064</td>
<td>1.387</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>87.411</td>
<td>114</td>
<td>0.767</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>92.729</td>
<td>119</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD
<sup>b</sup> Dependent Variable: Engagement
Consequently, the analysis supports the null hypothesis, and therefore, the alternative hypothesis can be rejected. More specifically, because the \( p \) value is greater than 0.05, the predictive regression line could not be determined with a 95% confidence. In this model, only 1.6% (adjusted \( R^2 = 0.016 \)) of engagement level could be predicted. Therefore, the demographic variables, student level of DSR, or student level of MSD will not explain a significant amount of the variance in student engagement level. The data in Table 19 indicate the amount of variance in student engagement level that is explained when controlling for each independent variable. In summary, the data indicate that the overall model does not explain a significant amount of variance in student engagement level, which means engagement level cannot be predicted with this model.

Table 19

<table>
<thead>
<tr>
<th>Coefficients*—Engagement Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Level of undergraduate study</td>
</tr>
<tr>
<td>DSR</td>
</tr>
<tr>
<td>MSD</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Engagement
RQ#9: What is the amount of variance that demographic variables, student level of DSR, and student level of MSD explain in student PTD dependency?

H₀: The demographic variables, student level of DSR, or student level of MSD will not explain a significant amount of the variance in student PTD dependency.

H₁: The demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student PTD dependency.

Variables:

- Independent - Age, gender, level of undergraduate study
- Independent - Student level of DSR
- Independent - Student level of MSD
- Dependent - Student PTD dependency level

Table 20

<table>
<thead>
<tr>
<th>Model Summary-PTD Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD

The data in Table 20 indicate that the model, with the independent variables of age, gender, level of undergraduate study, DSR, and MSD, explains 31.4% of the variance in PTD dependency level (adjusted R^2 = 0.314). Using ANOVA, the data in Table 21 indicate that this model explains a statistically significant amount of the variance in PTD dependency level (p ≤ .001).
Table 21

ANOVA\(^b\)-PTD Dependency

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>12.388</td>
<td>5</td>
<td>2.478</td>
<td>11.873</td>
<td>.000(^a)</td>
</tr>
<tr>
<td>Residual</td>
<td>23.790</td>
<td>114</td>
<td>0.209</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>36.178</td>
<td>119</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Age, Gender, Level of undergraduate study, DSR, MSD
b. Dependent Variable: PTD dependency

Consequently, the analysis supports the alternative hypothesis, and therefore, the alternative hypothesis can be accepted. More specifically, because the \(p\) value is less than 0.05, the predictive regression line can be determined with a 95% confidence. In this model, 31.4% (adjusted \(R^2 = 0.314\)) of PTD dependency could be predicted. Therefore, this model indicates that the demographic variables, student level of DSR, or student level of MSD will explain a significant amount of the variance in student PTD dependency level. Furthermore, the data in Table 22 indicate that, while controlling for each variable, for every unit change in student level of DSR (\(B = .308, p \leq .001\)) the mean score of student level of PTD dependency is expected to increase .308 points, reflecting a 57% (standardized \(B = 0.57\)) standard deviation increase in PTD dependency. In summary, the data indicate that the overall model does explain a significant amount of variance in student PTD dependency level, which means that student PTD dependency level can be predicted with this model. In addition, student level of DSR has a significant effect on student level of PTD dependency when controlling for age, gender, student level undergraduate study, and student level of MSD, which means
that student level of DSR may possibly predict student level of PTD dependency with a 95% confidence level ($p = .001$).

Table 22

<table>
<thead>
<tr>
<th>Coefficients$^a$-PTD Dependency</th>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td></td>
<td>0.937</td>
<td>0.311</td>
<td></td>
<td>3.012</td>
<td>.003</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>-0.100</td>
<td>0.053</td>
<td>-0.179</td>
<td>-1.894</td>
<td>.061</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>0.078</td>
<td>0.110</td>
<td>0.056</td>
<td>0.710</td>
<td>.479</td>
</tr>
<tr>
<td>Level of undergraduate study</td>
<td></td>
<td>0.070</td>
<td>0.057</td>
<td>0.113</td>
<td>1.260</td>
<td>.210</td>
</tr>
<tr>
<td>DSR</td>
<td></td>
<td>0.308</td>
<td>0.045</td>
<td>0.570</td>
<td>6.825</td>
<td>.000</td>
</tr>
<tr>
<td>MSD</td>
<td></td>
<td>-0.027</td>
<td>0.072</td>
<td>-0.034</td>
<td>-0.376</td>
<td>.707</td>
</tr>
</tbody>
</table>

a. Dependent Variable: PTD dependency

It should be noted that some collinearity among the measures of DSR, MSD, and PTD dependency may have influenced the results of the regression analyses. The instruments, while designed to measure distinct constructs, appeared to have some overlap. More specifically, Table 13 shows a relatively medium to high correlation between DSR and MSD ($r^2 = .408$, $p = .000$), between DSR and PTD dependency ($r^2 = .565$, $p = .000$), and MSD and PTD dependency ($r^2 = .246$, $p = .007$), indicating possible overlap among these constructs. This means that, by having a high correlation, the variables (DSR, MSD, and
PTD dependency) may have similar constructs and measurement of the same constructs may skew the results.

Chapter Summary

Quantitative analyses were conducted on the data collected from the student survey using descriptive statistics, correlations, and regressions. The research questions were answered according to the data presented. For research questions 1 through 3, the data in Table 12 indicate that there was no significant linear relationship between student PTD use of course related material and student level of DSR, student level of MSD, or student level of PTD dependency. For research questions 4 through 6, the data in Table 13 indicate that there was a significant positive linear relationship between student PTD use of non-course related material and student level of DSR, student level of MSD, or student level of PTD dependency. For research questions 7 and 8, the data in Tables 15 and 18 indicate that the model does not sufficiently explain a change in student GPA or student engagement level. For research question 9, the data in Table 21 indicate that the model does explain that changes in demographic variables, student level of DSR, or student level of MSD may explain changes in student PTD dependency. The following chapter offers discussion of findings, implications for research, practice, and future study, and limitations of the study with concluding remarks.
CHAPTER FIVE

DISCUSSION

The following sections offer discussion regarding this study of student use and misuse of PTDs in the higher education classroom. Implications for research, practice, and future study are discussed. Finally, limitations and concluding remarks of the study are presented.

Discussion of Findings

In order to fill a gap in research data, the degree of student use of personal technological devices (PTDs) for non-course related material in the higher education classroom as related to theory and student outcomes, a quantitative research study was conducted with 120 undergraduate higher education students at a large metropolitan university. A self-reporting online survey was used to measure student use and misuse of PTDs during instruction in the large f2f traditional classroom. Data regarding time spent using PTDs for course related and non-course related material during class were gathered. In addition, basic demographics (age, gender, level of undergraduate study, GPA) were gathered. Student levels of engagement, deficient self-regulation (DSR), media system dependency (MSD), and PTD dependency were determined. This study was based upon DSR and MSD theoretical frameworks. Quantitative analyses were conducted using descriptive statistics, correlations, and regressions.

Findings from this study support prior studies that most higher education students are not 100% engaged during class instruction but rather distracted by personal technological devices and by classmates that use PTDs during instruction (Allen, 2007; Bugeja, 2008;
The majority of students in the study (65%, 78) indicated that they did not use PTDs solely for course related material during instruction. In fact, when asked specifically, 77.5% (93) of students in the study indicated that they used PTDs for non-course related material during class instruction, some even gaming or watching movies. The study showed that 60% (72) of total respondents reported various non-course activities using PTDs during class instruction such as texting (50%, 60), accessing email (47%, 56) or social media (34%, 41), browsing the Internet or online shopping (19%, 23), gaming (8%, 10), completing other course work (6%, 7), or watching a movie (2%, 2). In addition, 50% (60) of students in this study reported that they were distracted by a classmate who used their PTD for non-course related material during instruction. Conclusively, the findings from this study indicate that students are not fully engaged and are distracted by their PTDs during instruction. This is important to know because administration and instructors need to understand that their undergraduate students are not engaged but rather distracted by their PTDs when in the large f2f traditional classroom.

Students were asked questions to determine their age, gender, student level of undergraduate study, student GPA, engagement level, DSR level, MSD level, and PTD dependency level. As expected, the data from the correlation analyses (Table 12) indicate that there was not a significant relationship between those students who indicated time spent on course related material during instruction and levels of DSR, MSD, or PTD dependency (p = .879, .159, .289 respectively). On the other hand, and as expected, the data from the correlation analyses (Table 13) indicated that there was a significant relationship between
those students who indicated time spent on *non-course* related material during instruction and higher levels of DSR, MSD, and PTD dependency ($p = .040, .049, .045$ respectively). More specifically, the more time students reported spending on *non-course* related material during class instruction, the higher their level of DSR, MSD, or PTD dependency. Conversely stated, higher student levels of DSR, MSD, or PTD dependency implies that students may spend more time on *non-course* related material during instruction and therefore, may not be engaged in the lesson at hand. Therefore, the study indicated that higher student levels of DSR, MSD, or PTD dependency may be a contributing force to students spending more time on *non-course* related material in the classroom during instruction.

The most significant analysis from this study appeared to be that a unit change in student level of DSR explained 30.8% of the change in the mean score of student PTD dependency. As LaRose et al. (2003) pointed out, “Internet addiction can be redefined as deficient self-regulation…” (p. 243). This supports the connection that a higher level of DSR may be a predictor of a higher level of PTD dependency. This is important to know because administration and instructors need to understand that students with higher levels of DSR will more likely have a higher level of PTD dependency and, therefore, may spend more time on *non-course* related material during instruction.

**Implications for Research**

As LaRose et al. (2003), Lee and Perry (2004), and Panek (2012) proposed, the data from this study affirmed that deficient self-regulation theory may be a theoretical framework for misuse of PTDs in the higher education classroom during instruction. In addition, as Ball-Rokeach (1998), Grant et al., (1991), and Mafe and Blas (2006) proposed, the data from
this study affirmed that media system dependency theory may also be a theoretical framework for misuse of PTDs in the classroom during instruction and there may exist a power struggle between student engagement and misuse of PTDs in the classroom during instruction. This is important to know because administration and faculty need to understand that undergraduate students with higher levels of DSR, MSD, or PTD dependency may spend more time on non-course related material during instruction. Moreover, as requested by other researchers, this study offered additional needed research regarding the phenomenon of the uncontrolled influx of PTDs in the classroom (Annan-Coultas, 2012; Bjorklund & Rehling, 2009; Fried, 2008; Nordstrom et al., 2009; Sana et al., 2013; Tagsold, 2012; Young, 2006). Therefore, a gap in research data (the degree of student use of PTDs for non-course related material in the higher education classroom as related to theory and student outcomes) has been fulfilled by this study. By utilizing data from this study, further research may be considered in order for administration and faculty to offer an uncompromised learning environment, free of distractions.

**Implications for Practice**

This study offered quantitative data that support the need for administration and faculty to look more closely at the classroom behavior of students with PTDs in large f2f traditional classrooms due to the fact that 77.5% (93) of students reported significant PTD distractions and off task behavior during instruction. It is possible that the format and instructional style of large f2f traditional classrooms might encourage misuse of PTDs during instruction. In order for instructors to offer a learning environment free of distractions for students, further research would be warranted to study student level of DSR in the higher
education classroom to determine whether a significant level of DSR exists within an aggregate number of students. By studying DSR levels of higher education students, administration and faculty may be able to determine best practices when using PTDs for large f2f traditional classroom environments. Additionally, as technology changes in the classroom, administration and instructors will need to look more closely at how large f2f traditional classrooms are going to be managed.

One respondent made the comment that they were thankful to be a part of this study because it made them think about their classroom PTD behavior during instruction. Perhaps communicating awareness of the issue will begin a process of incorporating change into the learning environment. As mentioned at the beginning of this document, in the new era of bring your own device (BYOD), most 21st century higher education students will attend classes equipped with personal technological devices (PTDs) such as smart phones, computers, tablets, etc. (Kjos, Miesner, & Chesnut, 2010). Although PTDs can be an advantage to student learning, such as communicating, note-taking, accessing course files, or looking up course topics (Annan-Coultas, 2012), sometimes PTDs can be a distraction (Bjorklund & Rehling, 2009; Campbell, 2006; Sana, Weston, & Cepeda, 2013; Wood et al., 2011; Young, 2006). As the findings from this study indicated, increasing ownership and usage of PTDs in the classroom has become a phenomenon of which the instructor must manage to ensure that a learning environment free of distractions is maintained (Stoner & Fincham, 2012). The instructor must become aware of the dynamics of this issue. Obviously, the student must also become more aware and responsible for their PTD behavior.
in the classroom in order to remain engaged and on task in the learning environment during instruction. Again, the objective is to offer an uncompromised learning environment.

**Implications for Future Study**

Future studies might include more specific data regarding how much time is actually spent off task during instruction for specific activities such as texting or accessing emails while in a large f2f classroom environment. By understanding this construct more closely, faculty can adjust their instruction to include instructional methods and strategy whereby more on task behavior would occur.

It may also be advantageous to study student level of DSR more in depth in large traditional f2f classrooms and compare levels of DSR between classes to determine an average student level of DSR. By understanding the average student level of DSR for undergraduate students, and given normal distribution parameters, faculty and administration may consider studying and incorporating best practices in the larger classroom to minimize distractions and possibly include activities to *increase* student self-regulation for those students with higher levels of DSR. Furthermore, while analyzing changes of student engagement level did not produce a significant model, age and level of undergraduate study are two variables to look at for future study (see Table 19). Ultimately, in order for administration and faculty to develop a best practices model for students with PTDs in the large, traditional, higher education classroom, many different strategies might be tested to confirm student engagement is increased while PTD distractions are decreased. Additionally, a recommendation could be made to confirm this study by securing a larger sample number with several different educational disciplines and repeating the study to
ensure sampling bias did not occur (Agresti & Finlay, 2009). Limitations for this study are outlined in the next section.

**Limitations of the Study**

One limitation of this study included the self-reporting process and volunteer sampling method. According to Agresti and Finlay (2009), self-reporting survey method may include understated or overstated responses regarding self-perception of behaviors while volunteer sampling method includes subjects who volunteer to participate in the study. Due to the nature of self-reporting and volunteer sampling, clear and concise conclusions should be guarded and warrant further study for confirmation. No method was implemented to ensure that a student could not take the survey more than once, although it was not anticipated that students would want to take the survey multiple times. In addition, some possible collinearity was noted among the measures of DSR, MSD, and PTD dependency possibly affecting the regression analyses. Table 13 indicated a medium to high correlation between DSR and MSD ($r^2 = .408$, $p = .000$), between DSR and PTD dependency ($r^2 = .565$, $p = .000$), and MSD and PTD dependency ($r^2 = .246$, $p = .007$).

A fourth limitation for this study included working through instructors to secure cluster sampling. Most instructors of large f2f classrooms are very busy people and adding another task to their list of things to do was asking a lot. Therefore, only four instructors of large f2f traditional classrooms representing three educational disciplines responded to the request to forward the survey link to their students even though the request was preapproved and sent via department heads twice. Unfortunately, that issue limited the number of student responses and any extra reminders that may be given to the students. Consequently, the
optimal response number of 370 respondents for categorical variables did not occur. However, since this analysis did include continuous variables, the minimal response number of 119 was met with 120 total valid responses and a decision was made to continue with the analysis using the number of responses that were secured (Bartlett et al., 2001). The next section relates concluding remarks for this study.

**Conclusion**

Overall, this study indicated that a majority of higher education students are being distracted by PTDs and using their PTDs for *non-course* material in the large f2f traditional classroom during instruction; many students are also being distracted by other students using PTDs for *non-course* material during instruction. The analyses from this study aligned student behavior with the social cognitive theories of deficient self-regulation and media system dependency. It is possible that because of student levels of DSR and MSD, this social cognitive behavior is depriving students from essential learning material that is offered during class instruction for greater success and outcomes. Furthermore, the study indicated that a higher level of student DSR may predict a higher level of PTD dependency. Administration and faculty may benefit from the findings of this study and perhaps begin to incorporate appropriate strategy in the large higher education f2f traditional classroom to better manage student PTD behavior and offer an uncompromised learning environment, free of distractions.
REFERENCES


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APPENDICES
APPENDIX 1

STUDENT PTD USAGE SURVEY

Informed Consent Agreement

Please read below regarding the purpose of the survey and what is expected from the participant.

1. Informed consent question (see Informed Consent Document Appendix 2)

Qualifying criteria

Your answer is required to qualify students that are of legal adult age.

2. As an undergraduate student in higher education, you have agreed to participate in this survey that will ask questions about your most recent face-to-face class activities.

Neither your professor nor the researcher will be able to determine which student answered which questions. Therefore, please be as honest as possible in your responses. Hopefully, your answers will help faculty and administration offer a more enhanced learning environment in the classroom with this study.

Are you 18 years old or older? (age qualifier)

- Yes
- No

Demographics

3. Which category below includes your age?

- 18-19
- 20-21
- 22-23
- 24-25
- 26 or above
4. What is your gender?
   - Female
   - Male

5. For which level of undergraduate study are you registered while in this class?
   - Freshman
   - Sophomore
   - Junior
   - Senior

6. What is your current grade point average (GPA)?
   - 4.1 or above
   - 3.6-4.0
   - 3.1-3.5
   - 2.6-3.0
   - 2.1-2.5
   - 2.0 or below

**PTD usage**

A personal technological device (PTD) may be considered as any device you bring into the classroom that uses technology to store, access, retrieve, or send information.

7. Please estimate, on average, the percentage of class time you use a PTD(s) listed below during class (personal or course related use). For example, if you use a PTD about 30 minutes of the 60 minute class, then choose 50%.

<table>
<thead>
<tr>
<th>Device</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop (any size)</td>
<td>0-----------25--------50--------75--------100%</td>
</tr>
<tr>
<td>E-reader or tablet (any type)</td>
<td>0-----------25--------50--------75--------100%</td>
</tr>
<tr>
<td>Smartphone</td>
<td>0-----------25--------50--------75--------100%</td>
</tr>
</tbody>
</table>

114
Other cell phone 0--------25--------50--------75--------100%
Game only device 0--------25--------50--------75--------100%
Music only device 0--------25--------50--------75--------100%
Other (please specify with estimated percentage) ___________________________

Course related material usage

8. Did you use a PTD for course related material over the past week during class?
   o Yes
   o No

9. Please estimate, on average, the percentage of class time you used your PTD(s) solely for course related material over the past week. For example, if your class is 60 minutes in length and you were using a PTD to look up related topics or take notes for 30 minutes, then you were on course related material 50% of the time.
   0--------25--------50--------75--------100%

10. If you used your PTD solely for course related material over the past week, please give specific examples of using your PTD during class time (yes, all of them, such as note taking, look up related data, etc.) for course related material over the past week.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Non-course related material usage

11. Did you use a PTD for non-course related material over the past week during class?
   o Yes
   o No
12. Please estimate, on average, the percentage of class time you used your PTD(s) solely for non-course related material over the past week. For example, if your class is 60 minutes in length and you were using a PTD for unrelated class activities for 30 minutes (such as typing another document, email, texting, etc.), then you were on non-course related material 50% of the time.

| 0% | 25% | 50% | 75% | 100% |

13. If you used your PTD for non-course related material over the past week, please give specific examples of using your PTD during class time (yes, all of them such as texting, checking email, gaming, etc.) for non-course related material over the past week.

________________________________________________________________________________________________________
________________________________________________________________________________________________________

PTD usage by classmate

14. Over the past week, were you distracted by a classmate who used their PTD for course related material?

○ Yes
○ No

15. Please estimate, on average, the percentage of class time you were distracted by a classmate who used their PTD for course related material. For example, if your class is 60 minutes in length and you were distracted by a classmate who used a PTD for course related activities for 30 minutes, then you were distracted 50% of the time.

| 0% | 25% | 50% | 75% | 100% |
16. If you were distracted by a classmate who used their PTD(s) for course related material, please list specific activities (yes, all of them) in which the classmate engaged with their PTD(s).

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

17. Over the past week, were you distracted by a classmate who used their PTD for non-course related material?

○ Yes
○ No

18. Please estimate, on average, the percentage of class time you were distracted by a classmate who used their PTD(s) for non-course related activities. For example, if your class is 60 minutes in length and you were distracted by a classmate using a PTD for non-course related activities for 30 minutes, then you were distracted 50% of the time.

0-----------------25-----------------50-----------------75-----------------100%

19. If you were distracted by a classmate who used their PTD(s) for non-course activities, please list specific non-course related activities (yes, all of them) in which the classmate engaged with their PTD(s).

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Engagement level

The next set of questions will address your engagement level during class instruction this past week (Mazer, 2013). Please answer this set of questions on a 7 point scale from (1) *never* to (7) *very often*.

20. In regard to your class activity, how often do you …

<table>
<thead>
<tr>
<th>Activity</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen attentively to the instructor during class. (silent in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Give your teacher your full attention during class. (silent in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Listen attentively to your classmates’ contributions during class discussions. (silent in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Attend class. (silent in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Take notes during class. (silent in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Ask questions of your teacher during class if something is unclear. (oral in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Participate during class discussions by sharing your thoughts/opinions. (oral in class)</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
<tr>
<td>Think about how you can utilize the course material in your</td>
<td>Never: 1, Very little: 2, Some of the time: 3, About half of the time: 4, More than half but not too often: 5, Often: 6, Very often: 7</td>
</tr>
</tbody>
</table>
everyday life. (thinking about content)

Think about how the course material is related to your life. (thinking about content)

Think about how the course material will benefit you in your future career. (thinking about content)

Review your notes outside of class. (out of class)

Prepare for class by reading assigned material. (out of class)

Complete assigned homework. (out of class)

Study for a test or quiz. (out of class)

Talk about the course material with others outside of class. (out of class)

Contact your instructor (in person or via email) about your progress in the course. (out of class)

Take it upon yourself to read additional material in the course topic area. (out of class)
Habit strength and deficient self-regulation level

The next set of questions will address your level of habit strength and deficient self-regulation (LaRose & Eastin, 2004). Please answer this set of questions as truthful as possible on a 7 point scale from (1) very unlikely to (7) very likely.

21. How often do I …

<table>
<thead>
<tr>
<th></th>
<th>Very unlikely</th>
<th>Unlikely</th>
<th>Somewhat unlikely</th>
<th>About half of the time</th>
<th>Somewhat likely</th>
<th>Likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find myself going online about the same time each day?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Make the Internet part of my usual routine?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Miss the Internet if I could no longer go online?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Have a hard time keeping my Internet use under control?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Have to keep using the Internet more and more to get my thrill?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Get tense, moody, or irritable if I can't get on the Internet when I want?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Try unsuccessfully to cut down on the amount of time I spend online?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Try to conceal how much time I spend online from my family or friends?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Go out of my way to satisfy my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Internet urges?

Feel my Internet use is out of control?  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
</table>

**Media system dependency level**

The next set of questions will address your level of media system dependency (Grant, 1996). Please answer the following questions as truthfully as possible on a 5 point scale from (1) *not at all helpful* to (5) *extremely helpful*.

22. In your daily life, how helpful is your personal technological device (PTD) to …

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stay on top of what is happening in the community?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Unwind after a hard day or week?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Gain insight into why you do some of the things you do?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Discover better ways to communicate with others?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Decide where to go for services such as health, financial, or household?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Relax when you are by yourself?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Find out how the country is doing?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Imagine what you will be like as you grow older?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Give you something to do with your</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
friends?

Figure out what to buy?  
1 2 3 4 5

Think about how to act with friends, relatives, or people you work with?
1 2 3 4 5

Have fun with family and friends?
1 2 3 4 5

Observe how others cope with problems or situations like yours?
1 2 3 4 5

Keep up with world events?
1 2 3 4 5

Be a part of events that you enjoy without you having to be there?
1 2 3 4 5

Get ideas about how to approach others in important or difficult situations?
1 2 3 4 5

Plan where to go for evening and weekend activities?
1 2 3 4 5

Have something to do when nobody else is around?
1 2 3 4 5

PTD dependency level

The next set of questions will assess your level of PTD dependency (Young, 2012). Please answer the following questions as truthfully as possible using a 5 point scale from (1) never to (5) always.

23. How often do you …
<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find that you stay on-line (or other digital activity such as video games) longer than you intended?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neglect household chores to spend more time on-line (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer the excitement of the Internet (or other digital activity such as video games) to intimacy with your partner?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form new relationships with fellow on-line users?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do others in your life complain to you about the amount of time you spend on-line (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your grades or school work suffer because of the amount of time you spend on-line (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check your e-mail before something else that you need to do?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your job performance or productivity suffers because of the Internet (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Become defensive or secretive when anyone asks you what you do on-line (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block out disturbing thoughts about your life with soothing thoughts of the Internet (or other digital activity such as video games)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Rating 1</td>
<td>Rating 2</td>
<td>Rating 3</td>
<td>Rating 4</td>
<td>Rating 5</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Find yourself anticipating when you will go on-line (or other digital activity such as video games) again?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Fear that life without the Internet (or other digital activity such as video games) would be boring, empty, and joyless?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Snap, yell, or act annoyed if someone bothers you while you are on-line (or other digital activity such as video games)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lose sleep due to late-night log-ins (or other digital activity such as video games)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Feel preoccupied with the Internet when off-line (or off other digital activity such as video games), or fantasize about being on-line (or other digital activity such as video games)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Find yourself saying &quot;just a few more minutes&quot; when on-line (or other digital activity such as video games)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Try to cut down the amount of time you spend on-line (or other digital activity such as video games) and fail?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Try to hide how long you've been on-line (or other digital activity such as video games)?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Choose to spend more time on-line (or other digital activity such as video games) over going out with others?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Feel depressed, moody, or nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
when you are off-line (or off other
digital activity such as video games),
which goes away once you are back
on-line (or other digital activity such
as video games)?

Comments

You are almost done! Please take a moment to comment on the length of time it took for you
to take this survey and relate any observations or concerns you may have regarding this
survey.

The last question will allow you to link to another webpage to enter the random drawing for
$50 Amazon.com gift card.

24. Approximately how much time did it take you to complete this survey?
   o 10-20 minutes
   o 21-30 minutes
   o 31-40 minutes
   o greater than 41 minutes

25. Did you have any trouble accessing the website to complete this survey?
   o Yes
   o No

26. Were the directions easy to understand?
   o Yes
   o No

27. Were the questions for each section easy to understand?
Thank you

Thank you for your time and thoughtful responses for this survey. Your input will help faculty and administration offer a better learning environment for the classroom. SurveyMonkey has assured that your responses will remain anonymous and not saved to any identifiable data. If you responded and are interested in participating in the random drawing for $50 Amazon.com gift card, click (link to survey shown below was here) to fill out an entry form. Feel free to contact researcher at avcurrie@ncsu.edu should you have any questions or comments.

Random Drawing for $50 Amazon.com Gift Card

Thank you for participating. Please submit your personal data to be included in the random drawing!

1. What is your first and last name?

____________________________________

2. What is your street address?

____________________________________

3. In what city do you currently live?

____________________________________
4. In which state do you live?
   (all states are listed here from which to choose)

5. In what ZIP code is your home located?
   (enter 5-digit ZIP code; for example, 00554 or 94305) ________________

6. At what email address would you like to be contacted?
   _______________________________________________

Thank you for your participation. You will be notified if you won the $50 Amazon.com Gift Card! Enjoy your day…
APPENDIX 2

INFORMED CONSENT FORM FOR RESEARCH
North Carolina State University

The Use and Misuse of Personal Technological Devices in the Higher Education Classroom

Researcher: Anna Currie, Doctoral Candidate
Faculty Sponsor: Dr. Diane Chapman

You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher named above at avcurrie@ncsu.edu.

The purpose of this research study is to gain better understanding of your personal use of technological devices in the classroom.

If you agree to participate in this study, you will be asked to complete an online survey via SurveyMonkey which will take approximately 20 minutes of your time.

There are no risks involved in completing the survey.

The benefits to you are the ability to be a part of helping to create better classroom environments. For participating in this study you will receive an opportunity to be included in a random drawing for $50 Amazon.com gift card.

The information in the study records will be kept confidential to the full extent allowed by law. Data gathered will be stored securely in the researcher’s computer, researcher’s personal SurveyMonkey account, and faculty sponsor’s computer. No reference will be made in the survey, oral reports, or written reports which could link you to the study. Your responses will be anonymous and NOT linked to your IP address so that no one can match your identity to the answers that you provide.

Participation in this study is not a course requirement and your participation or lack thereof, will not affect your class standing or grades.

If you have questions at any time about the study or the procedures, you may contact the researcher, Anna Currie at avcurrie@ncsu.edu.

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

CONSENT TO PARTICIPATE

“I have read and understand the above information. I have the option to print a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

By clicking “yes” you have agreed to the above “Consent to Participate” statement: ° Yes ° No
APPENDIX 3

EMAIL TO INSTRUCTORS

(researcher return data and date goes here)

Dear Instructor:

If you teach undergraduates in a f2f classroom format (not a lab) with 20+ students, then you might be interested in allowing your students to be a part of a very important research project during the months of September and October. As a doctoral candidate of NCSU and with permission from our Institutional Review Board and your Office of Research at UNCC, the following details will allow you to make an informed decision:

- The purpose is to study student behavior in the traditional classroom while using personal technological devices (PTD) in relation to engagement, deficient self regulation, media system dependency, and PTD dependency levels.
- Data from this study will be used to help administrators and instructors determine best classroom management strategy of student use of PTDs in the classroom.
- The research includes a self-reporting online anonymous student survey via SurveyMonkey requesting personal student responses of PTD behavior in the classroom.
- A motivational component is offered by including an option to participate via a separate link in a random drawing for $50 Amazon.com gift card at the end of the survey to capture contact info.
- Complete confidentiality safeguards will be implemented for you and the student. Only the winner of the random drawing will be contacted by the researcher.
- The survey (attached) is composed of basic demographic and PTD usage questions. It also includes four, previously used, reliable instruments relating to engagement, deficient self regulation, media system dependency, and PTD dependency levels.
- The survey should only take about 20 minutes to complete.
- A cluster sampling method has been suggested which is why I have contacted you.

Below is a possible script that may be forwarded to your students should you decide to allow your students to participate:

“Students, I have agreed to allow you to participate in an anonymous student survey on SurveyMonkey regarding your use of personal technological devices in the classroom. The survey will take only about 20 minutes of your time. SurveyMonkey and the researcher have assured that your responses will remain anonymous and not saved directly to your IP address. Your email address will remain confidential but may be stored in a separate survey only if you opt to be included in a random drawing for $50 Amazon.com gift card. Inclusion in the gift card drawing is strictly optional. Your input will help faculty and administration understand your personal device usage in order to offer a better learning environment for the classroom. Please go to the following site to participate: https://www.surveymonkey.com/s/PTD_Usage_Main_Survey Thank you for your honest input and I will see you in class!”

If you are interested in allowing your students participate, please send this request to your classes of 20 (minimum) students or more who are allowed to bring and use their personal technological devices during instruction within a traditional f2f course. This study will not be conducive for smaller classrooms or computer labs. Thank you in advance for your participation. Attached you will find poster data and the actual survey questions that are in the SurveyMonkey link.

My regards,

Anna Currie, MBA, NBCT, NCSU Doctoral Candidate