University of Nevada, Reno

An Ecological Study of Instructor Views of Free Use Multitasking with Digital Devices in the Classroom

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Education

by

Sandra McElrath Week

Dr. Rita Laden/Dissertation Advisor

May, 2016
We recommend that the dissertation
prepared under our supervision by

SANDRA MCELRATH WEEK

Entitled

An Ecological Study of Instructor Views of Free Use
Multitasking with Digital Devices in the Classroom

be accepted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

Rita M. Laden, Ed. D., Advisor

Diane Barone, Ed. D., Committee Member

George C. Hill Ph. D., Committee Member

Jafeth E. Sanchez, Ph. D., Committee Member

William Kuechler, Ph. D., Graduate School Representative

David W. Zeh, Ph. D., Dean, Graduate School

May, 2016
Abstract

University instructors experience continual technological change that affects their classroom teaching and their relationships with students. Few studies have been conducted regarding instructor views about student off-task multitasking during class. This study used a qualitative design with a phenomenological approach to discover meaning that instructors attribute to the challenges they encounter in dealing with student information and communications device use in the university classroom. Bronfenbrenner’s (1990) ecological systems theory was used as a lens to organize and bring understanding to data collected from participant interviews, classroom observation, and syllabus inspection. The design of the study was different than any studies found to date as it triangulated instructor interviews with syllabi and observational data. Twelve participants who teach freshman-and sophomore-level core curriculum classes from a western university were included in the study. Information accumulated in this study supported some of the current research, but was in direct opposition to other research. The findings provide practical recommendations and many new opportunities for future research.

Keywords: instructor views, classroom distractions; student engagement; multitasking, flow theory; digital immigrants
DEDICATION

This dissertation is dedicated to my parents: Bob and Rose Ann McElrath. My father died when I was working on my master’s in business and my mother while working on my PhD. They knew I would complete these endeavors, but it would have been wonderful to share these milestones with them. They had everything to do with every success I have had in life. They also helped me to learn from my failures. I am successful due to my father’s work ethic and joy in a job well-done and my mother’s kind, and ever-lasting support. My father taught me to fly in every sense of the word. My mother taught me to appreciate every day we have on this Earth. They both had lives well-lived and wanted the same for my sister Ann, my brother Neil, and me. What I miss most about their absence as I complete this dissertation is the fun we would have had in celebrating this event. I was ever so lucky to be their “kid.” Thanks Mom and Dad!
ACKNOWLEDGEMENTS

I was allowed to choose who sat on my dissertation committee. My choices were not random. However, each member proved to be more than I could have hoped. I have been fortunate to get through this process relatively unscathed because of my wonderful committee, my family and friends.

In many ways, writing a dissertation is a lonely endeavor. This was one of my most daunting challenges as I am a “people person.” It is why I express my everlasting thanks to my committee chair, Dr. Rita Laden. She was a casual friend for 20 years before becoming my advisor, gentle and wise critic, and motivator. I am awed by the amount of time and effort she expended on my behalf. I am forever in her debt and value our friendship beyond measure.

Dr. Diane Barone knows qualitative research. She knows how to teach it, how to conduct it, and how to direct a PhD student in accomplishing a finished dissertation. She was always willing to help. I learned how and why I needed to conduct this study from Dr. Barone and Dr. George (Gus) Hill. Dr. Hill taught my survey class and had long discussions with me about why I should conduct this qualitative research in order to later conduct survey research. Thank you both for your time and expertise.

Dr. Jafeth Sanchez was new to sitting on committees, but by no means a rookie. She knew organization, editing, and always had warm and sincere motivating help.

Dr. Kuechler’s door is always open, he listens intently, and always has something thoughtful to say that is right on point. He and the entire department of information systems (IS) faculty supported my beginning a PhD. Thank you to Dean Greg Moser and
Drs. Croasdell, Edberg, Kuechler, and Simkin who made emeritus status a reality which helped my study immensely.

My family and friends were supportive as well. My son, Dan, always lent me an ear, had wonderful insight, and cheered me on. My sister Ann Lougheed, and my brother Neil McElrath gave me loving support and make up the family that everyone wishes they could have.

Also, my friend for over 30 years, Mary Meyer, is a chef with the recipe for good times, solid friendship, and caring commiseration. And 18-year friend Cathy Buck is intelligent, steadfast, giving, and always good for a laugh. You two helped me through the difficult changes in my life that lead me to being the happy person I am today. I love you, my sisters.

Yes, I have been fortunate. True, the dissertation process is difficult, but can be done relatively painlessly when surrounded with wonderful people.
TABLE OF CONTENTS

ABSTRACT ........................................................................................................... i

DEDICATION ........................................................................................................ ii

ACKNOWLEDGMENTS ............................................................................................ iii

LIST OF TABLES ................................................................................................... viii

LIST OF FIGURES ................................................................................................. ix

CHAPTER I     INTRODUCTION .......................................................................... 1

   Background of the Study .................................................................................... 2

   Statement of the Problem ................................................................................... 5

   Purpose of the Study ............................................................................................ 6

   Significance of the Study .................................................................................... 7

   Research Questions ............................................................................................. 7

   Research Design ................................................................................................ 7

   Theoretical Framework ......................................................................................... 8

   Definition of Terms ............................................................................................ 9

   Summary ............................................................................................................. 13

CHAPTER II   LITERATURE REVIEW ...................................................................... 16

   Section 1: Multitasking ..................................................................................... 16

   Section 2: ICTs in the Classroom ....................................................................... 29

   Section 3: Competing Perspectives in Literature ........................................... 54

   Summary ........................................................................................................... 56
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>METHODOLOGY</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Study Design</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Ecological Lens</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Context of the Study</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Researcher’s Role</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Participants</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Observations and Interview Settings</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Data Analysis</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Assumptions, Limitations, and Scope</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>86</td>
</tr>
<tr>
<td>IV</td>
<td>DATA ANALYSIS AND FINDINGS</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Data Analysis using Ecological Systems Theory</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>132</td>
</tr>
<tr>
<td>V</td>
<td>DISCUSSION</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Purpose of the Study</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Study Design and Research Questions</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Summary of the Problem</td>
<td>134</td>
</tr>
<tr>
<td></td>
<td>Discussion of the Findings</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Limitations</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Conclusions</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Practical Recommendations</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>Implications for Further Research</td>
<td>155</td>
</tr>
<tr>
<td>REFERENCES</td>
<td></td>
<td>158</td>
</tr>
</tbody>
</table>
APPENDICES ............................................................................................................................................... 178

(A) Purposive Sample .......................................................................................................................... 178

(B) Letter to Possible Participants ...................................................................................................... 179

(C) Participant Information and Consent Form .................................................................................... 180

(D) Interview Questions ....................................................................................................................... 182
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table 1</th>
<th>System use Definitions and Examples</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2</td>
<td>Participant Description with Digital Native/Immigrant Status</td>
<td>73</td>
</tr>
<tr>
<td>Table 3</td>
<td>Design Validity</td>
<td>83</td>
</tr>
<tr>
<td>Table 4</td>
<td>Adapted System Use Definitions and Examples</td>
<td>90</td>
</tr>
<tr>
<td>Table 5</td>
<td>Various ICT Policies by Participant</td>
<td>94</td>
</tr>
<tr>
<td>Table 6</td>
<td>Participant Status, Class Size, Policies and Off-Task Behavior</td>
<td>105</td>
</tr>
<tr>
<td>Table 7</td>
<td>Instructor Adaptation, Demographics and Classroom Policies</td>
<td>124</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Flow Theory Model</td>
<td>24</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Ecological Systems Model</td>
<td>64</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Syllabi Data Entry</td>
<td>80</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Classroom Observation Data Entry</td>
<td>80</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Participant Data Entry</td>
<td>80</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Reflections Data Entry</td>
<td>80</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Adapted Ecological Systems Model</td>
<td>89</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Observed ICT Off-Task Behavior</td>
<td>137</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

Higher education professionals struggle with the question of whether information and communications technology devices (ICTs) should be allowed in the classroom during instruction (Young, 2006; Dietz & Henrich, 2014). Most higher education instructors experience pressure from students to permit the devices to be freely used during class (Campbell, 2006; Emanuel, 2013; Palen, Salzman & Youngs, 2001) and are aware of the calls to update teaching techniques to include technology in order to embrace student culture (Clayson & Haley, 2013; Dingus, 2014; Prensky, 2005; Tessier, 2013; Walker, Sampson, & Zimmerman, 2011). These calls are contrary to evidence that using ICTs for guided use increases negative consequences on learning due to student multitasking (Froese et al., 2012; Read, 2004; Wei & Wang, 2010).

When ICT use is guided, professors conduct classroom activities with well-defined tasks. However, off-task behavior may occur in the classroom during structured, guided use. In free use scenarios, students may use the devices for note-taking and for personal reasons at will. Multitasking, the act of doing more than one thing at a time, in both guided and free use occurs at rates that negatively affect learning (Aagaard, 2015; Berry & Westfall, 2015; Carr, 2010; Foerde, Knowlton, & Poldrack, 2006; Greenblatt, 2010; Heathcote et al., 2015; Kraushaar & Novak, 2010; Rosen, Lim, Carrier, & Cheever, 2011; Wei, Wang & Fass, 2014), grades (Fox, Rosen, & Crawford, 2009), and cumulative grade point average (GPA) (Bradstreet Grinols & Rajesh, 2014; Junco, 2012; Karpinski, Kirschner, Ozer, Mellott, & Ochwo, 2013; Mark, Wang & Niiya, 2014; Rosen, Carrier, & Cheever, 2013; Wood et al., 2012). Multitasking can also be a
distraction to both instructors and other students attending class (Aagaard, 2015; Bailey & Konstan, 2006; Berry & Westfall, 2015; Campbell, 2006; Glenn, 2010a; Goundar, 2014; Junco & Chickering, 2010; Kraushaar & Novak, 2010; Sana, Weston & Cepeda, 2013; Shelton, Elliot, Evans, & Exner, 2009).

It is reported that multitasking while endeavoring to learn has negative consequences (Kraushaar & Novak, 2010). Although some studies show that students using ICTs are more engaged with the material in the classroom, and spend more time outside of the classroom learning (Gikas & Grant, 2013), others show that students learn less than expected (Froese et al., 2012). In addition, studies show that ICTs are used to cheat on exams (Dietz & Henrich, 2014; Read, 2004; Tindell & Bohlander, 2012), and to engage in various cyberloafing (off-task) behaviors (Karaoglan Yilmaz, Yilmaz, Tugba Ozturk, Sezer, & Karademir, 2015; Taneja, Fiore & Fischer, 2014). In general, when students are off-task using ICTs in the classroom, the media is so compelling that they negatively affect teacher immediacy, i.e., the ability for a teacher to gain and hold student attention (Wei & Wang, 2010). The contradictory findings on learning outcomes when using multimedia in classrooms (Krippel, McKee, & Moody, 2010) further confound the issue of whether instructors should embrace ICTs as a teaching tool, and pertinent to this study, if they should or should not allow free use of ICTs during class.

**Background of the Study**

Instructors experience continual technological change that affects their classroom teaching and their relationships with students. Research delves into the differences between students who grew up with digital technology (digital natives) and instructors who did not (digital immigrants) (Prensky, 2005). Digital natives had access to ICTs
since birth and are comfortable with technology. Conversely, digital immigrants are
defined as tourists in the new, digital world. In addition, with millennial generation
students now the majority of undergraduates at U.S. universities (Coomes & DeBard,
2011), instructors are experiencing increasing free use of ICTs for tasks other than class-
related activities (Synnott, 2013; Zickuhr, 2011).

Students do not want to be passive; they want involvement during class (Astin,
1984). The journal *The Internet and Higher Education* addresses the desire of students
and instructors who want to use ICTs for teaching. It is devoted to “addressing
innovative deployments of Internet technology in instruction” and publishes research that
demonstrates the “effects of the internet and information technology (IT) on instruction in
various contexts in higher education” (Dingus, 2014; Aims & Scope, para. 1). Although
millennial students want to use active learning methods in classes rather than lecture,
active learning is difficult to employ in large classes and is more time consuming to
prepare (Bonwell & Eison, 1991; Kirchner, 2015; Lam & Tong 2015). In addition,
“considerable attention needs to be dedicated to both training and implementation” to
successfully use ICTs in classroom teaching (Archer et al., 2014, p. 148). Often, quality
materials are not readily available and many instructors do not have the technological
expertise, support, or training to use ICTs for teaching (Bingimlas, 2009).

Instructors must make difficult decisions regarding ICT classroom policy as they
rely on research and experience to make decisions. Numerous articles tout the benefits of
ICTs as instructional aids (Prensky, 2005; Tessier, 2013; Walker et al., 2011) while
others report obstacles and unintended negative consequences that occur when ICTs are
used during class (Froese et al., 2012; Read, 2004; Wei & Wang, 2010). Research is
mixed concerning cell phone use in the classroom (Schmid et al., 2014) with no clear cut answers for educators. Although many studies show using computers as part of learning activities can be successful, students tend to be distracted by the technology.

Young (2006) stated that it is often at the professor’s discretion whether ICTs are allowed to be used in the classroom. Currently, instructors use an array of policies to curb or outright ban the use of ICTs in the classroom (Clayson & Haley, 2013; Emanuel, 2013; Rogers & Monsell, 1995; Tindell & Bohlander, 2012). Emanuel (2013) argued that banning ICTs is not the answer; professors must better engage students during class. He stated:

Integrating [ICT] use into instruction meets students where they are, it uses a tool they are comfortable with, it speaks their language, it shows innovativeness on the part of the instructor, it provides for an engaged, entertaining, and interactive exchange with students, and it enables the classroom to tap into the information super-highway. (p. 78)

In 2006, Fried said, “There does seem to be a developing feud between those who want to promote [ICT] use [in the classroom] and those who are resistant to it” (p. 906). Today, the feud not only involves students, instructors, and administration, but business and society as well.

A disparity of expectations exists between professional and educational environments. The ability to multitask is highly valued in professional environments. When searching Monster.com using the skill “multitasking,” hundreds of jobs are listed that range from nursing assistants to accountants (Monster.com, n.d.). “The faster we’re able to navigate [online] media and the more adroitly we’re able to shift attention among
online tasks, the more valuable we’re likely to become as employees,” says Carr (2010, p. 140). Off-task multitasking with ICTs is generally shunned by higher education instructors even though huge investments in technology have been made at the collegiate level (Maddox, 2009).

The difference in the value placed on multitasking in business and higher education may be two-fold. First is the difference in focus. Higher education professionals value learning where business professionals value productivity and the ability to stay calm while multitasking under pressure (Bell, Compeu, & Olivera, 2005; Colom, Martinez-Molina, Shih, & Santacreu, 2010). The second issue is the particular applications used when multitasking. Students are often off-task with social media (Bradstreet Grinols & Rajesh, 2014; Carrier, Cheever, Rosen, Benitez, & Chang, 2009; Cheever, Rosen, Carrier, & Chavez, 2014; Rosen, Whaling, Rab, Carrier, & Cheever, 2013) where workers are expected to be concurrently performing work-related tasks (Morgan et al., 2013). The social acceptance of multitasking and the fact that some careers demand the ability to multitask are at odds with the teaching and learning environment in higher education (Aagaard, 2015; Bell et al., 2005).

**Statement of the Problem**

Due to the mixed results found in current research and pressures that emanate from various entities, instructors have no clear direction as to whether they should allow the free use of digital devices during class. Instructors may feel student, peer, administrative, and social pressures (including those entities that hire graduates). In addition, little research exists regarding instructor views in dealing with technological change. Instructor views should be investigated as they have practical experience in the
classroom and are knowledgeable about the issues regarding free use of ICTs during class.

While many studies have delved into the perceptions of students’ perceptions of ICT use during class (Alsaggaf, Hamilton, & Harland, 2013; Bjorklund & Rehling, 2010; Hirschy & Braxton, 2004; Hoffman & Douglas, 2014; Thompson, 2013; Lavin, Korte & Davies, 2011; Ravizza, Hambrick, & Fenn, 2014; Tessier, 2013) and the guided use of ICTs in the classroom (Archer et al., 2014), few studies have explored instructors’ views concerning student free use of ICTs during class (Campbell, 2006; Langmia & Glass, 2014; Synnott, 2013). It is not known if the advent of ICTs has changed instructor relationships with students or the dynamics of the classroom. Synnott’s (2013) study found that most instructors want college or university-wide policies. However, calls to set universal ICT policies on campuses are not apparent in the literature. It is not known whether instructors are changing their attitudes concerning student free-use of ICTs in the classroom over time. Nor is it known if instructors feel a responsibility to teach where and when ICT use and multitasking is or is not acceptable. Instructor thoughts, opinions, and experiences should be explored to contribute to research regarding student multitasking with ICTs during class.

**Purpose of the Study**

The purpose of this qualitative study was to add to the research by focusing on instructors’ views of college student free use of digital devices during classroom instruction at a western university. The study also explored instructor acceptance or resistance to technological change and whether professors believe that ICTs are a benefit or detriment to student learning during classroom instruction.
Significance of the Study

In a naturalistic way (Lincoln & Guba, 1985), this study may be useful as a tool for instructors to understand their own views and those of others in the midst of cultural change due to increasing ICT use in society. It may assist instructors and administrators in university settings to manage disruptions in the classroom and enhance learning. Finally, as very little research has been conducted on this subject, it will add to the knowledge base and be a basis for further research.

Research Questions

The study focused on the following questions by examining syllabi, observing student off-task ICT use in the classroom, and interviewing instructors. The research questions in the study include:

1. What are instructors’ views concerning college student use of digital devices during class?
2. What are instructors’ views regarding policies they or their institutions set forth regarding ICT use during class?
3. How have instructors dealt with student free use multitasking with ICTs during class in the past, and how do they view the challenges of the future?

Research Design

Study participants, documentation in the form of observed courses syllabi, and data collected from classroom observations were used in this qualitative study. The participants were garnered from the purposive sampling. Participants volunteered to be part of the study. Each participant was asked the same core questions; however, the
interviews were conversational in nature so that personal experiences, opinions, and examples were discussed. Observations of participant classes and data gleaned from course syllabi facilitated triangulation of data collected in interviews. Chapter III of this document covers data collection and analysis in detail.

**Theoretical Framework**

Lincoln and Guba (1985) stated, “A paradigm is a world view, a general perspective, a way of breaking down the complexity of the real world” (p. 15). This qualitative study used Bronfenbrenner’s ecological systems theory (EST) (1979) as a lens to facilitate breaking down the complexity of the information gathered from the participants in this study. The lens shaped the types of data to be collected in document inspection, observations, and interviews (Creswell, 2014). In addition, the model supported the creation of themes from the data.

The ecological systems model guided the researcher in determining how a person accommodates and responds to pressures and influences exerted by others. The model dictated the nature of questions used in the interviews and the relationship of document inspection and observations to participant contributions in the interviews. The lens also guided the researcher in understanding pressures felt by instructors from students, from the education community, and within the context of society. It directed probing questions to facilitate data collection regarding instructor opinions in order to discern if educators are adapting to change in classroom teaching due to increasing use of digital devices and advances in technology.
Definition of Terms

The following definition of terms may have disparate meanings in other contexts. However, the definitions below are used for the purpose of this study.

1. Active learning - Rather than passively receiving information from the course instructor, active learning is a classroom experience where participation and engagement are part of the learning process.

2. Belief – A perception, view, opinion or conviction.

3. Checking - A student in the act of looking at an ICT for new updates in social media, new email, new texts, updates in sports scores, etc., or for feedback that others are viewing posts the student created (Goundar, 2014).

4. Cyberloafing/Cyberslacking - The act of using ICTs to engage in off-task behavior during class (Karaoglan Yılmaz et al., 2015; Taneja et al., 2014).

5. Digital natives - People born after 1980 who have grown up with digital devices as part of everyday life (Prensky, 2001).


7. Distraction, external – Distractions that do not originate with the distracted person, per se. They are audio, visual or other sensory interruptions, such that originate in a person’s environment.

8. Distraction, internal – Self-interruptions that are “internal decisions to stop an ongoing task to attend to another, due to personal thought processes or choices” (Alder & Benbunan-Fich, 2013).
9. Ecological lens - Ecological systems theory (EST) (Bronfenbrenner, 1979) is an approach to study human development in the face of multilayered influences that affect change in the developing person. The ecological model describes change in a person’s life and how he or she relates to people, circumstances, and systems.

10. Flow theory - Flow occurs when one is “in the zone.” It is the state of challenge between boredom and anxiety where a person is so involved in an activity that nothing else matters (Csikszentmihalyi, 1990). Flow theory posits that students are more distractible when they do not understand material than if they are bored with material presented in class, and that learning occurs when students are in a state of flow (English, 2006).

11. Flipped classroom - “Where the reading and learning of material is done by students before class time and class time is used for application, exercises, and what used to be called homework, smartphones can be effectively used to carry out these activities” (Bradstreet Grinols & Rajesh, 2014, p. 92).

12. Grade point average (GPA) - Depending on the study, grade point average may be reported in overall averages to date, by semester, or by year.

13. Information and communication technologies (ICTs) - ICTs include cell (smart) phones, personal digital devices (PDA), tablets, laptops, gaming devices, and wearable technologies such as Apple Watch and other jewelry.

14. Instructor – A term that includes all those who teach at the college level.

Examples include graduate assistants, adjunct professors, lecturers and professors.
15. Interruption - When a stimulus arises that activates an attention shift. In a multitasking situation, the new goal becomes the focus of attention until old goals are reactivated (Adler & Benbunan-Fich, 2013).

16. Involvement - The energy, both physical and psychological, that a student devotes to the classroom experience.

17. Millennial generation - Those born from the early 1980s to the early 2000s.

18. Multitasking - Occurs when attention is divided between tasks on personal digital devices and classroom lecture.

19. Naturalistic inquiry – A type of inquiry often used in qualitative research where the researcher interprets peoples’ life situations as they naturally occur and takes into account how people understand these situations (Beuving & de Vries, 2015; Creswell, 2014).

20. Off-task behavior - Inattentiveness due to engagement in tasks that are not class-related. Also known as cyberloafing or cyberslacking.

21. Perception – A belief, view, opinion or conviction.

22. Positivism – A type of inquiry often used in quantitative research where the researcher seeks to find universal social laws that exist in society (Beuving & de Vries, 2015, p 27; Creswell, 2014).

23. Presenteeism – The term originally used in business for employees attending work when sick is extended to mean students physically being present in class, but not mentally attentive due to multitasking behaviors (Gehlen-Baum & Weinberger, 2014).
24. Quick succession task-switching (QST) – A student breaking off between texting or surfing to take notes and returning to the off-task ICT activity multiple times in quick succession.

25. Sample, Convenience – A sample of participants selected for a study that is easy for the researcher to use and may not be representative of the population (Vogt, 2005).


27. Sample, Purposive– A sample that a researcher believes is composed of potential participants that are “typical or ‘representative’ of the population” (Vogt, 2005, p.252).

28. Sample, Stratified random – The random selection of equal size groups within a population.

29. Teacher immediacy – Instructor verbal and nonverbal behaviors that enhance communication and student attention in class. For example, eye contact, calling on students by name, and asking for student feedback (Wei & Wang, 2010).

30. Use, guided - ICTs used in classroom activities for well-defined tasks (Salter, 2013).

31. Use, free - Class policy that allows students to use ICTs for tasks other than class-related activities (Salter, 2013).

32. Uses and gratifications theory (UGT) - examines how a user actively chooses media content to meet social and psychological needs (Katz, Blumler, & Gurevitch, 1973).
33. View – A belief, perception, opinion, or conviction.

34. Viral texting – A group of students who socialize by sharing texts. The distraction spread to additional students who joined in the group behavior. The behavior disrupts other students outside of the group who tend to check or text on their phones.

35. Working memory capacity (WMC) - The amount of task information that can be stored for concurrent processing and is a predictor of multitasking ability (Medeiros-Ward, Watson, & Strayer, 2015).

Summary

Chapter I introduced the complexity of higher education instructors’ decisions regarding student free use of ICTs during class. The pressures instructors face when making these decisions were described. It described free use and guided use scenarios in the classroom and the contradictory outcomes in current research on the impact on learning, grades, and GPA when students multitask with ICTs during class.

The background of the study described current literature regarding the nature of students today and the disparity of expectations between students, faculty, their institutions, and society on the learning environment and student ICT multitasking during class. It included information about the current research in student and instructor perspectives on student free use of ICTs during class.

The statement of the problem discussed the lack of research on instructor perspectives. Although student perspectives have been broadly studied, very little research exists on instructors’ thoughts, opinions, experiences, and the pressures they feel concerning technological change.
The purpose of the study is to add to the research by obtaining information on instructor views, and exploring their acceptance or resistance to technological change. The significance of the study is that information gained in this study will be useful to instructors and administrators to make policy decisions and the findings will add to current research.

The research questions were listed and the research design was discussed. The questions center on instructors’ views concerning the use of ICTs during class, policies that affect higher education classroom teaching, and how instructors are currently dealing with technological change. The design of the qualitative study was to use data collected from instructor interviews, syllabi, and classroom observations to create themes regarding instructor perspectives.

Bronfenbrenner’s EST was described in the theoretical framework section. The EST served as a lens for the study and shaped data collection. It also worked as a model to produce themes based on these data. Various assumptions, limitations, and the scope of the project were discussed, and a list of definitions of terms was included to clarify verbiage used in this dissertation.

Chapter II will examine the literature related to this study. It includes information on multitasking and flow theory and their effect on student learning, grades and GPA, and current research on student and instructor perspectives concerning the use of ICTs in the classroom. It also covers a number of studies about the effects of the free use of ICTs in the classroom.

Chapter III describes the methods used for data collection, the organization, and the production of themes for this study. Chapter IV presents the results of the study.
Chapter V includes a discussion of the study’s findings. A discussion of the implications for future practical use of the study, and how the study’s findings may be used for further research was included.
CHAPTER II
LITERATURE REVIEW

The purpose of this study was to explore instructor views of student free use of digital devices in the classroom. The review of literature includes research on student multitasking with ICTs in the classroom and its effect on learning, overall grade point average (GPA) and student anxiety. In addition, research regarding student and instructor views concerning the use of information and communication technologies (ICTs) in the classroom is included. The various pressures instructors encounter in their positions as educators is examined.

This chapter is divided into three sections. The first section reviews current research on multitasking and its effect on learning and how flow theory is salient to ICT use in the classroom. It includes information on causes of student internal and external distractions while in class due to digital device use. The second section discusses literature on use of ICTs in the classroom. Student and instructor views of in-class multitasking and classroom policies are included. The propensity of new types of disruptions is covered to exemplify the changing nature of technology and disruptions. The last section discusses gaps in the literature, includes calls for research related to instructor views regarding the ubiquitous use of ICTs in society today, and how this study fits into the extant literature.

Section 1: Multitasking

Millennial students (born after 1982) believe that it is a more effective use of time to multitask (Ellis, Daniels, & Jauregui, 2010). Multitasking “is characterized by interleaving independent tasks in the same time period and switching among them”
Researchers are trying to create a unified theory of multitasking in which a number of theories are combined (Salvucci, Taatgen, & Borst, 2009). The unified theory explains how different tasks compete for brain resources and it posits that it takes more time to complete multiple tasks when multitasking in comparison to completing tasks sequentially.

Multitasking is generally not an efficient use of time, especially if the tasks use the same brain resources (Pashler, 1994). For example, a study at Stanford University with thirty students found “heavy media multitaskers performed worse on a test of task-switching ability, likely due to reduced ability to filter out interference” (Ophir, Nass, & Wagner, 2009, para. 1). Research shows that working memory capacity (WMC), the amount of task information that can be stored for concurrent processing, is taxed when multitasking (Medeiros-Ward et al., 2015). Overtaxing WMC is particularly problematic when tasks require complex problem solving or use similar thinking resources. For example, Bailey and Konstan (2006) state that peripheral information is disruptive and that it costs in error rate and completion time.

In a comprehensive review of the literature on the performance of simultaneous cognitive tasking, Pashler (1994) suggests that people have remarkably severe limitations when trying to perform two different tasks at once, even when the cognitive processes seem fairly trivial. Pashler, Johnston, and Ruthruff (2001) indicate that even if a student is trying to pay attention, attention may be involuntarily allocated to distractor stimuli and that switching from one task to another causes additional cognitive load. Further, same or similar tasks do not pose as substantial a load as differentiated tasks (Rogers & Monsell, 1995). In other words, what students are doing when they are multitasking in
class may be as important as whether they are multitasking at all. For example, a student looking up translations of vocabulary words during a Spanish class may not be as distracted as a student switching from Facebook to a lecture on astronomy.

Studies show that multitasking in class and when studying negatively affects learning in higher education (Aagaard, 2015; Bradstreet Grinols & Rajesh, 2014; Carr, 2010; Greenblatt, 2010; Heathcote et al., 2015). A 2010 study revealed that it took multitasking students more time to complete educational activities than those who focused on the activities (Bowman, Levine, Waite, & Gendron). The incidence of multitasking is underreported by students, is on the increase, is causing anxiety (Carrier et al., 2009; Cheever, Rosen, Carrier, & Chavez, 2014; Fox et al., 2009; Mark, Wang, & Niiya, 2014), and is distracting to learning in the classroom (Aagaard, 2015; Kraushaar & Novak, 2010; Berry & Westfall, 2015).

**Multitasking and Anxiety**

Young people today are more anxious compared with young people of earlier generations (Carrier et al., 2009). These anxieties can be predictors of psychological disorders. “More inclination to multitask appeared to provide a major boost in clinical symptoms of depression, mania, narcissism, antisocial disorder, compulsive disorder, and paranoid disorder” (p. 1251). Studies show that multitasking increases anxiety in college students and may be a catalyst for a number of neuroses (Cheever, Rosen, Carrier, & Chavez, 2014; Rosen, Whaling, Carrier, & Cheever, 2013; Fox et al., 2009; Mark et al., 2014). On the contrary, more time spent talking on the phone or using computers as tools for schoolwork were predictors of decreased anxiety among students.
Carrier et al. (2009) studied multitasking across generations with over 1,300 participants divided into generations by birth year. The authors defined Generation X as those between the Net Generation (born before 1981) and Baby Boomers (born between 1946 and 1964). As expected, the Net Generation multitasked the most, Baby Boomers the least, and Generation Xers were in the middle. The types of multitasking were not significantly different across generations. Younger people felt that they had the least trouble acquiring new skills, but all three generations agreed on which combinations of tasks were more difficult than others. The types of tasks that people combine when multitasking have a great deal to do with difficulty (Greenblatt, 2010). Those that demand more WMC are tapping into similar brain functions which causes more stress. Further, the study found that students’ multitasking behaviors cause anxiety, lower reading comprehension, and lower grades (Fox et al., 2009).

In 2014 it was found that undergraduate students were multitasking at a higher rate than information workers (Mark et al.). Staying up late at night and spending more time overall on computers were associated with higher stress levels and lower grades. However, there was a confounding finding that those who multitasked with social media lowered their stress levels as they were more “connected” with others. Conversely, a 2013 study with 82 participants concerning social media use and well-being found that increased Facebook use negatively predicted life satisfaction while face to face interactions increased a participant’s well-being (Kross et al.). The “fear of missing out” leads some to increase social media use due to the belief that others have more satisfying lives (Alt, 2015, p. 117).
Students experienced anxiety when they were deprived of their cell phones in a 2014 study where 75% of the 163 participants were under 25 years old (Cheever, Rosen, Carrier, & Chavez, 2014). Those who were light cell phone users were unaffected when their devices were taken away. High users experienced increasing anxiety over time when they were deprived of their devices. The authors gave two explanations for this anxiety: fear of missing out; and separation anxiety. They stated that obsessive compulsive disorder (OCD) use of digital media is not to increase pleasure, but to reduce anxiety.

A debate exists whether if it is possible to be addicted to multimedia and if multitasking is the basis for computer addiction. Some believe that young people are able to multitask better than older people. Prensky (2001) defines the generation born after 1980 as digital natives, while older adults are considered digital immigrants. Prensky states that a disconnect exists between these groups to such an extent that the digital natives speak “an entirely new language” and that they “think and process information fundamentally differently from their predecessors” (p. 2). Prensky asserts that digital natives created a new language during their childhoods that digital immigrants learned in a different way later in life. This new language is purported to reside in a different part of the immigrants’ brains than in the brains of their younger counterparts. In contrast to immigrants, digital natives like to parallel process and multitask.

On the other hand, habitual distraction that leads to multitasking occurs as modern students seem to have difficulty with the traditional classroom environment and react “particularly strongly to the perceived monotony of lecturing” (Aagaard, 2015, p. 95). Both China and South Korea invested in treatment centers for internet addiction as it is “a
primary public health concern” (Greenblatt, 2010, p. 780). Treatment centers are on the increase in the United States as well (Tinker, 2013). Some experts deem that the term “addiction” is used too lightly today and that multitasking behaviors are not a new phenomenon (Greenblatt, 2010). In the 18th century British author Samuel Johnson wrote that people tend to go from “anticipation to anticipation” rather than from “satisfaction to satisfaction” (p. 781). Greenblatt states that today’s technology not only allows people to constantly multitask - it demands multitasking.

Multitasking and Learning

Persuasive research shows that multitasking is hampering student learning and academic performance at the higher education levels (Aagaard, 2015; Bradstreet Grinols & Rajesh, 2014; Heathcote et al., 2015). Brain studies have shown that it takes a great deal of mental attention to learn a skill and that once it becomes habitual, the brain does not have to work as hard to complete the task (Duhigg, 2012). However, while texting and social media tasks may become habitual, new material presented in an educational environment is likely novel in nature. Attempting to learn while multitasking can result in knowledge attainment that is less flexible when applied to new situations (Foerde et al., 2006).

In 2011 75% of participants in a study by Rosen et al. (2011) said that receiving and sending texts “ruins one’s ability to learn from a lecture” (p. 170). A 2013 study found that 40% of the participants felt it was acceptable to text during class (Rosen et al.). The study showed when multitasking, a “marked and substantial reduction in information [was] acquired from educational materials” (p. 597) as compared to a control group. Kraushaar and Novak (2010) found that students do not accurately report the actual
amount of multitasking they engage in during class. For example, students under-reported their use of instant messaging in class by about 40%. The authors concluded that students experience social pressure to engage in multitasking.

Further studies have shown that students’ study habits and overall social networking use are counterproductive and damaging to overall GPA. For example, Rosen et al. (2013) found that second to getting up to stretch or walk, technological distractions were responsible for task switching behavior. The study also found that participants, on average, stayed on task for 10 minutes of a 15-minute study period. In another example, analysis of 451 U.S. university students showed that the amount of social networking site use in minutes per day was negatively predicative of overall college GPA in higher education courses to date (Karpinski et al., 2013). In a 2012 study, Adler and Benbunan-Fich found that “accuracy steadily decreases as multitasking behavior increases” (p. 166).

A pilot study compared recorded biometric responses to media between digital natives and immigrants (Marci, Frank, Rule, Martin, & Hardy Williams, 2013). The study used a monitoring system similar to a lie detector test plus a video camera attached to eyeglasses to “record moment-to-moment changes in biologic indicators of emotional response including changes in heart rate, breathing patterns, skin conductance, and motion” (p. 1). Information gleaned of interest is that natives have an “increased emotional response to digital platforms” (p. 4), a significantly shorter attention span, a higher tendency for boredom, and they multitask to alleviate their boredom.

High multitaskers generally perceive that they are excellent at task switching, but actually worse than self-proclaimed light multitaskers in multitasking scenarios (Ophir et al., 2009). A continuum of ability exists from those who can only work sequentially to
those termed *supertaskers* (Watson & Strayer, 2010). The supertasking outliers were discovered during a study of 200 participants’ cell phone use while driving. It was found that approximately 2.5% could attend to more than one task at a time with no mental switching costs.

Medeiros-Ward, Watson and Strayer continued research on supertaskers in 2014. Using brain imaging while participants multitasked, the authors found that supertaskers had the ability to stay calm under pressure. Supertaskers are found to manage working memory capacity (WMC) in “dual-task situations qualitatively differently” (p. 882) than others. A 2015 study showed that WMC can be a predictor of superior multitasking abilities (Medeiros-Ward et al.). However, it was found that WMC was only important in simpler multitasking situations (Morgan et al., 2013). These outcomes illustrate that research in WMC is rudimentary at this time (Heathcote et al., 2015).

**Flow Theory**

Flow is the *optimal experience* that occurs when a person is involved in an activity to the point that nothing else is important at the time (Csikszentmihalyi, 1990). According to Csikszentmihalyi, most anyone is able to experience flow whether rich or poor, young or old, and that it is not based on intelligence. In addition, flow “seems to be a phenomenological state that is the same across cultures” (Debold, 2002, p. 5). Further, a person who is experiencing a high level of involvement is satisfied only with the experience and needs no other compensation other than the experience itself (Csikszentmihalyi, 1990).

In a flow experience, one feels autonomous and in control of personal fate. Alt (2015) studied students’ intrinsic and extrinsic motivations for learning. The study found
that students who were intrinsically motivated were driven by an interest in the material and a desire to learn. These students were less likely to use social media in the classroom. Conversely, those who were extrinsically motivated by grades or passing exams were more likely to use social media during class.

Flow occurs in the classroom when a student’s skills and current knowledge are challenged within the “flow channel” as depicted in Figure 1 (Csikszentmihalyi, 1990). High engagement that requires concentration creates a deep, but effortless involvement that removes awareness to other stimuli. Multitasking occurs when a student is not in the state of flow (Adler & Benbunan-Fich, 2013). Additionally, a student who is already multitasking cannot achieve a state of flow.

![Flow Theory Model](image)

*Figure 1: Flow Theory Model: Adapted from* Flow: The psychology of optimal experience, (p. 74) by M. Csikszentmihalyi, 1990, New York: Harper & Row.

The level of concentration put toward a learning task may significantly influence learning outcomes (Yang, Li, & Lu, 2015). The student not adequately challenged becomes bored and is subject to multitasking. Teaching that is too advanced will also keep a student from achieving flow (Adler & Benbunan-Fich, 2013). Both internal and
external interruptions can keep a student from achieving flow or draw a student out of the state of flow (Adler & Benbunan-Fich, 2013). Internal cues cause self-interruption where the student attends to another goal with no external alert. External interruptions can also create an entropic state where distractions are caused by environmental cues or alerts.

Those who experience flow create positive psychic energy. The alternate state is entropy where internal order is disrupted (Csikszentmihalyi, 1990). It only takes a short duration disruption to break concentration during a cognitively engaging activity (Altmann, Trafton, & Hambrick, 2014). Interruptions lasting 4.4 seconds caused three times as many errors as those in a non-interrupted state. Even a 2.8 second disruption doubled the number of errors.

According to motivational intensity theory, an individual will stop investing effort if a task is not perceived as achievable (Tozman, Magdas, MacDougall, & Vollmeyer, 2015). Alder and Benbunan-Fich (2013) found that a student not in the state of flow is more likely to multitask during lecture when ideas are too challenging rather than during periods of boredom. The student will use “adjustment mechanisms to seek a more optimal experience” (p. 1443).

Brooks (2015) found that distractions when trying to multitask while completing tasks in a classroom environment caused negative effects in performance, technostress, and lowered happiness among participants. The researcher used distraction conflict theory and boundary theory to explain the study results. In addition, role conflict existed when incompatibility between two tasks or two types of relationships were competing for attention. For example, a student may be in the classroom and receive a text from a
parent. The role of student and daughter conflict causing multiple awareness. It is not possible to maintain a state of flow in the learning environment without complete concentration.

Using activity theory, which is closely associated with the study of human/computer interface, a set of metrics was created to accurately gauge the amount of multitasking while completing a problem (Benbunan-Fich, Adler, & Mavlanova, 2011). Measurements included both the number of computer applications used during a time frame, and internal and external interruptions. The authors found that students were internally interrupted about every five minutes to attend to email, browse the web or engage in social networking. They were also externally interrupted by the computer interface when messages were received. Self-interruptions (internal distractions) occurred more often and when participants were in a state of anxiety. They were drawn out of a state of flow when they were frustrated (they could not figure out the problem), were exhausted (they were tired of working on the problem) or were bored. Internal and external interruptions are discussed in detail below.

**Internal distractions.** Self-interruptions are “internal decisions to stop an ongoing task to attend to another, due to personal thought processes or choices” (Alder & Benbunan-Fich, 2013). For example, the habitual checking for text messages or new posts to social media creates an entropic state where a person is internally disrupted from a flow experience. Students are unlikely to answer a ringing phone in class, however, the relative privacy of text messaging has changed classroom behavior. Students report they miss important information in class while checking cell phones (Berry & Westfall, 2015).
Internal disruptions occur on laptops as well as cell phones. For example, Goundar (2014) surveyed 55 computer science majors to glean students’ opinions about internal distractions during class. When asked if having access to a laptop would “distract me from paying full attention in the classroom,” 53% of these students agreed or strongly agreed.

Checking behavior is a type of internal distraction. Wakefield conducted a survey of 500 currently enrolled college students each year from 2010 to 2014. The 2013 survey found 47% of the 500 surveyed were checking ICTs in less than 10 minute increments (CourseSmart®, 2013, 2014). In 2014, “45% of students said they usually do not go more than 10 minutes without using some form of technology during an average school day” (para. 5).

The checking behavior becomes so ingrained that most people who carry cell phones in their pockets experience internal cues when no alert occurred. In a 2011 survey of 290 college students that regularly carried phones, 13% experienced daily phantom cell phone vibration alerts (Drouin, Kaiser, & Miller, 2012). Only 11% had never experienced “imagined vibrations” from a mobile device.

Wei and Wang (2010) hypothesized that teacher immediacy could overcome the high level of gratification students receive from texting during class. Teacher immediacy is the ability of an instructor to influence learning by making an emotional and psychological connection with students and is linked to motivation. The authors found that the gratification gained by texting was more powerful than the instructor’s ability to engage students in class material as “texting behaviors may be triggered by students’ internal gratifications and by habitual media use” (p. 489).
Undergraduate college students reported they read an average of 11.5 text messages and send an average of 10 messages during each class (Wei & Wang, 2010). A number of studies employing the uses and gratifications theory (UGT) suggest that students satisfy social and psychological needs with text messages (Campbell, 2006; Grellhesl & Punyanunt-Carter, 2012; Katz et al., 1974; Leung & Wei, 2000, Wei & Wang, 2010) and they are anxious when they cannot check in (Rosen et al., 2013; Ragan, Jennings, Massey, & Doolittle, 2014). Based on UGT, media use can become habitual and may even be considered an addiction (Wei & Wang, 2010).

The phenomenon was demonstrated by the Tindell and Bohlander (2012) study where 92% of 269 surveyed students said they received text messages during class and 30% said they texted during every class. Moreover, students may be underreporting cell phone use during class (Duncan, Hoekstra, & Wilcox, 2012). Duncan et al. (2012) found that observations of classes showed cell phone use is closer to an average of seven times per class period as compared to the average of three times reported on a survey of 392 students. The study also showed that the final grade in an astronomy class correlated negatively with the self-reported number of instances of cell phone uses in class.

**External distractors.** External distractions do not originate with the disrupted person. They are audio, visual or other sensory interruptions. For example, students in the classroom in a state of flow can be drawn away from the experience by ringing cell phones, students sitting in front of them playing videos, surfing the web, or checking their cell phones, or visual or vibration alerts on a personal cell phone.

A survey by Goundar (2014) included questions about students’ opinions of what distracts them in class. While 49% either agreed or strongly agreed to statements that
other students checking cell phones or surfing the web were distracting, only 28% found students typing notes on their laptops to be a distraction. This research is contrary to findings by Sana et al. (2013) where it was found that students that had a direct view of other students multitasking activities had lower scores on tests than students who were not distracted by others.

A survey asked 3,616 students what behaviors they considered to be uncivil in the classroom (Bjorklund & Rehling, 2010). They ranked the degree of incivility of 23 activities using a 5-point scale. A four or more was considered very uncivil while a two was considered somewhat uncivil. Students considered ringing cell phones the third most uncivil behavior at 4.14. They felt that text messaging and using ICTs for non-class activities to be between moderately to very uncivil at 3.30 and 3.25 respectively. A ringing cell phone was considered more uncivil than conversing loudly with others. Texting and non-class computer use were considered more uncivil than leaving and returning during class. Campbell (2006) reported both students and instructors felt strongly that ringing cell phones were a distraction in the classroom. These interruptions are external distractors and therefore can move a student from a state of flow or keep a student from achieving flow during class (Adler & Benbunan-Fich, 2013).

Section 2: ICTs in the Classroom

Literature regarding student multitasking behavior during class and how off-task behavior affects learning are central to this study. This section covers students’ intrinsic and extrinsic motivations for learning. Studies show the negative effect that multitasking has on learning by describing the frequency and variety of multitasking in the classroom. Guided use and free use of ICTs in the classroom are further defined. Studies are
included that demonstrate the effect guided and free use of ICTs have on student behavior and learning. Also, studies that use video as a supplement or alternate to classroom teaching add to the current research on student in class multitasking behavior.

Cyberloafing is defined and studies regarding this behavior are presented. In addition, student and instructor views regarding the use of ICTs in the classroom are discussed. Also covered are policies used to control multitasking behaviors and the resulting effect on actual student behavior.

Granular studies where particular technologies such as the use of clickers and the incorporation of texting in classroom learning are explained. A number of studies have recommendations for instructors as to how and why they should use ICTs during class due to changes in technology and student expectations.

**Multitasking and Learning in the Classroom**

Alt (2015) studied students’ intrinsic and extrinsic motivations for learning. The study found that students who were intrinsically motivated were driven by an interest in the material and a desire to learn. These students were less likely to use social media in the classroom. Conversely, those who were extrinsically motivated by grades or passing exams and those who were amotivated (detached from learning experiences) were more likely to use social media during class.

Alt found that extrinsically motivated and amotivated students were more likely to use social media during class due to the “fear of missing out.” These students were anxious during class due to the belief that people in their social networks were having rewarding experiences without them. In addition, they feel anxiety when their friends
garner news and other popular information before they do. Consequently, they have an intrinsic need to multitask with ICTs during class.

Wood et al. (2012) found the frequency and variety of multitasking activities during instruction appeared to be correlated with increasing negative impacts on learning. The study conducted with 145 participants found that students who used laptops for note taking were more likely to multitask during lecture and scored lower on a quiz than those who took notes with paper and pencil. In a study with 151 participants, Mueller and Oppenheimer (2014) also found that taking notes with pen and paper produced superior results and postulated that taking notes on a laptop results in shallower processing. When the quality of notetaking was compared to SAT scores, no correlation was found. Further, a study with 508 students showed a negative correlation of off-task behavior and exam scores (Ravizza, Hambrick, & Finn, 2014). No correlation was found when comparing exam scores to ACT scores. Therefore, multitasking had a negative effect in both the notetaking and exam score studies regardless of students’ academic ability.

Guided and free use in the classroom. Two models of ICT use exist in the classroom: guided use and free use (Fried, 2008; Salter, 2013). Guided use usually includes computer generated graphic representations, quizzes, games, or specific tasks that can be helpful in learning. For example, dynamic-representation environments increase student engagement in mathematics (Lavigne & Mouza, 2012). Devetak and Glažar (2014) discuss a number of active learning examples where computers can facilitate learning. For example, a student may use a program to simulate an experiment rather than learning by rote. Publishers have created a number of homework and/or computer lab use programs for students to use rather than books. For example, a product
by Cengage Learning called SAM allows students to work in a simulated environment to learn MS Office applications (Cengage Learning, n.d.).

Clickers are often used for attendance and to review learning materials through quizzes in class. This technology is generally connected to a learning management system so that quiz results are directly entered into the class gradebook. The use of clickers for active learning in the classroom have been broadly studied. Clickers were once expensive, but now students are able to use cell phones or access a web page for use. Quinn (2010) used Chickering and Gamson’s (1987) principles for good practices using clickers in the classroom. His study with 126 students found clickers increased participation, allowed for anonymous participation, and facilitated discussion (Quinn, 2010).

Programs for modelling, simulation, and business games are useful for understanding simple to complex concepts (Bhaumik, 2012). Bhaumik states that some of the products simply replace didactic methods, but others are “completely new and effective for instructors using the constructivist model of learning” (p. 251).

Examples of free use of ICTs in the classroom are the use of laptops for notetaking, eReaders to reference reading materials, cell phones to look up facts or find definitions, or a situation where the instructor allows students to use ICTs in any way they desire. Free use also includes a student’s decision to use ICTs for off-task purposes when the instructor has policies against digital device use in class or during in-class guided use activities.

Research shows that in free use situations students using laptops during class multitask between tasks that are directly related to lecture and those that are not related
(Fried, 2008; Hembrooke & Gay, 2003). For example, Wei and Wang (2014) detailed the phenomena that students were writing class notes with pen and paper and using laptops for off-task purposes.

Fried (2008) states that laptops can be beneficial when used for structured activities (guided use) but unstructured use (free use) is deleterious to learning. In a study of 97 undergraduates that allowed their laptop use to be monitored during class, it was discovered that students had non-course-related software applications open and active about 42% of class time (Kraushaar & Novak, 2010). Students who were off-task during class exhibited lower academic performance in the course. It was also found that students not only distracted themselves, but also distracted those seated nearby.

Fried (2008) examined the relationship between multitasking with ICTs in guided use and overall course grades and found that students who did not use laptops in class performed significantly better in the course overall than those who did. Learning was negatively impacted when students used ICTs during class in both guided and free use scenarios. However, the negative effect on learning was especially pronounced in free use situations where laptops were not used for specific tasks related to classroom activities. Laptop users stated they multitasked an average of 17 minutes out of a 75 minute class. Of the 126 participants in the study, 81% checked email, 68% used instant messaging, 43% surfed the web, and 25% played games during class. These behaviors occurred during both guided activities and free use time in class.

Students report that they have a desire to learn in using ICTs in the classroom, but they also acknowledge that laptops have a potential for distraction (Alsaggaf et al., 2013).
It is not known if guided use in the classroom, especially for short durations, causes free
use behaviors before, during, or after the active learning events.

**Studies using video presentations to assess multitasking and learning.** Unlike
watching a video, a lecture cannot be paused to multitask or due to a distraction (Dietz &
Henrich, 2014). A 2014 study conducted in German universities surveyed a sample of
399 students after experiencing video-taped lectures on the academic subjects of
education, computer science, or economics that were between 69 and 138 minutes in
length in traditional classroom environments (Gehlen-Baum & Weinberger, 2014). In
large class settings a sample of students were observed during the lecture; in smaller
classes all students were covertly monitored in 30-second intervals. Observers rated
students to discern if they were on- or off-topic. If off-topic, observers noted what they
were doing. On average during the first half of the lectures (up to about 41.5 minutes)
71.8% of the observed students used their mobile devices. Observers found little
variation by academic subject as to how students used ICTs. Use of email, cell phone
checking, or posting to Facebook or other social media generally drew students off-task
for a few minutes from time to time during lecture. Fifteen students were observed
playing games for extended periods during lectures.

Cell phones ringing during class impairs academic performance during a video
lecture. Specifically, 32 participants who were interrupted with a cell phone ringing
twice during a 15-minute lecture performed over 25% worse on test items and were over
25% less likely to have noted pertinent test information for test items than the 39
participants in the control group who were not interrupted (End, Worthman, Mathews, &
Wetterau, 2009). A study with 27 sophomore honor students showed cell phones ringing
during lecture significantly affected performance on a pop quiz after lecture as compared to the control group (Shelton et al., 2009).

Drouin (2014) conducted an experiment with 141 student participants to discern whether students attend class if recorded lectures were available online. A comparison was made of two psychology classes - one that had lectures available online and one that did not. Students who attended the in-class lectures where a recording was available rarely reviewed the material online. However, the class with supplemental lectures had poorer attendance and poorer final grades than the class where no recordings were available.

A similar study conducted by Pashler, Kang, and Renita (2013) divided 109 participants into three groups to compare comprehension while multitasking. Participants in group one were given as much time as needed to read an historical narrative. During their reading they were interrupted five to eight times. Participants in groups two and three were similarly interrupted while listening to the narrative on an audio tape. Participants in group two could pause the tape to address the interruptions while participants in group three were not allowed to pause the tape. Interruptions significantly reduced comprehension in group three as compared to groups one and two. Effects to memory were not substantial when participants were able to multitask at will and then resume attending to educational material at their own pace. The scenario used for group three where pausing to multitask was not allowed can be related to the experience of students in a live lecture. Of course, in a live lecture, students are unable to pause the instructor at will.
In 2011, 185 student participants were divided into three groups to test memory recall of a 30-minute videotaped lecture (Rosen et al.). The control group received no text messages, the low-texting group received four text messages, and the high texting group received eight messages where half were timed to coincide with content that would be on the posttest. The average score for the control group and the low texting group was 10.6% higher (the difference of a grade level) than scores of students who received and replied to eight texts. Rosen et al. (2011) suggested that instructors give students two breaks two to four minutes in duration during a 45-minute class so that they can take care of outside disruptions.

**Cyberloafing.** Cyberloafing or cyber-slacking is the act of using ICTs to engage in off-task behavior during class (Karaoglan Yilmaz et al., 2015; Taneja et al., 2014). Taneja et al. studied cyberloafing using the theory of planned behavior with a number of determinates for the intention to indulge in the behavior. Surveys were completed by 267 college student participants between 18 and 23 years old. Reported results were that attitude (the degree of value students placed on cyberloafing behavior) was governed by three drivers: students that have positive feelings toward ICTs for off task purposes; students who believe they can easily cyberloaf without consequence; and the norms of their peers. Inattention occurred when students were disinterested or found the subject hard to understand (see Figure 1).

Due to ever-increasing class sizes, instructors find it is more difficult to engage students in class (Glenn, 2010a). Administration at Chico State has seen increased class sizes due to budget woes, and the faculty feel that the quality of teaching and learning are suffering. Other universities have increased class size as well. The University of
Colorado increased its 25-student cap on many upper-level courses to 35 and 40. At Western Carolina University, the cap on class size was recently changed to classroom capacity. The lack of personal interaction between instructors and students is shown to positively increase cyberloafing. For example, in a study with over 3,000 enrolled students, laptop use was observed in large classes. Students were found to be off-task with laptops almost two-thirds of class time (Ragan et al., 2014).

Karaoglan Yilmaz et al. (2015) looked at the demographics, the amount, and type of off-task behaviors of those who cyberloaf in lab courses. A survey of 288 students taking management information systems (MIS) and history courses in a lab environment found that males were significantly more likely to cyber-slack. In addition, males engaged in types of behaviors that were “more serious” distractions than females. Males tended to be off-task with social and other engaging material whereas females tended to use the internet to supplement learning during class. Class duration may affect the amount of cyberloafing as the four-hour MIS class had more instances of off-task behavior than the two-hour history class. However, the increased amount of cyberloafing may be due to business students having a more positive attitude toward ICTs (Teneja et al., 2014).

Gehlen-Baum and Weinberger (2014) found that when lecturers gave new information, activities unrelated to the lecture increased. This may speak to a condition where the student is not in a state of flow due to ideas being more difficult to master (Alder & Benbunan-Fich, 2013). Researchers indicated that students who were surfing unrelated websites, playing games, or watching videos were more distracted than those off-task communicating on email (Gehlen-Baum & Weinberger, 2014). An interesting
observation was that some students engaged in presenteeism (see definitions), where they were off-task the entire class; some even wore headphones.

Taneja et al. (2014) recommend that off-task behavior can be minimized by an instructor through clear classroom policies that include: consequences for those who cyberloaf; student intervention; creation of an exciting learning environment; and “teaching strategies to eventually influence students’ attitudes towards cyber-slacking” (p. 149).

Student Views of ICT Use During Class

Gikas and Grant (2013) found that students were frustrated with professors who did not allow cell phone technology in their classrooms. In a documentary entitled Digital Nation: Life on the Virtual Frontier, Turkle stated, “Every professor who looks out on a sea of students these days knows [that] there’s e-mail, Facebook, [and googling] happening in the classroom” (PBS, 2010). On the same program, an M.I.T. student named Lauren said, “You are paying attention in class to your professor, e-mailing another professor, and you are working on something else.” She also stated, “I feel like the professors here do have to accept that we can multitask very well… if they try [to] restrict us from doing it, it's almost unfair because we are completely capable” (PBS, 2010).

In a 2013 study of a first year biology class, students reported the use of cell phones for learning in class was either not distracting or was a little distracting (Tessier). Enjoyment, attendance, and learning improved as the amount of cell phone use for class purposes increased. Students were more concerned about distractions with laptops than with texting (Read, 2004). Seventy nine percent of 73 students were concerned that they
used their laptops to the extent of neglecting other things. Students believed that others are distracted by their own texting behaviors, but that they personally were not affected (Dietz & Henrich, 2014).

Students report more disruptions due to student texting during class than instructors – especially in large classrooms (Berry & Westfall, 2015). Thirty one percent of 384 students stated they missed important class information while being off-task on ICTs. Three quarters of the participants felt that it was acceptable to be off-task on ICTs during class, and 80% of the participants reported that they notice close proximity off-task use of ICTs in class. In comparison to the 96 instructors surveyed in the study, students reported a higher degree of ICT use during class.

Tindell and Bohlander (2012) found that 54% of 269 students believe that instructors are unaware of the quantity of text messaging that occurs during class. In addition, the larger the class size, the easier it is to text unnoticed. Ninety percent said they are able to text unnoticed in a class of 100 or more. A substantial majority, 89%, feel they should be allowed to have cell phones on vibrate mode during class and 24% responded that cell phones should be allowed to be used in class to send and receive text messages.

Lam and Tong (2012) reported that students view ICTs as useful for notetaking and to actively explore the internet for additional information related to class. Students were more willing to attend class if they were able to freely use digital devices.

Similarly, Lam and Tong (2015) conducted a pilot study entitled, “Should teachers hold an open attitude to students using digital devices in the classroom”. Over 70% of students surveyed responded that they spent the majority of the time on their
laptops doing tasks that related to course work and considered them beneficial to their learning experiences.

Uses and gratifications theory attempts to describe how mass media fulfills a complex set of needs and that users actively seek the pleasure or satisfaction that can be obtained from the exposure to digital media either on a personal or social level (Katz et al.; 1973, Watson & Hill, 2012). Students use ICTs during class to fulfill these needs.

**Student Views of ICT Policy in the Classroom**

Students indicate they use cell phones during class even when classroom policies explicitly state that they should not (Emanuel, 2013; Wei & Wang, 2010). In addition, cell phone use in the classroom is “weighted toward the public end of the public-private continuum” (Campbell, 2006, p. 289), meaning that students view classrooms as public rather than private spaces. Youth and frequency of use are positively correlated to tolerance for mobile phone use in public and in the classroom (Campbell, 2006; Palen et al., 2001).

Some students are calling for stricter policies. Junior and senior students were surveyed to ascertain their views about other students’ disruptive behavior during class (Hoffman & Lee, 2014). Each of the 228 students described two incidents. Almost 32% of the students described disruptive incidents involving the use of or lack of control of ICTs during class. This issue was second only to 37% describing incidents where students speak out of turn. Over half of the students believed that instructors should develop and enforce policies to contend with these disruptions.

Nevertheless, students objected to outright bans on using laptops during class. At the University of Memphis, June Entman, a law professor banned laptops during class
(Young, 2006). She said that laptops were physically creating a wall that kept them from having a flow of discussion and that the laptops gave students a sense of anonymity. The law students complained about the policy to the university and to the American Bar Association saying the policy denied students the ability to access current information. The complaints were dismissed.

**Instructor Views of ICT Use During Class**

Educators struggle with the question of whether ICT devices should be allowed during instruction (Young, 2006). They have two major concerns: one is whether students are actually using the devices to support classwork in real time and the other is whether students are able to divide their attention (multitask) between the social use of these devices and class instruction (Glenn, 2010c). Clayson and Hayley call for instructors to control student internal distractions by increasing cognitive load, i.e., to increase the quantity of content delivered in a class session (2013).

Instructors and students agree that ringing cellphones and texting during class are disruptive (Langmia & Glass, 2014; Rehling & Bjorklund, 2010). However, the reasons they believe these behaviors are uncivil are different (Langmia & Glass, 2014). Instructors believe that disruptions were a sign of disrespect to both faculty and students where students find these disruptions draw their attention away from class content and learning. Interestingly, students report that texting is a more serious issue than instructors believe, and that they are unaware of the quantity of texting during class.

In a study by Lam and Tong (2015) regarding student perceptions, a class was surveyed and one professor was interviewed. The professor stated that there was a lack of connection with the students as they would look at their laptops rather than at him, and
that often they would smile at odd times making him think that they were not focused on the material. He also said that loud tapping on computer keyboards was distracting as well.

The type of class offering may make it difficult for an instructor to feel that he or she can ban computers as the subject matter may create an expectation that technology should be allowed in the classroom. Nass, who was a preeminent researcher on the dangers of multitasking, stated in an interview that he allowed laptops in his classes because “it would just seem too strange to ban laptops in a class on computers and society” (Glenn, 2010c, para. 29).

Many studies collect data as to teacher attitudes toward changing their teaching styles to include ICTs in the classroom (Archer et al., 2014; Henderson, Chapman, & Fouст, 2015; Funkhouser & Maouza, 2012; Gibson et al., 2014; Hernandez-Ramos, Martinez-Abad, Garcia Penalvo, Herrera Garcia, & Rodrigues-Conde, 2013; Hwang & Jackson, 2013; Kirchner, 2015, Lam & Tong, 2015; O’Bannon & Thomas, 2014). Although some studies take note of the unintended consequences of students using computers for learning activities (Groundar, 2014; Nworie & Haughton, 2008), most do not address how the free use of these devices is affecting instructors.

Instructors who are 49 years and younger were more likely to use mobile phones in both teaching and their personal lives (O’Bannon & Thomas, 2014). Those 50 and older were “less supportive and more fearful of the integration of cell phones in the classroom” (p. 21). These findings were supported in a 2015 study of business teacher perceptions of ICT use for learning purposes (Henderson et al.). The study showed that many instructors had positive perceptions about the use of mobile phones in class and
Facebook to connect with students beyond classroom walls. Although younger instructors are more likely to teach using ICTs in the classroom, most instructors in the study had negative perceptions of the devices because they caused disruptions in the classroom.

Due to the copious calls for instructors to use technology in teaching, O’Bannon and Thomas (2015) surveyed 92 pre-service postsecondary instructors to garner their opinion concerning the free use of ICTs in the classroom. A little over half of the participants believed that laptops and cellphones would increase student engagement and communication. Therefore, almost half of those in the study were not prepared to accommodate ICTs (the technology most embraced by students) in the classroom. Moreover, 72% of the participants were considered digital natives. It follows that some digital natives hold the belief that free use of ICTs is not beneficial to students in class.

In a 2013 study, 32 higher education instructors participated in a questionnaire to ascertain views regarding student in-class ICT use, and classroom policies (Synnott). Synnott stated that instructors are aware of the amount of off-task use of ICTs in the classroom which differs from the findings by others (Berry & Westfall, 2015; Rehling & Bjorklaund, 2010; Tindell & Bohlander, 2012). Synnott said, “A clear majority of professors did not believe learning improved with students' use of smartphones during class time” (p. 126). Another valuable finding was that the majority of instructors inform students about classroom policies both on their syllabi and verbally. Synnott also found that female participants had significantly different opinions regarding student use of ICTs during class to text, email, and engage in social media. Females agreed or strongly
agreed that students were engaging in off-task ICT use during class where males were neutral regarding this behavior. 

Instructors believe evaluations are improved when guided use of technology is incorporated into classroom teaching (Hernandez-Ramos et al., 2013). As students want to freely use ICTs during class, instructors sensitive to student evaluations may allow the devices in order to obtain better evaluation scores (Lam & Tong, 2015).

Lam and Tong (2015) emphasized the difficulty instructors have in deciding whether or not ICTs should be used during class. They found there is little in the way of software for in-class active learning. In addition, they stated that instructors have to provide guidance and instruction to students if ICTs are to be allowed in the classroom. Kirchner (2015) suggests most instructors do not have curriculum-level experience and that having them design coursework using ICTs would be piecemeal and counterproductive.

**Instructor Views on ICT Policy in the Classroom**

Faculty who ban laptop usage in class argue that the devices physically block eye contact, are distracting the students, and are annoying to the professor (Rogers & Monsell, 1995). A 2014 study found that not only were the students disrupting class with their cell phones, but that professors further disrupted class by bringing attention to the behavior in an effort to “attract attention from distracted students” (Langmia & Glass, p. 20).

Pressure from students to allow the free use of ICTs, especially smart phones, is growing. In a survey of 560 college students, 57% indicated they engage in ICT checking behaviors and 54% stated that texting should be allowed during class (Emanuel,
Clayson and Haley (2013) state that texting during class is so culturally ingrained that instructors may need to simply “accept texting in class as another manifestation of modern culture” (p. 36), or incorporate texting.

**Instructor versus campus-wide policy.** Instructors are key in the debate as to whether to allow ICTs for free use in the classroom. Most universities allow professors to set policy for their classes (Tindell & Bohlander, 2012). Each semester instructors must choose whether or not to create a policy to limit free use and, if so, how they will enforce it. Studies show that most instructors agree that campus-wide policies should be implemented to limit or ban student free use of ICTs in the classroom (Langmia & Glass, 2014; Synnott, 2013).

A survey of 134 university professors showed a significant difference between full-time and part-time professors on the perceived value of a campus-wide policy to curtail student ICT use in class. Part-time instructors were almost unanimous that there should be a university-wide cell phone policy (Synnott, 2013). In addition, there was no significant difference in responses between full-time tenured professors and full-time non-tenured professors.

As instructors generally see the backs of students’ laptops, some believe that students switch from a screen of entertainment to one of education when they approach the viewable side of the device (Glenn, 2010c). Consequently, discussions about being able to turn off the internet have occurred in order to stop this multitasking behavior (Young, 2006). Still, doing so will not stop students from having their own connections via their cell phones.
Rather than campus-wide policies, Junco (2015) recommends stronger statements in course syllabi to curtail off-task behavior. Findings were significant that younger instructors were stricter than older ones, and that females were stricter than males with cell phone policies (Langmia & Glass, 2014). Instructors with one to five years of experience and those with 15 to 25 years of experience had strict policies against free use of cell phones in class. Those with six to 14 years of experience were much more moderate with their policies.

Berry and Westfall (2015) stated that instructors must find more punitive ways to curtail off-task behavior as students report that reprimands in class and syllabus statements have little or no effect on their off-task behavior. Nevertheless, Berry and Westfall believe that ICTs should be integrated into the classroom and many studies show using computers as part of learning activities can be successful (Schmid et al., 2014).

Conversely, Karpinski et al. (2013) believe that students tend to be distracted by the technology and said:

Thus, while educators and policy makers espouse the possible benefits of using such applications and tools for knowledge development, creation, and sharing, “the inability of its users to limit themselves to using it for the prospective goals undermines their use for even legitimate reasons. (p. 1191)

**Academic dishonesty.** Many of the respondents in the Langmia and Glass (2014) study were angry and frustrated that students were using their phones to cheat. Instructors must consider the propensity for academic dishonesty and create policy accordingly. For example, a 2015 study of 384 college students and 96 college teachers
revealed that 6.5% of students cheat on exams using ICTs (Berry & Westfall). Tindell and Bohlander (2012) found 10% of students that answered a survey question about cheating admitted to having texted during an exam. It is interesting that 33% of the students in the survey of 269 did not answer this question even though the option “I don’t know” was available. The authors surmised the students who did not answer may have been concerned that they would be punished or that they did not want professors to know that this behavior was occurring. In a survey with 100 students at California Polytechnic State University, students answered questions about their perceptions and suggestions for classroom policies on the use of ICTs (Jackson, 2012). Well over half of the students were aware that students cheat with cell phones by looking up answers to questions in class or in the bathroom or texting answers to others in class.

Though cell phones may be used to look up facts and may be employed as clickers to respond to quizzes, they are often used for texting and at times to cheat (Dietz & Henrich, 2014). Dietz and Henrich recommend, “For the majority, texting should not be allowed in the classroom” (p. 166).

**Instructor evaluations.** Instructors are sensitive to student perceptions when creating classroom ICT policies (Glenn, 2010b). If they control digital devices in the classroom in a way that students perceive as harsh, they may suffer on student evaluations and in the public domain. A majority of students surveyed at California Polytechnic State University felt strongly about their annoyance with faculty who ban mobile technology and felt that faculty should consider student perspectives when making classroom policies (Jackson, 2012). In addition they felt that classroom policies
should be clearly stated and should be enforced, but that instructors should not publicly embarrass students.

Student evaluation scores are often used in promotion and salary decisions (Carrell & James, 2010). The measure of teaching quality is principally driven by available data. Evaluation data are fairly easy to obtain at the institutional level. In addition, some instructors worry about the possibility that student evaluations will be published in the public domain which may negatively affect their public personas. For example, the Texas legislature wanted public disclosure of instructor evaluation scores to audit promotion decisions at the University of North Texas (Glenn, 2010b). Administrative backlash and a change in how student evaluations were structured blocked public dissemination of the evaluation data.

**Calls for instructors to change teaching styles.** Many researchers have made the assumption that using technologies in the classroom increases student motivation and learning (Aagaard, 2015). However, multitasking in class splits WMC between lecture information and off-task information which may affect a student’s ability to retain details (Bradstreet Grinols & Rajesh, 2014; Heathcote et al., 2015).

Bradstreet, Grinols and Rajesh (2014) recommend that professors provide hands-on learning and the “flipped classroom.” In a flipped classroom, students experience recorded lecture and read materials before class that result in a dynamic classroom experience. Students participate in in-class activities that might normally be considered homework. However, this method is not conducive for students who do not do their reading, or are not studying with retention before class. Furthermore, some students may disrupt class discussion and group activities by multitasking.
A great deal of research on the use of ICTs as a teaching tool has been conducted even though ICTs have only been in the classroom for a few decades. For example, a comprehensive meta-analysis of the effect of technology use in the classroom published in 2013 explored over 11,000 publications and included over 1,100 in the study (Schmid et al.). In this meta-analysis, programs that facilitate learning were used. Presentation software to assist the instructor and retrieval programs that assist both instructor and student were excluded. Interesting findings about ICTs facilitating learning were:

- Excessive information can lead to cognitive overload and can lead to interference with learning and performance. This may be due to flow theory where students become distracted when they experience too much dissonance.

- Students have better learning gains when they have increased flexibility meaning that well-designed tools allow students to work at their own pace and to employ their own style of learning to subject matter.

- Although it is understood that active learning supports knowledge attainment, it is not yet understood “specifically how to design effective cognitive tools” and “how to integrate them into instruction” (p. 285).

The researchers stated that the synergistic relationship of technology with teaching is what is important. “It is the pedagogy not the technology that matters” (p. 285).

Twining, Raffaghelli, Albion, and Knezek (2013) agree stating that teacher professional development is the key to moving instructors into the digital age and that they should employ information technology as a “constituent part of learning experiences” (p. 434).
Archer et al. (2014) conducted a meta-analysis of 38 studies regarding the effectiveness of ICT interventions. Although varied, these interventions for computer-assisted learning focus on student learning outcomes and instructor performance and acceptance of various technologies. The meta-analysis indicated a medium overall effect size in learning improvement. The study found that comprehensive teacher training and support as well as teacher attitudes toward technology use in the classroom were important factors in the success of ICT interventions. Recent research points to a lack of acceptance of technology by instructors who are older or are in tenured positions as a barrier to its proper use in the classroom (Henderson et al., 2015).

Often research done on ICT guided use in the classroom is done as an intervention for a specific, well-defined technology. In other words, an experiment or study that is well-prepared for a novel purpose may not be applicable in other circumstances. Fried stated, “Many of the published papers in this area [and] are simply prescriptions on how faculty can adapt their classes to make use of the technology” (2008, p. 907).

Many of the recent studies conclude that instructors must be more willing to accept and use technology as part of their teaching (Funkhouser & Maouza, 2012; Gibson et al., 2012; Hwang & Jackson, 2013; Roblyer, McDaniel, Webb, Herman, & Witty, 2010) while other studies show the intensity of the distraction ICTs cause in the classroom (Berry & Westfall, 2015; Glenn, 2010a; Junco & Chickering, 2010). Most of the skeptical instructors state that it takes time to learn to use technologies for use in the classroom, it takes more time to teach students to use the technologies, and preparing classes that use technology is more time consuming than current methods. The time
commitment to use technology in the classroom is unwise if it does not contribute to learning.

Maddox (2009) states that there is scant proof that teaching with technology produces more knowledgeable students than before. He suggests that the push to integrate ICTs in education is the result of Prensky’s and other researchers’ willingness to believe that digital natives (those who grew up with technology) think and learn differently than digital immigrants. He supports his argument stating that the industrial revolution did not necessarily change how humans think and learn and questions whether the acceptance of technology as part of curriculum takes student and teacher time away from the fundamentals. Maddox states that there is a lack of skepticism in research in this area.

The classroom studies discussed in this chapter showed learning deficits with free use of ICTs in the classroom. When students are allowed as much time to multitask as they wish, grades are not affected as they are able to pause to multitask. However, free use in the classroom results in lower quality work as students cannot pause class activities. Several suggestions are made by researchers for instructors to deal with ICTs in the classroom. They range from policy-making, to giving students technology breaks, to using a flipped classroom design. One of the suggestions for instructors from Clayson and Haley (2013) was that instructors should incorporate texting in classroom activities. Others have had success by using computers in new or novel ways.

When instructors are “tech savvy,” they become picky about which technologies to employ during class (Hwang & Jackson, 2011). Decisions on technology are based on the time it takes to prepare lessons employing technology and the differences in student
capabilities. The study was conducted by survey at a California State University convention and included 22 responses. The questionnaire supported the grouping of teachers into tech-savvy versus novice technical skills. While most of the instructors employed technology in their classrooms, those who were tech-savvy used technology in qualitatively different ways. For example, a novice might use a video for students to review as many times as necessary to master the content where a tech-savvy teacher might have students create a video as an assignment. All instructors agreed that the “right equipment, training, and support are crucial for the success of educational technology use” (p. 13).

In sum, even though student perspectives of ICT use has been researched in detail, and some research has been conducted on instructor perspectives on university policy, very little research has been conducted on how technological change is affecting instructors’ views of teaching in the classroom. A plethora of suggestions are made for instructors to use technology in class as a pedagogical aid (Clayson & Haley, 2013; Dingus, 2014; Prensky, 2005; Tessier, 2013; Walker, Sampson, & Zimmerman, 2011). Many assessments have been made of these uses (Schmid et al., 2014; Archer et al., 2014), but few take note of the unintended consequences of students using computers for learning activities (Groundar, 2014; Nworie & Haughton, 2008).

**Future Concerns**

“We are innovating at an unprecedented rate” (Wadhwa, 2012, p. 2). Are educators ready for the new and novel technological innovations? An example that administration and educators are dealing with new problems in the classroom is the cell phone app called Yik Yak. Released in November 2013, it is specifically marketed to college
students and uses GPS technology for its anonymous social media platform for students to post “observational campus comedy” (Finney, 2014; Koenig, 2014). A user may post a comment to all other devices with the app within 10 miles of his or her phone. Mild to serious disruptions have occurred in classes. Students are known to laugh out loud when reading posts, all cough at once, or simply be distracted while reading and posting comments.

The serious side of Yik Yak is its anonymity. Students are able to post degrading comments about others with impunity. Comments may be homophobic, misogynistic, considered bullying, or may even contain threats. For example, honor students in a freshmen interdisciplinary class of 230 students posted in excess of 100 demeaning Yik Yak posts about three Eastern Michigan University professors during class (Schmidt, 2015). Posts were insulting about their appearances, included sexual remarks with vulgar terms, were generally insulting, and made them feel they could no longer teach the class due to a lack of authority. One student wrote, “She keeps talking about Detroit. Bitch, yo white ass probably ain’t never been in Detroit” (para. 13). The professors complained to administration and their union of a hostile work environment.

The article appeared on The Chronicle of Higher Education’s online site (Schmidt, 2015). Registered members had strong opinions in support of the students and the instructors: “Suck it up already,” and “Go teach 1st grade” were examples of those who felt the instructors were being too sensitive. Many took the side of the instructors as well. For example, one member stated, “Do you seriously believe the 1st [amendment] gives you the right, say, to call your boss a bitch and expect not to be fired?” Two issues discussed in Schmidt’s (2015) article were that slanderous comments are on the internet
in perpetuity and that students may be more likely to act out in this way due to a “herd mentality” coupled with anonymity. “Cyberfences” have been created around primary, middle, and high schools, but university administrators are loathe to restrict students’ freedom of speech even though Yik Yak may be deleterious to attendance to those who experience cyberbullying or threats (Koenig, 2014).

Instructors will need to consider other technologies that are on the market today and will be tasked with dealing with new and possibly disruptive technologies in the future. For example, Apple Watch was launched in April of 2015 and has a direct link to the user’s cell phone and allows the user to read messages and emails (Tibken, 2015). Consequently, a student using the watch has the ability to access crib notes on his or her wrist. Google Glass is another wearable technology that directly accesses the user’s cell phone. The display is projected on the inside of the user’s clear or prescription glasses. These two technologies are expensive and have not had high sales, but they are just the beginning of wearable computer interfaces. No research was found on instructor views of these technologies nor their plans on how they will deal with new technologies described in this section.

**Section 3: Competing Perspectives in Literature**

This section includes student and instructor competing perspectives of in-class ICT use in the classroom and the calls for research that these debates generate. Gaps and the fit of this study within current literature are also discussed.

Calls for study of students’ classroom laptop usage and the resulting effect on learning have been made (Fried, 2008; Hembrooke & Gay, 2003; Kraushaar & Novak, 2010; Wood et al., 2012). A number of studies have been conducted to explore student
opinion and perceptions concerning the use of ICTs in the classroom (Berry & Westfall, 2015; Dietz & Henrich, 2014; Gikas & Grant, 2013; Tessier, 2013), but few studies have been conducted on instructor views of ICTs in the classroom (Emanuel, 2013; Gikas & Grant, 2013; Tessier, 2013; Walker et al., 2011). Most importantly to this study, researchers have stated that studying the views of instructors who teach in the current digital climate is warranted (Goundar, 2014; Mueller & Oppenheimer, 2013; Synnott, 2013; Tallvid, 2014; Tallvid & Lindstrom, 2014).

A debate exists regarding the usefulness of, and the problems that occur due to student off-task use of ICTs in the classroom in both guided and free use scenarios. A great deal of research exists regarding multitasking and the effects of student internal and external distractions both in and out of the classroom, as well as student views on the use of ICTs for class activities, notetaking, and free use. Aagaard asks “How do we as educators cope with off-task use of educational technology?” (2015, p. 96). His answer is that instructors should ask students to put away devices before covering difficult concepts. He says that outright banning of technology only pushes students from external disruptions to internal disruptions. He also states “as educators we must help students cultivate good technological habits” (p. 96).

Debate also exists about appropriate policies for ICT use in class. However, very little research has included instructor views on classroom teaching. The researcher could find no qualitative studies on instructor views in general nor their perspectives regarding their responsibility to teach appropriate ICT use in particular. Most behavior of distracted students has been conducted by survey (Berry & Westfall, 2015; Bjorklund & Rehling, 2010; Goundar, 2014; Tindell & Bohlander, 2012), but some observational
studies have been undertaken as well (Gehlen-Baum & Weinberger, 2014; Ragan et al., 2014).

Berry and Westfall (2015) state that instructors use a “wide variety of tactics and generally believe that they are effective,” however, “students report low levels of policy effectiveness” (p. 70). Tindell and Bohlander (2013) purport that policy must be enforced to be effective, but in general, faculty are not verbally confrontational with students as it is not an effective deterrent (Berry & Westfall, 2015). Further, Langmia and Glass (2014) state that professors further disrupt class when confronting a student for engaging in off-task behavior.

Another point of conflict is that of university wide policies regarding student ICT use during class. Wei and Wang (2010) state that “future studies should investigate establishment of university-wide management strategies that can proactively assist college teachers to overcome the use of text messaging by college students” (p. 492). Instructor opinions in Synnott’s 2013 survey found that most instructors, especially adjunct professors, feel that a campus-wide policy should be implemented. However, Synnott said, “Research on this evolving topic is limited,” and called for study of professors’ personal experiences in the classroom. Also, research in this area needs frequent updating because the proliferation of new technology is growing at an exponential rate” (2013, p. 120). As most universities allow professors to set policy for their classes (Tindell & Bohlander, 2012), a qualitative inquiry of instructors regarding campus-wide policy and educator experiences is warranted.

Also at issue is the difference in student opinions about their in-class ICT usage as compared to instructor views. Surveyed students state they are using laptops for a
majority of class time for on-task work. Glenn (2010c) states that instructors believe students are not. Students report they use cell phones less often in small classes (Berry & Westfall 2015). In addition, students believe that instructors are unaware of the quantity of text messaging that occurs during class (Tindell & Bohlander, 2012). On the other hand, a recent survey shows that instructors are aware of the quantity of off-task texting (Synnott, 2013). A qualitative inquiry is warranted with a comparison of written policy and instructor interviews with observed classes. Qualitative classroom observations will add to the literature.

Langmia and Glass (2014) discuss instructor frustration that students use ICTs to engage in academic dishonesty during class. Students admit to using ICTs during in-class exams to cheat (Dietz & Henrich, 2014; Read, 2004; Tindell & Bohlander, 2012). What are instructors’ opinions and experiences in regard to cheating?

Governments of developed countries are investing in technology to improve the quality of student learning (Hernandez-Ramos et al., 2013) and instructors are encouraged to engage students with ICTs for classroom learning (Archer et al., 2014; Devetak & Glažar, 2014). The costs of technology implementation and subsequent updates could be better spent elsewhere (Maddox, 2009). Maddox stated that more research is needed with “a widespread attitude of skepticism” to be sure that the expenditures in dollars and in teacher and student time is warranted (p. 184). In addition, future studies are needed as technology is continually evolving, governments and schools continue to invest in technology, and students are growing up more and more connected to devices.
Suggestions are made that clickers and other active learning techniques should be employed in higher education classroom teaching. Rosen et al. (2011) suggested technology breaks during class. Are these breaks observed in participating instructors’ classes? Also, studies have shown that students learn more in class by taking notes with pen and paper rather than laptops. Do instructors’ policies reflect this research? In addition, observations in conjunction with policy review and instructor opinions may facilitate understanding of how students are using laptops during class.

Yik Yak was used as an example of a new technology that can negatively affect instructors during class. What are instructors’ views about changing culture due to the advent of new technologies? Are they prepared for additional technological change?

Research on the evolving topic of student off-task behavior with ICTs during class is limited, especially concerning professors’ personal experiences. Also, research in this area needs frequent updating because of the rate of growth in technology, and influx of digital native students. Consequently, this study used the current literature to form suitable questions for qualitative interviews and included classroom observations and syllabi examination.

**Summary**

This chapter reviewed the literature related to the research topic of instructors’ views of ICT use in the classroom. The history of research on multitasking, flow, and student ICT use in the classroom is short. The chapter included a discussion of how learning is affected by multitasking behavior. Flow theory was covered as it explains what can occur when students are not multitasking and why students multitask when they are not in a state of flow. The chapter explained that students contend with both internal
and external distractions which keep them from attainment of the state of flow or draw them away from a state of flow.

A number of studies about the effects of the free use of ICTs in the classroom were discussed. The opinions and views of students have been well covered in the research. However, little research has been conducted on instructor views of how ICT use is affecting teaching in the classroom. The current, but scant, research on instructors’ thoughts and opinions that has been published was discussed.

Calls for instructors to create and enforce policies to control student free use of ICTs in the classroom have been made. Both students and instructors are experiencing distractions in the classroom that can range from the benign to creating a hostile work environment. Debate of policy issues, calls for research, and gaps in the literature were discussed as well as how this study may add to the current literature.

Chapter three discusses the qualitative design of the study using Bronfenbrenner’s ecological systems theory to discover themes within the data. It includes the research design and methodology as well as the plan for data collection and analysis.
CHAPTER III
METHODOLOGY

This study was of an exploratory and descriptive nature. It used a qualitative design with a phenomenological approach to find meaning that instructors attribute to challenges they encounter in dealing with student ICT use in the university classroom (Creswell, 2014). The product of a phenomenological study should be a description of the issues that allows the reader to better understand the experiences of the participants (Merriam, 2009).

A description of the qualitative design and the lens used for the study are included. The researcher’s role is addressed followed by the character of the purposive sample, participant selection, participant description, and context of the study. Next, data collection and analysis are described. Finally, the study’s limitations are covered.

Study Design

Most qualitative research is interpretive research. Rather than using a positivist or critical orientation, this study uses the interpretivist perspective. This worldview maintains that reality is socially constructed and there are “multiple realities, or interpretations of a single event” (Merriam, 2009, p. 8). Creswell (2014) calls this “constructivism” where a person seeks to find meaning in life experiences.

Qualitative research uses a flexible structure in order to conduct research to find out “how people interpret their experiences,” how they “construct their worlds,” and “what meaning they attribute to their experiences” (Merriam, 2009, p. 27). In particular, phenomenological research seeks to uncover the underlying structures of phenomena. Even though all qualitative research deals with phenomena or constructivist
epistemology, this phenomenological study has an emphasis on the *shared* experiences of humans and the interpretation of those experiences. The study of instructor views of free use of ICTs by students in a classroom setting is an excellent example of a shared experience and is the basis for using Bronfenbrenner’s (1979) ecological systems theory (EST) as the lens to direct the study.

This was the correct lens to use for this study as it guided the researcher to research all aspects of instructors’ experiences and attitudes about the free use of technology in the classroom environment and to consider the time element of rapidly changing technology. The views of instructor interrelationships with students, peers, administrators, as well as views and experiences while teaching in a time of great technological change were captured. The lens served as a blueprint to conduct in depth research of phenomena.

**Ecological Lens**

For over 100 years psychological scientists have used laboratory settings with controlled experiments to understand human psychological processes. Bronfenbrenner believed that some mysteries were only observable by studying human relationships in a naturalistic way. An interrelationship exists which involves verbal and non-verbal behavior, and the relationships that one has with “the immediate to more remote environment shapes the course of human development throughout the life span” (1979, p.11). At times, observation rather than experimentation is the preferred method to study human behavior.
Innumerable phenomena have been studied using EST as a lens. A cursory query on a university library system for dissertations that use Bronfenbrenner’s theory as a lens resulted in over 750,000 papers.

Ecological systems theory provides a conceptual scheme to study structures and processes that humans undergo due to progressive accommodation to phenomena. The lens allowed the researcher to view perspectives of an individual in the context of influences that affect the individual in a particular situation and to take into consideration change in each of these systems over time. It differs from studies that use psychological and sociological views. Bronfenbrenner’s model arranged these forces into systems that illustrated and categorized the immediate to more remote forces that affect the individual (1979). The model in Figure 2 demonstrates the various influences and pressures using EST. Table 1 summarizes how the various systems are used in this study.

The *individual* is situated at the core of the study. The participant shapes his or her social identity through personal beliefs and behaviors. This individual interacts with others in his or her environment on many levels, *i.e.* the *microsystem, mesosystem, exosystem* and *macrosystem*. Each level tends to influence other levels of interaction. In addition, the individual’s beliefs, attitudes and experiences change over time. Therefore, the *chronosystem* affects each of the other systems as well.

The *microsystem* represents people who have direct impact on the individual’s development. Examples are relationships with family, friends, and students. The microsystem influences the individual’s beliefs, attitudes and assumptions. In this study an instructor’s microsystem represents his or her views on personal use of ICTs, and
beliefs and opinions of how their relationships with students are affected by student free use of ICTs during class.

The *mesosystem* is an expanded layer of influence that includes the person’s social, educational, and work interrelationships. Therefore, issues with student engagement in class is analyzed in the mesosystem. Other instructor perceptions reflected in the mesosystem are instructor opinions and experiences due to class size, and cheating with ICTs during class. Policies created to address student ICT use during class and the enforcement of policies are included in this system. Student distraction by peers’ ICT use during class and the researcher’s classroom observations fit within this system.

The influence of communities where social and employment networks are formed because of the individual’s geographic location or organizational memberships is called the *exosystem*. Instructor perception as to whether their departments, colleges or university policies should address free use of ICTs fit within this system. In addition, support of technological issues such as classroom connectivity, availability of applications, training, and support are exosystem issues.

The *macrosystem* is the pressure exerted by cultural values and norms of the community. Therefore, current attitudes, habits, and societal acceptance of ICT use are addressed in this system.

Finally, time is considered. The *chronosystem* describes changing social norms that influence change in all of the other systems. Instructor perceptions about what the future may bring due to the challenges and benefits of ICT technology use in the classroom are issues relevant to the chronosystem.
Table 1

*System Use Definitions and Examples*

<table>
<thead>
<tr>
<th>System</th>
<th>Definition</th>
<th>System Examples</th>
<th>Chronosystem Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual</strong></td>
<td>Personal beliefs, attitudes, assumptions</td>
<td>Personal use of devices; beliefs and opinions regarding student use of ICTs in general and in the classroom</td>
<td>Change in personal beliefs, opinions</td>
</tr>
<tr>
<td><strong>Microsystem</strong></td>
<td>Associations with family, friends, and students</td>
<td>Engagement, beliefs, and experiences regarding the individual student’s learning and distractions</td>
<td>Change in opinions regarding student learning and behavior as compared to past</td>
</tr>
<tr>
<td><strong>Mesosystem</strong></td>
<td>Social, educational, and work interrelationships</td>
<td>Classroom policy; experiences in the classroom such as disruptions and cheating; use of ICTs in the classroom</td>
<td>Policy changes, deletions, and additions; changes in preparation and teaching; changes in classroom environment</td>
</tr>
<tr>
<td><strong>Exosystem</strong></td>
<td>Social and employment networks at an institutional level</td>
<td>University and department policies; technical support; pressure to use ICTs in teaching</td>
<td>Policy changes or desire for changes in policy; changes in funding, investment, and support of technology</td>
</tr>
<tr>
<td><strong>Macrosystem</strong></td>
<td>Cultural values and norms of the community</td>
<td>Opinions about technology and how it affects society; expectations of value from others; i.e., society and business partners’ views on student education</td>
<td>Opinions about change in social relationships due to technology; opinions about future</td>
</tr>
</tbody>
</table>


**Context of the Study**

Instructors have faced new challenges with millennial students (digital natives) attending college courses. Few researchers have studied instructor views. This qualitative study is needed to add to the research as most of the previous studies were conducted with surveys. Also, it may assist administrators to address policy regarding
student free use of ICTs during class. This study used an inductive style of qualitative research that is further defined in the data analysis section of this chapter (Bronfenbrenner, 1979; Creswell, 2014).

Bronfenbrenner’s theory can be used in a laboratory setting, however, it is strongly skewed for use in the naturalistic setting. The theory directed the research based on instructor views about the issues of ICT use in the classroom in the context of the nested systems in which they participate. The study consisted of document examination, classroom observations to witness teaching in its natural setting, and interviews to probe the instructor views toward the free use of student ICT use during class.

The basis for using the naturalistic paradigm in this study is to find “multiple constructed realities that can be studied only holistically” (Lincoln & Guba, 1985, p. 37). There must be fit between what is being studied and how it is being studied. Two axioms come into play: “the nature of reality” and “the relationship of the knower to the known” (Lincoln & Guba, 1985, p. 37).

Using the naturalistic paradigm, realities in the classroom are “multiple, constructed and holistic,” i.e., they are not “fragmentable” nor “reductionist” as in the positivistic paradigm. The views of instructors are not inseparable from the realities experienced in the classroom, the university, and society as a whole. Therefore, instead of proving or disproving a hypothesis, the study’s findings evolved during the process of data collection and analysis (McMillan & Schumacher, 2006).

If the researcher simply used Kurt Lewin’s formula that behavior is a function of the interplay of people to their environments, or $B = f(PE)$, the social interactions that would be observed in this study would be unidimensional (Bronfenbrenner, 1979). As
change occurs in peoples’ environments, they progressively accommodate, or develop ways to deal with changes over time. Bronfenbrenner supports naturalistic inquiry stating that when researchers confine themselves to a two-person model, they reflect the influence of the laboratory paradigm. Even when the researchers “take into account the actions of more than two persons, the behavior of each is usually analyzed separately and interpreted as an independent effect” (pp. 67-68).

In order to study the naturalistic setting of the classroom, both dyads and triads are considered. The relationship of the instructor and an individual student is a dyad. A triad is formed by the interaction of the instructor, and an individual student in the classroom, and the other students in the classroom. The effect the instructor has on individual students and the classroom as a whole, and the effect the individual students have on the instructor and their classmates in the classroom is salient to research on instructor views. For example, Langmia and Glass (2014) discussed instructors who called out students for individual disruptive behavior. That action disrupted the flow for others attending class. Observation of both verbal and non-verbal behavior in dyadic and triadic interactions was necessary to view actions and reactions in the classroom and was the only way to study the effect of off-task behavior with digital devices in the classroom.

Bronfenbrenner stated, “Rarest of all is the recognition that environmental events and conditions outside any immediate setting containing the person can have a profound influence on behavior and development within that setting” (Bronfenbrenner, 1979, p. 18). For example, a change in public cultural norms can change the environment in the classroom. Students bring their views of the world into the classroom and influence the
Bronfenbrenner (1979) also shared hypotheses about power structures and the roles of those within those structures. He stated that the perceptions, activities and patterns of interpersonal relationships are affected by the degree in which a role is socially sanctioned. The higher the degree of this social power, the higher the expectation that the person with power must adhere to the expectations of that role which in turn results in feelings of responsibility. In addition, the higher degree of power also creates a higher propensity to exploit that power. Instructors are expected to work within these sanctioned roles of power.

Conversely, those who are in relative relationships (in this case students) are also expected to work within their role and are more likely to be submissive depending on the degree of power that the instructor holds. Consequently, the classroom environment must be observed and the findings related to the individual instructors’ comments to study the ecological picture for this study. The examination of instructor policies in regard to free use of ICTs and how those policies were carried out in the classroom illustrated instructor power. Adherence to or disregard of policies illustrated student power.

**Researcher’s Role**

The researcher was uniquely suited to perform this study as she had a history of being an early technology adopter since the 1980s and taught in face to face classes at a western university for over 16 years between 1998 and 2014. She used an array of technologies in the classroom in support of learning throughout her career. She understood ICT usefulness and utility due to years of business experience before
teaching. She also held a master’s degree in business administration with a concentration in information systems. Together, education and experience provided the researcher with a rich professional and academic background in computing issues. The researcher recently retired from classroom teaching which created a higher degree of reflexivity as she had an understanding of the issues regarding ICTs in the classroom, but was not currently experiencing face to face instruction.

Personal experience and recent research (Bowman et al., 2010; Fried, 2008; Junco, 2012; Kraushaar & Novak, 2010) led the researcher to question whether students learn as well as they did in the past due to ICT use for off-task purposes during class. Also, the knowledge that instructors were ambivalent as to whether or not they should allow electronics during instruction formed the basis for the study (Schmid et al., 2014). The researcher was concerned about findings in current research, namely, the deleterious effect of student multitasking to both learning and teaching during class with laptops, cell phones, and other personal digital devices (Langmia & Glass, 2014; Wei & Wang, 2010; Young, 2006). In addition, her knowledge of emerging technologies, expanding class sizes, and millennial students’ technological dependence made her question how instructors accommodated or otherwise dealt with change (Coomes & DeBard, 2004; Wilson & Gerber; 2008).

Participants

Purposive sampling and participant selection are discussed in this section. Included are details pertaining to how and why the sample was selected and exact procedures for participant selection. The purposive sample was as large and as
homogeneous as possible. Creswell (2015) states that a homogeneous sample is more likely to allow the researcher to develop clear themes from the data.

**Purposive Sample**

In order to collect the best possible data with the greatest anonymity and homogeneity, all freshman level (100-level) required core classes from a medium to large sized western university was included in the sample. Also included were three 200-level classes that were mostly comprised of first year students.

Classes in the sample were required for all who seek a degree at the institution. Therefore a high level of variability in colleges and departments, course subject matter, types of instructors, class sizes, and student intrinsic interest in the course material was expected as these required courses did not lead to a specific major. Students in higher level courses and those who have elected to take courses generally have a higher level of intrinsic interest in the course (Feldman, 1978). Consequently, challenges with instructor engagement were likely found in this sample populated with first-year, first-semester students who are not accustomed to university culture and instructor policies regarding ICT use during class (Wei & Wang, 2010). Finally, the purposive sample (Creswell, 2014) insured that no one college or department was over-represented.

The researcher purposely chose the university due to connections made during earlier work. A single stage design (Creswell, 2014) was used to access the names of instructors from the university database. The instructors in the sample were contacted by email to describe the study in detail and inquire if they were willing to participate in the study (see Appendix B). Instructors were aware that they would receive no compensation for the time they spent on the study.
First, the university general catalog was reviewed to create a list of all core courses, i.e., courses required of all students at the university. The schedule was consulted to create a list of instructors teaching the afore described core courses. The sample included 26 course subjects with 228 sections taught by 79 different instructors; 38 females and 41 males. There were 53 full-time professors or lecturers. Others were postdoctoral scholars, graduate assistants, or adjunct professors (see Appendix A). An email was sent that provided information to potential candidates that included how the researcher planned to collect data in the classroom, and the proposed time commitment for interviews (see Appendix B).

**Participant Selection**

Systematic sampling was used (McMillan & Schumacher, 2006). Homogeneity of the sample was achieved by using required core classes, and stratification (Creswell, 2014) was achieved by the number of participants. To protect instructor anonymity, a small number of participants was selected at 15.2% of the purposive sample (see Appendix A).

The first 12 instructors who answered the invitation email were included in the study. Individuals were asked if they did not want the researcher to keep their data, however, no one requested that their information be scrubbed from the database after the study was complete. The remaining willing participants were notified that the study was at capacity, however, with their permission, the researcher would keep their contact information in case it was needed in the future. If themes did not emerge with the number of participants in the study, additional participants may have been required.
The researcher contacted each participant to determine dates, times, and locations for classroom observations and interviews. Permission to observe the class was signed by each participant before the observations (see Appendix C). Interviews were conducted as soon as possible after the classroom observation for two reasons: so that the experience of the interview did not influence actions in the classroom; and so that little time had elapsed between the classroom experience and the interview to encourage accurate participant and researcher recollection.

**Participant Description**

Eight females and four males agreed to participate. Of these, one was a graduate assistant, four were adjunct professors, three were full-time lecturers, and four were full-time assistant to full professors. Their teaching experience ranged from two years to over 20 years. Participant ages ranged from approximately 30 to 60 years old. Three of the classes observed were considered “small” as they had 35 or fewer students, four were considered “medium” as they had 36 to 149 students, and the remaining five were considered large with 150 or more students (see Table 2).
Table 2

*Participant Description with Digital Native/Immigrant Status.*

<table>
<thead>
<tr>
<th>Alias</th>
<th>Gender</th>
<th>Status</th>
<th>Class Size</th>
<th>Digital Status</th>
<th>Years Teaching</th>
<th>Syllabus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma</td>
<td>F</td>
<td>Adjunct Professor</td>
<td>Medium</td>
<td>Immigrant</td>
<td>6-19</td>
<td>Policies with penalties</td>
</tr>
<tr>
<td>Mike</td>
<td>M</td>
<td>Lecturer</td>
<td>Large</td>
<td>Immigrant</td>
<td>&gt;=20</td>
<td>Policies with penalties</td>
</tr>
<tr>
<td>Monica</td>
<td>F</td>
<td>Professor</td>
<td>Large</td>
<td>Native</td>
<td>&lt;=5</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>James</td>
<td>M</td>
<td>Adjunct Professor</td>
<td>Small</td>
<td>Immigrant</td>
<td>6-19</td>
<td>No policies</td>
</tr>
<tr>
<td>Gina</td>
<td>F</td>
<td>Adjunct Professor</td>
<td>Small</td>
<td>Immigrant</td>
<td>6-19</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Hugo</td>
<td>M</td>
<td>Graduate Teaching Assistant</td>
<td>Small</td>
<td>Immigrant</td>
<td>&lt;=5</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Lisa</td>
<td>F</td>
<td>Professor</td>
<td>Medium</td>
<td>Native</td>
<td>6-19</td>
<td>Policies with penalties</td>
</tr>
<tr>
<td>Heather</td>
<td>F</td>
<td>Lecturer</td>
<td>Medium</td>
<td>Cusp</td>
<td>6-19</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Amy</td>
<td>F</td>
<td>Professor</td>
<td>Large</td>
<td>Immigrant</td>
<td>6-19</td>
<td>Policies with penalties</td>
</tr>
<tr>
<td>Nicole</td>
<td>F</td>
<td>Lecturer</td>
<td>Large</td>
<td>Immigrant</td>
<td>&gt;=20</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Rebecca</td>
<td>F</td>
<td>Adjunct Professor</td>
<td>Medium</td>
<td>Immigrant</td>
<td>&lt;=5</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Russ</td>
<td>M</td>
<td>Professor</td>
<td>Large</td>
<td>Immigrant</td>
<td>&gt;=20</td>
<td>No policies</td>
</tr>
</tbody>
</table>

**Anonymity and Confidentiality**

Anonymity and confidentiality are important tenets of qualitative research because it is “more likely to be personally intrusive than quantitative research” (McMillan & Schumacher, 2006). No students’ names or other identifying information were included in the researcher’s notes or analysis to protect student anonymity. During classroom observations, students were identified by an article of clothing, or where they were sitting in relation to the researcher or another student. They were subsequently assigned a number in the database. No individual student behavior was discussed with
the instructor. Instructor anonymity was protected with alias names. Common names were chosen that did not appear in the sample. In addition, the analysis did not include information about the subject matter taught in class.

Special care was taken to protect the written and digital artifacts produced by the study. For example, interview, observation, and analysis data was password protected. The written notes and reflections were kept in a locked location. The researcher sat where no student could view observational notes. Observations were not digitally recorded.

Outside transcribers were used for interviews. The data recordings included no names or other identifiable information. The transcriber simply used the terms “participant” and “interviewer.” The files were also protected as the transcriber kept no copies of the digital artifacts. Transcriptions of the interviews were provided to the participants so that they could check for inaccuracies and had the opportunity to change, delete, or add comments.

**Observation and Interview Settings**

Data collection occurred over weeks three through nine of a 16 week semester in the fall of 2015. Three types of qualitative data were collected and are detailed in this section. The researcher used document examination in the form of syllabi, classroom observations, and semi-structured interviews (Creswell, 2015). Reflections with thoughts about any issue that occurred during the study were collected.
Document Data Collection

Syllabi were reviewed to collect policy data. These data were coded in terms of Bronfenbrenner’s ecological systems model to triangulate observation and interview data.

Classroom Observations

Observations were conducted in the participants’ classrooms before participant interviews occurred. One classroom observation was completed for each participant. The researcher arrived at least ten minutes before class started and left after all students departed. Small classes afforded a view of almost all students from the back of the room. Medium-sized and large classes with theater-style seating were more difficult to observe. The researcher sat in the middle of large classrooms and toward the back of medium-sized classrooms. Impressions were based simply on the quantity and quality of off-task behavior in the immediate vicinity.

Descriptive field notes were collected on a laptop and/or by handwritten notes to observe use of ICTs by the students or the instructor. Notes were taken with pen and paper in classes that had policies against laptop use. Specifically, notes were taken concerning individual student behavior when using ICTs in class. For example, data collected regarding off-task ICT use might state that the female in the black shirt used her handbag to obstruct the instructor’s view of her cell phone while texting. An example of on-task ICT use might state that the male with the red cap used a laptop to take notes each time a new slide was presented by the instructor. The researcher coded whether the behavior happened during lecture, group work, or other teaching method. Incidents where students used ICTs in tandem with others, and students who were disrupted by others’ ICT use were noted as well.
A number of general comments were captured. For example, the researcher noted the general behavior of students as they waited for class to begin, when class began, and when it ended. General comments examples included: students laughed at an appropriate time; the instructor asked a clicker question; the class ended abruptly. In addition, a description of the classroom, the seating arrangement, the approximate number of observed students in the room, and teaching methods were noted. Finally, the approximate number of students (both those who were using ICTs and those who were not) was recorded.

**Instructor Interviews**

Instructors signed a consent form to be interviewed (see Appendix C). A digital recording was made and transcribed. All interviews took place in the instructors’ office or a conference room. Interviews were approximately 30 to 45 minutes in length. After transcription, an interpretive document was made available to participants to further refine interview findings, to check for accuracy, and to insure that instructors had time to evaluate their stances (Denzin, 2010).

Semi-structured questions were asked as the data to be collected was phenomenological in nature (see Appendix D). An effort was made to establish trust, by showing understanding, and by having a genuine interest in instructor issues (McMillan & Schumacher, 2006), as it was necessary to ask the instructors about expectations emanating from administrators, students, and others that result in real or perceived pressures.

Probing occurred to garner as much detail as possible about participants’ personal use of ICTs, their lived experiences in the classroom, and their opinions and experiences
in dealing with and accommodating ICTs in the classroom. Further, probes were made to discern factors used in instructor decisions in classroom policy creation and enforcement. To discover the effect of instructor power, questions were asked about feelings of responsibility to curb student off-task behaviors and disruptions that occur from ICT use in the classroom. Finally, it was important to identify what measures instructors had used in the past, the outcome of those measures, and how they planned to accommodate future technological advances.

Reflections

In addition to observation and interview field notes, the researcher used a journal at will for reflection during the study (Tracy, 2012). These commentaries, memos and asides allowed the researcher to document “uncertainties, opinions and emergent interpretations” during the process of data collection (p. 122). These notes helped the researcher to recall events in an honest and balanced way during data analysis and increased reflexivity during the process of data collection.

Data Analysis

The researcher strived for objectivity by using the tenets of naturalism in the analysis as the goal was to “understand social reality on its own terms” (Bryman & Burgess, 1999, p. 122). A four phase process of inductive analysis was conducted. The phases were data collection, coding, interpretation, and explanation (McMillan & Schumacher, 2006, pp. 364-383). The researcher stepped forward and backward through the phases to analyze collected data.

Interim analysis took place during data collection (phase one) which allowed the researcher to evolve data collection strategy. For example, slight modifications occurred
in those classes where the researcher sat in theater-style lecture halls. She found she was able to collect more data by sitting at the side of the hall than the middle.

Phase two included both the coding and categorizing of data where triangulation occurred using artifact collection (syllabi), field observations (classroom observations), and informants (interviews). The ecological systems theory (EST) forced consideration of relationships between the individual and spheres of influence.

Phase three was the process of categorizing data to find patterns and organize them into themes. Patterns were found through analyzing each system that combined all three types of collected data, i.e., syllabi, observation and interview. The database tables in Figures 3 through 6 were instrumental in this process.

Creation of narrative structures using naturalistic explanation transpired in phase four (McMillan & Schumacher, 2006). The final product was a thick, rich description of the issues and visual representations because detailed descriptions of the settings and multiple perceptions of the participants’ experiences were included in the results. The setting and the discussion resulted in “an element of shared experiences” which added to the “validity of the findings” (Creswell, 2014, p. 202).

**Data Entry and Analysis Procedures**

Data from observations, syllabi, interviews, and reflections were entered into a database created by the researcher (see Figures 3 through 6). Systems were color coded to match colors assigned to the ecological systems model seen in Figure 2. Most instructor responses fit within one system. However, the database accommodated multiple systems and multiple themes within systems for each data entry. For example, an interview response that was coded in multiple systems dealt with the participant’s own
addiction to ICTs, her assumption that students shared this addiction, and that addicted students distracted others in the classroom. This comment was coded in the individual system with the theme “personal dependence on ICTs,” in the microsystem with the theme “beliefs about student distraction during class,” and in the mesosystem with the theme “engagement.” The database was also designed to code a comment that related to more than one theme within a system. The participant data, observations data, syllabi, and reflections data were coded as shown in Figures 3 through 6.

The flexibility of the database allowed the researcher to view information by participant, question number, student number, reflection number, by system, by theme, by data table, or by any combination of combined data. For example, after data entry, the researcher was able to query by microsystem across all data tables or query all reflections having to do with data collection.
**Figure 3.** Syllabi data entry. Created by Sandra M. Week from *The ecology of human development: Experiments by nature and design* (pp. 3-9) by Bronfenbrenner, U., (1979) University Press, Cambridge, Mass: Harvard.

<table>
<thead>
<tr>
<th>Systems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Number</td>
<td>Instructor (Individual)</td>
</tr>
<tr>
<td>Number</td>
<td>Theme</td>
</tr>
</tbody>
</table>

**Figure 4.** Classroom observation data entry. Created by Sandra M. Week from *The ecology of human development: Experiments by nature and design* (pp. 3-9) by Bronfenbrenner, U., (1979) University Press, Cambridge, Mass: Harvard.

<table>
<thead>
<tr>
<th>Systems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Record #</td>
<td>Part #</td>
</tr>
<tr>
<td>Number</td>
<td>Number</td>
</tr>
</tbody>
</table>

**Figure 5.** Participant data entry. Created by Sandra M. Week from *The ecology of human development: Experiments by nature and design* (pp. 3-9) by Bronfenbrenner, U., (1979) University Press, Cambridge, Mass: Harvard.

<table>
<thead>
<tr>
<th>Systems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Record</td>
<td>Participant Number</td>
</tr>
<tr>
<td>Number</td>
<td>Number</td>
</tr>
</tbody>
</table>

**Figure 6.** Reflections data entry. Created by Sandra M. Week from *The ecology of human development: Experiments by nature and design* (pp. 3-9) by Bronfenbrenner, U., (1979) University Press, Cambridge, Mass: Harvard.

<table>
<thead>
<tr>
<th>Reflection #</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Notes</td>
</tr>
</tbody>
</table>
Reliability and Validity

In order to augment reflexivity, the researcher discussed the design of the project with a qualified qualitative researcher before IRB proposal. In addition, the researcher kept a journal of analytic reflections (Tracy, 2012). Hand-written data from classes where laptops were not allowed were entered into the database within a few hours of classroom observation completion.

McMillan and Schumacher (2006) discussed 10 strategies that researchers use to enhance validity in qualitative research. Of those 10, eight were used in this study: multimethod strategies; participant language; verbatim accounts; low-reference descriptors; mechanically recorded data; member checking; participant review; and negative or discrepant data (see Table 3).

Multimethod strategy was used to triangulate data collected in the syllabi review, the observations, the interviews, and the analytic reflections. Participant verbatim quotes were included in the results. Other “low-reference descriptors” from field notes and analytic reflections were weaved into the analysis to give detailed information about the settings. In addition, where possible, descriptions of participants and students were included if anonymity could be protected.

As previously stated, great care was employed in gaining permission to mechanically record participant interviews, along with preservation of anonymity in digitally recorded materials. Member checking and participant review of recordings were employed so that instructors were sure that the data the researcher collected was accurate and precisely represented their views and experiences. Negative and/or discrepant data
was not ignored nor explained away. Any outlying data was included as such in the results so that exceptions to themes were known.
Table 3

Design Validity.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Definition</th>
<th>Data Analysis</th>
<th>How Used in Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimethod</td>
<td>Data triangulation improves analysis</td>
<td>Syllabi review, observations, interviews and reflections</td>
<td>Triangulation of materials will be discussed in results</td>
</tr>
<tr>
<td>Participant Language, Verbatim Accounts</td>
<td>Literal statements from participants are used in the results</td>
<td>Interviews and observations</td>
<td>Quotes from participants in observations and interviews will be included in results</td>
</tr>
<tr>
<td>Low-Reference Descriptors</td>
<td>Precise, detailed descriptions of people and situations</td>
<td>Interviews, observations and reflections</td>
<td>Care will be taken to be candid and accurate in notes and reflections</td>
</tr>
<tr>
<td>Mechanically Recorded Data</td>
<td>Digitally recorded data</td>
<td>Interviews</td>
<td>Participants will sign a release to allow interviews to be recorded and the resulting files will be protected</td>
</tr>
<tr>
<td>Member Checking</td>
<td>Check informally with participants for accuracy during data collection</td>
<td>Interviews</td>
<td>The researcher will clarify understanding of comments made during interviews by rewording statements back to the participant</td>
</tr>
<tr>
<td>Participant Review</td>
<td>Participant review of recorded and/or transcribed materials</td>
<td>Interviews</td>
<td>Participants will receive transcribed interviews and will be given ample time to modify and/or add to account</td>
</tr>
<tr>
<td>Negative or Discrepant Data</td>
<td>Search for negative or discrepant data that are exceptions to patterns and/or themes</td>
<td>Syllabi review, observations, interviews and reflections</td>
<td>The researcher will look for any data that may be considered an outlier, and/or data that disproves any studies used in the research documentation, and/or data that does not fit within major themes, and/or unexpected patterns in the data.</td>
</tr>
</tbody>
</table>

Assumptions, Limitations, and Scope

Qualitative reliability is attained when a researcher is consistent throughout a project (Creswell, 2014). During the process of collecting data, data collected and reflections of earlier data collection were carefully reviewed before subsequent observations or interviews to help the researcher maintain consistency in observations and interviews.

The researcher communicated to each instructor that he or she may introduce the researcher to the class as a teaching observer if they wished. This could be considered deception as students were not be told that they were being observed. The omission of an explanation of the researcher’s attendance was necessary so that students would engage in normal ICT use.

Simply by interviewing instructors, the researcher may have activated opinions by showing interest in instructor views due to the Hawthorne Effect (Landsberger, 1950). Additionally, the Hawthorne effect (Landsberger, 1958) may have changed teaching and student behavior in the classroom during researcher observations. It was assumed that participants answered questions truthfully and accurately and were forthcoming with examples of their experiences. The researcher’s personal acceptance of technology may have influenced perceptions of the usefulness of technology. In addition, her experience, both positive and negative, in the classroom due to free use of ICTs may have affected perceptions.

Purposive sampling was used rather than random sampling, proportional stratified random sampling, or convenience sampling. The researcher used purposive sampling to
obtain a high level of variability in colleges and departments, course subject matter, types 
of instructors, class sizes, and student intrinsic interest in the course material.

The researcher chose to select instructors who taught courses likely populated by 
first-year students due to research by Feldman (1978) and Wei and Wang (2010). 
Feldman (1978) found that students in upper-level classes often had a higher level of 
intrinsic interest in classes. Therefore, the researcher chose to use classes usually 
attended by first-year students as they were more likely to contain students with a mixed, 
or stratified level of interest in the material. Wei and Wang (2010) found that first-year, 
first-semester students who are not accustomed to university culture and instructor 
policies regarding ICT use during class resulted in increased challenges for instructors. 
Therefore, these same classes usually attended by first-year students were chosen to 
garner the views of instructors that had likely experienced challenges with off-task digital 
device use during class.

A random sample, proportional stratified random sample, or convenience sample, 
would have included participants who taught freshman through senior students. These 
sampling methods may have resulted in a better representation of instructor challenges 
across the university (Vogt, 2005). The researcher may have introduced bias and 
“inferences about a population cannot legitimately be made using a purposive sample” (p. 
252).

Although the data may be compelling and allowed for considerable depth of 
analysis, the findings are not generalizable to other populations. In this case, the findings 
may not be generalized to the university population. The intent of the study was to 
analyze the findings so that they may be the basis for further qualitative and quantitative
research regarding instructor views of classroom teaching in a digital world. Implications for practice may be made, however, the small number of participants may be deemed a limitation.

**Summary**

This chapter discussed a phenomenological approach to qualitative design and supported why it was the proper method to collect and analyze data regarding instructor views of free use of ICTs in the classroom. The interpretive (constructivist) worldview was discussed. In addition, the use of an ecological lens to direct naturalistic inquiry in classroom observations and instructor interviews to find themes was covered in detail.

Data collection procedures for classroom observations and participant interviews were detailed and the chapter included support for sample selection and procedures. Data analysis techniques and procedures to achieve reliability and validity were defined and discussed as well.

After extensive analysis with a four phase approach (McMillan & Schumacher, 2006), the researcher was able to create a holistic account to “develop a complex picture of the problem or issue under study” (Creswell, 2014, p. 186). Themes were organized using ecological theory systems and were visually reported by adding them to Figure 2 to create a visually rich adapted model (see Figure 7 in Chapter IV). Findings and themes were presented and analyzed in Chapter IV and discussed at length in Chapter V.
CHAPTER IV

DATA ANALYSIS AND FINDINGS

Chapter IV reports findings from the data collected for this study followed by an overview of the adapted ecological systems model (ESM). Each system is presented with detail from collected data. Themes found in the data are categorized by research question and followed by a summary of the chapter.

Data Analysis Using Ecological Systems Theory

Data collected from interviews, observations, and syllabi were entered into a database. Each instructor comment, observation data point, and relevant syllabi phrases were categorized into relevant ecological systems. Each ecological system was analyzed for interrelationships between the interview, observational, and syllabi data. Finally, results of the data analysis were organized and written using the ecological systems theory (EST) as a lens to develop themes.

Bronfenbrenner’s ecological system was used as a lens to organize data concerning instructors’ views of ICT use during classroom instruction. It also framed data regarding instructor acceptance or resistance to technological change in general. Interview, observational, and syllabi data were reported by ecological system starting with the individual, working outward to the macrosystem, and ending with the chronosystem.

Figure 7 illustrates issues by ecological system from individual to macrosystem found in this study. Table 4 chronicles the chronosystem. An issue may affect one system or the interrelationship of systems and several issues relate to each system. For example, an instructor’s beliefs may affect his or her personal behavior (individual
system), behavior with individual students (microsystem), behavior in the classroom (mesosystem), or opinions about departmental or university policies (exosystem). The culture and experiences in public (macrosystem) or any other systems may influence those beliefs. The chronosystem represents changes in these beliefs over time. For example, an instructor may work in the professional realm and teach part-time. That instructor may form beliefs due to experiences over time in the workplace. In addition, those beliefs are subject to change over time as technological acceptance changes by generation.

Information is built using the issues notated in the systems represented in Figure 7. Table 4 shows each system within the chronosystem, its definition, the findings in this study and an example. Systems may exclusively deal with an issue, or may be a combination of issues. For example, in the context of this study, cheating is an issue that occurs in the mesosystem due to its taking place in the classroom. Instructors form beliefs based on experiences (or lack thereof) involving student academic behavior during in-class exams. Another example is that of technology. Instructors deal with the availability of technology for use in the classroom and the lack of acceptable publisher content.
### Table 4

*Adapted System Use Definitions and Examples*

<table>
<thead>
<tr>
<th>System</th>
<th>Definition</th>
<th>System Findings</th>
<th>Chronosystem Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual</strong></td>
<td>Personal beliefs, attitudes, assumptions</td>
<td>Digital native or immigrant; personal ICT addiction/habits; responsibility for student engagement</td>
<td>Change in personal beliefs, opinions, relationship to digital native/immigrant status</td>
</tr>
<tr>
<td><strong>Microsystem</strong></td>
<td>Associations with family, friends, and students</td>
<td>Views/assumptions about student ICT use and distraction; opinions about peers; experiences in the classroom with individual students</td>
<td>Change in opinions regarding student learning and behavior; student communications methods</td>
</tr>
<tr>
<td><strong>Mesosystem</strong></td>
<td>Social, educational, and work interrelationships</td>
<td>Engagement; how disruptions and cheating affect class materials; basis for classroom policy and how it was delivered to entire class; effect of class size; student distraction; dealing with ICTs with class as a whole (policy and observations); teaching with ICTs</td>
<td>Changes in policy; desire to use guided ICTs in class; changes in preparation, teaching and classroom environment</td>
</tr>
<tr>
<td><strong>Exosystem</strong></td>
<td>Social and employment networks at an institutional level</td>
<td>Technical support; available technology; opinions about personal control versus university and department policies; pressure to use ICTs in teaching</td>
<td>Dealing with future technologies students may freely use in class.</td>
</tr>
<tr>
<td><strong>Macrosystem</strong></td>
<td>Cultural values and norms of the community</td>
<td>Opinions about ICT use in society, i.e. etiquette; culture</td>
<td>Adaptation to cultural change due to technology</td>
</tr>
</tbody>
</table>


**Individual (Instructor) System**

The instructor is representative of the *individual* system and is at the core of the study. Interview, observational, and syllabi data were analyzed to discern how the participant shapes his or her social identity through personal beliefs and behaviors.

Included in this section are instructor beliefs about the technology’s effect on students
and themselves. Findings in the individual system are instructors’ personal habits with or addiction to ICTs and where some felt a responsibility to teach students about proper ICT use. Also, some believed it was their responsibility for student engagement while others did not.

Half of the twelve instructors discussed their own dependence on the devices (see Table 5), with some showing concern about, and understanding of student dependence. Two participants commented on their personal dependence without relating it to student use of ICTs. Monica said that her phone would distract her in class if she were a student and that she did not bring digital devices to meetings as she would be similarly distracted. Lisa used her phone for email and an alarm clock and said, “It feels a little bit like an addiction.”

Instructors related their personal dependence to views about students’ classroom use of ICTs. Emma was ambivalent about students using phones. She said, “I don't trust the students on their phones the whole time. I don't trust me on my phone. Come on. It is so addictive.” In answer to a question as to whether she verbally prohibited ICTs in class she said, “Is it really a big deal? No, because I'm a phone addict.” Two instructors were understanding of the drive to use phones in class. Rebecca spoke about her temptation to text in movie theaters and said, “I love my phone too, probably almost as much as my millennial students.” Amy said, “I think maybe a couple of times I’ve asked a student to stop using their phone, but that was before I got a phone myself and realized that it’s not just for texting.”

Several instructors felt it was their responsibility to keep students engaged in the classroom. Mike said, “It's my job to be more interesting than their texts [received in
Lisa was concerned that professors are “not taught how to teach.” They commented that individual students’ off-task behaviors affect class culture. Others did not feel this pressure.

- Gina said, “I don't even know why you would feel like the onus was on the teacher to make sure that they were so interested that they wouldn't want to text.”
- Heather said, “The part that is frustrating is that you have to work a lot harder to convince them to engage.”
- Lisa said, “You can't always just be like this spitfire, bit of excitement, in front of the room. They have to care.”

In sum, some participants felt that it was their responsibility to keep students engaged by force of personality, with class activities, or by removing distractions. Some were frustrated feeling they must choose between ignoring student ICT use or enforcing ICT policies. Others felt that student motivation played a factor.

**Microsystem**

The *microsystem* represents the people who have direct impact on the individual’s development. In this study, individual instructors have relationships with peers and individual students. Student relationships differ in the microsystem as compared to the mesosystem. In the microsystem the instructor is dealing with individual students in the classroom and one on one outside the classroom. Instructors deal with groups of students, i.e., the classroom environment in the mesosystem. The rules in syllabi are a contract between the instructor and the student. They set the tone for the power relationship. Other issues discussed in the microsystem are instructors’ views about
issues with individual student ICT distraction and one participant (Mike) gave an opinion about some of his peers.

**Class Policy**

Each class had a different set of policies. Ten of the classes had written policies in syllabi. Of those, four had written penalties that would be imposed if a student disregarded policy. Two classes had no written policies in their syllabi. All participants said that they verbally discussed policy on the first meeting of class. Every class had some difference in what was expected and what was not allowed (see Table 5).
<table>
<thead>
<tr>
<th>Alias</th>
<th>Laptop and/or Tablet</th>
<th>Phone</th>
<th>Penalties</th>
<th>Pen &amp; Paper Note-taking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma*</td>
<td>Yes, laptops and tablets for course-related activities only</td>
<td>Emergencies with permission</td>
<td>Withhold student's phone; asked to leave; take away from entire class</td>
<td></td>
</tr>
<tr>
<td>Mike*</td>
<td>Yes, laptops and tablets allowed for note-taking</td>
<td>For &quot;time-sensitive business&quot; - leave room</td>
<td>Lose laptop privileges if &quot;too distracting or isolating,&quot;</td>
<td></td>
</tr>
<tr>
<td>Monica*</td>
<td>&quot;Please refrain from using&quot;</td>
<td>&quot;Please refrain from using&quot;</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>James</td>
<td>No policies</td>
<td>No policies</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Gina</td>
<td>No, except for &quot;specific accommodation&quot;</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Hugo</td>
<td>Yes, to ICTs to access readings only</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Lisa*</td>
<td>Yes, but must sit in front of class and &quot;you will be called on often.&quot;</td>
<td>Clicker quizzes only</td>
<td>The inappropriate use of ICTs in class &quot;may result in your being asked to leave class and may negatively affect your grade.&quot;</td>
<td>Yes</td>
</tr>
<tr>
<td>Heather</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Amy*</td>
<td>No</td>
<td>Clicker quizzes only</td>
<td>May result in a reprimand and/or points being deducted from final grade.</td>
<td>Yes</td>
</tr>
<tr>
<td>Nicole</td>
<td>Yes, if used for class purposes only</td>
<td>Clicker quizzes/attendance only</td>
<td>No. but in all capital letters states that a disruptive classroom is not tolerated</td>
<td></td>
</tr>
<tr>
<td>Rebecca</td>
<td>Yes, laptops and tablets allowed for note-taking</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Russ*</td>
<td>No policies</td>
<td>No policies</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Note: Instructors that stated they were personally dependent or addicted to ICTs.
Instructor Views About Student In-Class ICT Use

Participants were asked what they assumed students were doing when using ICTs during class. Half believed that students may be using ICTs for class purposes and at other times they were distracted by the devices. Some felt that students might be typing notes, looking at eBooks, or looking up something for class. Amy said, “I used to assume they were being bad students, but I don’t assume that, not anymore.” She also said, “I think sometimes [students] note some things down. If you’re reminding them about the essay, they might want to take a note of that on their phone. It’s not always that they’re using them for nefarious purposes.” Rebecca stated,

If they've got pretty consistent keystrokes on a tablet or a laptop - they're taking notes. If I see them typing into a phone, I'm assuming it's a text - not class related because it's hard to take notes on a phone. If they're just staring and laughing at a laptop or a tablet - they're reading Facebook.

And Gina said, “Occasionally I can tell that it definitely is not someone looking at the text [on a laptop].”

Four of the participants believed that students were usually off-task when using ICTs during class. The attitudes of these instructors varied from being very concerned to no concern that students were not on-task. Some comments from concerned instructors were:

- Hugo said, “It's a distraction. It's sort of burdensome also to all students around them to see the bright screen that is flashing.”

- Heather said, “They're doing their online homework, they're doing Facebook, [and] they’re studying for another class. It's very obvious, you look in the
back of the room and they're so engaged with whatever - they're not participating.”

- Monica said, “The phones… they're just distracting and we don't need them in the classroom. And there's no reason why they need to have their phones. We don't refer to anything on their phones.” And, “I know that from my experiences as a student that... if I brought my laptop to class, I would inevitably open up my email, check my email, be looking online, kind of letting myself be distracted.”

- Lisa simply said that she would rather just trust her students and “assume that what we're doing is engaging enough that they're there.”

Russ was pragmatic about student use of ICTs stating,

I'm not going to monitor it. I don't like it when they do it. As long as they're quiet and not bothering someone else, then I don't care. I tell them it's my same attitude about attendance. They're paying for the class. I get paid whether they're there or not. I get paid whether they pay attention or not. As long as they are courteous and don't bother other people. I don't know why [they are] there, but they're adults. That's their choice.

Few instructors gave their views about their peers, however, Mike said,

I can't give you any hard data, but I know people who teach who have just retracted into a shell. Especially in [the] big lecture situations. But even in smaller classes, they'll just drone on and on and on in the same tone of voice and they'll put something on the chalkboard. They've just checked out and they're getting paid too much money to do what they're doing, but they're not putting any
energy into it. The students on the other hand, the brighter ones are bored out of their skulls. Maybe [the instructor is] driving them to texting, but could care less what's happening out there.

About his peer instructors he also said, “Don't be a Luddite. Don't kick and scream against the technology. Use it.”

**Mesosystem**

The *mesosystem* is an expanded layer of influence that includes the person’s social, educational, and work interrelationships. Therefore, issues with student engagement in class is analyzed in the mesosystem. Student distraction by peers’ ICT use during class and the researcher’s classroom observations fit within this system. Other instructor perceptions reflected in the mesosystem are instructor opinions and experiences due to class size, and cheating with ICTs during class. Therefore, a breakdown of observations by class size is included in this section. Policies created to address student ICT use during class and the enforcement of policies are also included in this system.

**Engagement and distraction.** Engagement and distraction are linked. Instructors reported mixed success with numerous techniques used to keep students engaged. However, as explained in the internal distractions section, when students are off-task (distracted) using ICTs in the classroom, the instructor has a difficult time keeping students engaged (Wei & Wang, 2010). Although no teacher was observed to talk to a student who was off-task, many instructors stated that they do so. Data collected on both engagement and distraction follow.

In the interview Amy spoke softly and punctuated her thoughts with laughter. She discussed her views about engaging students. She said,
My problem that you probably noticed is that I'm not exuberant and I'm not an extrovert in the classroom the way that some very charismatic professors are and so students interpret that as a lack of enthusiasm. It's not that I’m not enthusiastic – that’s just not my style. I’m a quiet person, a thoughtful person. My lectures are carefully crafted, using reason and arguments, that's how I demonstrate my enthusiasm.

She is passionate about the quality of her teaching and that students are able to experience class undistracted.

Emma, Mike, and Russ believed that keeping students on-task was not their responsibility whereas a number of instructors felt a responsibility to keep students engaged. For example, Mike held the belief that he can engage students if they are willing and said, “As long as I reach some of them some of the time, I'm fine.” He accepts that there are approximately a third of the students in his classes that cannot be reached. However, he believes, “in a Utopian scenario, we (instructors) would be able to meet them (students) where they are. Draw them out somehow. Make them accountable for it (class content).”

Heather highlighted the controversy about whether an instructor is responsible for student engagement with this comment:

I know for some people it just doesn't bother them [that students are off-task with ICTs] and their perspective is [students] are adults they can do whatever they like. I guess I'm just too invested in the outcome and I know they're not paying attention and I would like them to engage in the class.
Gina said that students who surreptitiously text must already know that what they are doing is not appropriate in class. She said, “Really, it's just rude. I mean it's not paying attention to someone, in my case, a professor who they're paying to be taught something. And I have a lot of schooling, and they should at least respect my talking to them.” She stated she will tell a student using a phone during class to put it away “because it is distracting.”

Most instructors had confronted students during class and some volunteered examples of how they handled off-task behavior with ICTs. Emma gave the researcher two examples where she experienced a high number of distracted students. In one case, after emailing the entire class and experiencing no change in their behavior, she collected students’ phones and placed them on the desk in the front of the room for the duration of the class. In a second example, she said that she had a class where “barely anyone was really looking at class material.” The following day she sent out an email saying, "I'm noticing this, and I'm noticing it consistently. Therefore, there's no more e-readers. There's no more laptops. You guys lost your privileges."

James found through experience that if he “harassed” a few students he did not have a problem with student off-task behavior in class. He said, “I didn't really do it today, but I'll go up to people and insult them, or irritate them. Insult meaning, ‘Is he hot? Are you texting a hot guy with this right now?’ I'll shame them.” He said he once dropped a cell phone in the garbage because it rang repeatedly in class. “She went and got it out, and we were fine. She got the message.”

Nicole did not want to waste class time by asking students to stop off-task behavior; however, she gives them three to five minute cell phone breaks in class. She
did not give a break in the observed class. Others broke class time up into different types of activities so that students do not become bored. For example, Heather frequently changed teaching methods in class using videos, PowerPoint assisted lecture, quiz questions, and think/pair/share activities.

Some instructors had complicated views of their responsibilities. Rebecca said, “It is my responsibility not maybe to teach them how they should behave but it is my responsibility to maintain an environment for all 130 people, or 65 people or whatever it is, that they can learn in.” Mike said, “It’s my responsibility to teach them how to be professionals and interact.” Heather said she is “too invested in the outcome and I know they’re not paying attention and I would like them to engage in the class.” She said that she tells both the entire class and individual students to put their devices away – even if they are looking up material being discussed. Lisa believed that it was not the content of her class to teach responsible ICT use. Lisa also said, “It actually annoys me that I do feel like I need to remind them, ‘Put your phone away, it's disrespectful.’ I don't want to be the cop. To me that isn't teaching.” Similarly, Nicole felt a responsibility to keep ICT using students from distracting others in the classroom, but did not think that dealing with distractions should be her focus.

Some instructors had different opinions about engagement and distraction depending on class size. Amy said that the large class environment encourages some students to think they can “text their friends, read newspapers, and surf the internet.” Mike asks people to stop off-task in small classes, but not in larger ones. James may “tolerate electronics” in longer classes. Lisa feels class size makes a great deal of difference in engaging students. She engages students in discussion in smaller classes to
curb off-task ICT use, but believes it is not something she can enforce in larger classes. Rebecca sums up the issue of ICTs in class by stating, “If there are more students, there are more problems.”

**Cheating.** The participants were asked whether they believed students were using ICTs to cheat during class. Answers highlighted two types of cheating: using a phone to access the internet or crib notes during exams; or multitasking with phones during clicker quizzes.

Most participants believed students use ICTs to cheat. Gina said, “It is a very cheat-assisting device. I am sure students do cheat with them. I haven't seen that in my classes.” Heather admitted, “I'm sure there are things that happened that I didn't even notice.” Rebecca said, “I think the cheating is due to the larger class sizes” or that “the increase could be cultural.” And James said, “One honor student told me that he felt like cheating was worse. The statistics seem to bare out in the honors classes because the people are so driven to get the best possible grade.”

Some instructors try to minimize academic dishonesty with test construction. Monica believes students do not have time to cheat due to the number of questions and time limitations. Similarly, Nicole recently upped the number of questions to curtail “any searching” during exams. Lisa said, “I'm sure that they [cheat], but on the other hand I make all my quizzes open book because the kind of teaching I'm doing I'm really mostly trying to get them to engage with the reading.” And Russ stated, “I've never caught anybody texting during a test.” He believes it would be difficult to perform an internet search on the types of questions asked.
Amy and Nicole have experienced academic dishonesty incidents with ICTs during exams, however, Amy could not prove the charges. She said, “I'm sure they do [cheat]” as the students can multitask between the web and the clicker quiz questions. Nicole said, “Oh yeah, last semester. Well, he was on the internet.” One of her teaching assistants told her that there was a student online during the test. “[The] student got a zero.” Mike and Gina have experienced students who went to the restroom during an exam and assumed the pupils were looking up answers on their phones. Gina no longer allows students to leave the classroom during exams.

Class size. All of the “ICT dependent” instructors had written policies against misusing ICTs in the classroom. Class size was not a factor in any participant comments nor policies in their syllabi. However, class size had an important relationship to the amount of off-task behavior. Only one large class had a medium amount of observed off-task multitasking. The other large classes had high, or very high observed off-task behavior with ICTs. Conversely, small classes had low to medium amounts of off-task behavior. These results were not in regard to the number of students that could be observed in the class, but what observed students were doing in each class.

Mike discussed the idea of “flipping the classroom” where students are prepared to discuss readings or work in groups. He stated that that strategy is only effective in a small class. In his “flipped” class students discussed quotes from their reading material. When Mike was observed in class, students showed high engagement and few off-task behaviors.

In Monica’s large class, students were expected to work in pairs with information from outside readings. Students who were not distracted by electronics used the
opportunity to engage in the material. However, several were engaged in heavy ICT use, chose not to join groups, and continued to use electronics during discussion activities. Monica is new to teaching large classes and said she is still “negotiating how to manage” large classes. “There's something about the mass of students that I don't want to test whether they will listen to me.” As student evaluations are determinate in promotion, she had some concerns about student pressure to freely use ICTs during class.

A number of mismatches occurred between teacher belief that students were engaged and observations of the classes. For example, Rebecca did not believe that students were distracted as she showed interesting videos and asked students numerous questions in class. However, observations for that medium-sized class showed high off-task behavior rates among students.

Several small-class instructors believed no one was off-task as well, but all classes had at least some students engaging in off-task behavior with ICTs. In smaller classes students hid texting behaviors in their laps, in books, and behind course materials on their desks. Larger classes had more incidents of off-task behavior where many students openly multitasked with ICTs. Class policies had some effect on these behaviors and will be discussed in detail below.

Instructors had a wide range of views concerning student engagement. Mike said, “You talk more than eight minutes and you can lose anybody.” Conversely, Hugo said that he did not see why the students could not stay engaged in a short (50 minute) class. Emma said, "Let me show you how technology can be something that you can learn from too.” She also opined, “I love the idea [of] having students take out their phones and then
answer polls in class.” Mike said that ICTs are “part of how people learn these days, but they should be engaging [students] in the class, not isolating [them] from it.”

**Classroom observations.** In syllabi, three instructors indicated notes should be taken with pen and paper and did not allow ICTs in class (see Table 5). Table 5 also shows that three more did not allow ICTs in class without the pen and paper note-taking statement as laptops were not allowed in class. The researcher coded levels of ICT off-task behavior by considering the number of students observed to be using ICTs for tasks not related to the class material (see Table 6). Impressions of the intensity of the involvement by students was taken into account.

In Table 6 collected data is compiled on instructor position (status), class size, policies, and the amount of observed off-task behavior with ICTs. A class with a “low” amount of off-task ICT behavior had a few students who checked or texted one or two times during class, but most students were fully engaged the entire class period. A “medium” rating was given if many students observed were texting or surfing, but were mostly engaged in class material. A “high” rating was given when the observer saw that most observed students were engaged in off-task ICT behaviors for much of the class. One class was given a “very high” rating as a great deal of near constant texting or surfing by many students was observed. Of those she was able to observe, few students did not engage in ICT off-task behavior.
Table 6

Participant Status, Class Size, Policies and Off-Task Behavior

<table>
<thead>
<tr>
<th>Participant</th>
<th>Status</th>
<th>Class Size</th>
<th>Syllabus</th>
<th>Observed ICT Off-Task Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>James</td>
<td>Adjunct Prof.</td>
<td>Small</td>
<td>No policies</td>
<td>Low</td>
</tr>
<tr>
<td>Hugo</td>
<td>Teaching Asst.</td>
<td>Small</td>
<td>Policies/no penalties</td>
<td>Low</td>
</tr>
<tr>
<td>Gina</td>
<td>Adjunct Prof.</td>
<td>Small</td>
<td>Policies/no penalties</td>
<td>Low</td>
</tr>
<tr>
<td>Heather</td>
<td>Lecturer</td>
<td>Medium</td>
<td>Policies/no penalties</td>
<td>Medium</td>
</tr>
<tr>
<td>Emma</td>
<td>Adjunct Prof.</td>
<td>Medium</td>
<td>Policies with penalties</td>
<td>Low</td>
</tr>
<tr>
<td>Lisa</td>
<td>Asst. Professor</td>
<td>Medium</td>
<td>Policies with penalties</td>
<td>Low</td>
</tr>
<tr>
<td>Rebecca</td>
<td>Adjunct Prof.</td>
<td>Medium</td>
<td>Policies/no penalties</td>
<td>High</td>
</tr>
<tr>
<td>Nicole</td>
<td>Lecturer</td>
<td>Large</td>
<td>Policies/no penalties</td>
<td>Medium</td>
</tr>
<tr>
<td>Amy</td>
<td>Asst. Professor</td>
<td>Large</td>
<td>Policies with penalties</td>
<td>High</td>
</tr>
<tr>
<td>Mike</td>
<td>Lecturer</td>
<td>Large</td>
<td>Policies with penalties</td>
<td>High</td>
</tr>
<tr>
<td>Monica</td>
<td>Asst. Professor</td>
<td>Large</td>
<td>Policies/no penalties</td>
<td>High</td>
</tr>
<tr>
<td>Russ</td>
<td>Professor</td>
<td>Large</td>
<td>No policies</td>
<td>Very High</td>
</tr>
</tbody>
</table>

Note: Small classes are 35 or fewer students, medium are between 36 and 149, and large are 150 or more students.

Presumably all those checking, texting and surfing were doing some sort of multitasking. While numerous students multitasked between ICTs to take notes, some were observed to task-switch rapidly. In these cases it was obvious a student was breaking off between digital devices to take notes and returning to the off-task activity multiple times in quick succession. The researcher coded this as quick succession task-switching (QST). Four students were noted to engage in QST between writing notes with pen and paper and laptops, and thirteen were observed to be QST between hand-written notes and phones. In addition, two were observed to be QST between writing notes on laptop and texting on phones. These observations occurred in medium- to large-sized classes.
Class size appeared to be a factor in the amount of off-task behavior. The amount of off-task behavior in large classes was well above that of small classes (see Table 6). Large class off-task behavior varied greatly with no relationship between policies and penalties to actual classroom behavior. Written policies in syllabi had no relationship to off-task behavior, however, penalties in syllabi may have played a role in curbing off-task behavior in medium-sized classes. The large class that had no written policies was critically different as it had the most off-task behavior of any observed class in the study. Students in small classes showed more clandestine behavior when off-task. Finally, no pattern was found when examining off-task behavior ratings and instructor position.

Class size and configuration greatly affected observations in a number of ways. The researcher observed as many students as possible and rated the distracted behavior based on the number of students observed. Small classes afforded a view of almost all students from the back of the room. The researcher sat to the side, mid-way between the front and back of the classroom in medium-sized and large-sized classes with theater-style seating. She was able to observe 14 to 20 students in those classrooms. Impressions were based simply on the quantity and quality of off-task behavior in the immediate vicinity. The presence of the researcher may have affected the amount of off-task behavior – especially in smaller classes.

**Class size: small.** All three of the small classes observed had “low” amounts of observed ICT off-task activities. No classes were observed to engage in QST or viral texting behaviors. James, Gina, and Hugo verbally advised students the first day of class that they were expected to take notes with paper and pencil.
James entered the classroom and started class with a great deal of energy. He was a bombastic, energetic, humorous, instructor. He used the occasional curse word in the observed class and told the researcher, “I'll share things that I should never share” in class. Although he lectured most of the observed class, he inspired a great deal of student participation by calling on students with raised hands and by name. Students were very engaged because of his teaching style and humor. The class was enjoyable and exciting as one never knew what he would say or do next.

Although no written policies or penalties were in the syllabus, there were a few incidents of off-task behavior among the 18 honors students in the class. The researcher was able to observe most of the students in the classroom. Four students texted once during the class and two of those checked their phones twice during class.

Gina started the class with a quiz and then gave a handout for group work. The researcher observed several students using laptops to access reading materials. She allowed the use of ICTs for this purpose, but not to engage in off-task behavior.

Gina said, “Today I didn't see anybody texting.” However, two students texted multiple times during the class: one at least five times and the other at least three times. Two others engaged in checking behaviors once during the class. Some of this behavior occurred while Gina’s back was to the class as students presented their findings from the group activity.

Hugo’s class had 24 students that sat in a large semi-circle around the classroom. It was easy to observe all students in the classroom. His discussion class followed the policies set forth by the lead professor where ICTs were not allowed.
First, Hugo went over the material that was presented in the lecture class that occurred earlier in the week. He then commenced discussion for the remainder of the time. Students were unaware of when they would be called on to add to the class-wide conversation. Very few incidents of surreptitious texting were recorded. One student checked his phone and another sent one text.

**Class size: medium.** In medium-sized classes, instructors’ policy statements concerning ICT use were varied. They had no relationship to the amount of off-task behavior observed in class. Emma and Lisa had policies with penalties in their syllabi. Emma’s class rated “low” and Lisa’s class “medium” in observed multi-tasking behaviors. Heather and Rebecca had policies against off-task ICT use, but no penalties described in their syllabi. Heather’s class was rated as “medium” and Rebecca’s class as “high” in observed ICT off-task use where both OST and viral texting behaviors were observed.

Emma’s syllabus contained stringent policies with penalties. For example, students may be asked to leave, have their phones withheld, or technology can be taken away from the entire class. Before the observed class started at least two thirds of the approximately 60 students were using their phones, however, almost everyone put their phones away when class began. Only three people were observed to have phones available, however, no checking or texting behaviors were observed. Therefore off-task behavior was rated as “low”.

In general, students were very engaged throughout Emma’s class. She used lecture, wrote on the whiteboard, had the students do a number of group exercises, and asked questions to engage students in the class. Students obviously trusted her. Several
students spoke out about very personal experiences in this class of over 65 pupils. Emma was able to make each a “teachable moment” that related to the material presented.

Before Emma’s class started students were in verbal conversations throughout the room. Many had their phones out concurrently. However, this class was different than all others in that almost all of the students were engaged in verbal conversations before class. In other classes, most students were observed to be independently using ICTs with some students having face to face conversations.

Lisa handed out papers while concurrently giving a great deal of verbal information for the first five minutes of class. Students were observed using this time to text on their phones. She took attendance with clicker software. Even though there was a medium amount of off-task behavior, the behaviors were short-lived and students were otherwise engaged with class material. The class moved quickly as she gave dense information in lecture and involved the class with group exercises followed by group reports. As she quickly went through questions quickly on a clicker quiz, it was difficult for students to be off-task with their phones.

Approximately half of the 50 students in Lisa’s class were observed during the class. Eighteen students texted multiple times during the class. Many used hiding behaviors, but some openly texted on their desktops. One student engaged in checking behaviors, but did not text during the class.

The syllabus stated that ICTs should be stowed unless a clicker quiz is taking place and students may be asked to leave or grades may be negatively affected if improperly using ICTs. Lisa’s class showed a medium amount of observed off-task behavior in the observed group. In the interview she said that she pauses class and
announces that students must put their ICTs away as “it is disrespectful.” However, she did not make an announcement during the class.

Heather is an award-winning full-time lecturer who modeled a great many teaching methods during the observed class. Her policies stated that no laptops or phones were allowed during class. No penalties for these behaviors were mentioned in the syllabus. The observer was able to view roughly twenty students. Approximately half of those engaged in off-task behaviors with ICTs. Four observed students used laptops and one used a tablet. Overall, there was a medium amount of off-task behavior where many observed students hid ICTs behind books, backpacks, or purses on their desks. Most with laptops surfed the internet. Two students surfed the internet for most of the class period. A number of students engaged in checking behaviors on phones and a few texted during class.

Heather used subtle humor and changed teaching methods every five to ten minutes. She used clickers for students to vote on matters of controversy in her subject, think/pair/share activities, and gave a short quiz. Her PowerPoint supported lecture included short videos that were both funny and informative.

Rebecca enjoys being able to use technology to augment teaching both face to face and online. Her enthusiasm for her subject matter is evident in her teaching. However, her class of about 60 students was observed to have a high amount of multitasking behavior. Her moderate policies were specific and clear. For example, Rebecca stated that students must remove headphones and may only use laptops for taking notes. There were no stated penalties for off task ICT use. She said she
confronted students that were distracting others. Yet she did not discuss off-task behaviors with any students during or after the observed class.

The class observed was action-packed, fast-paced, and entertaining. Rebecca used video to visually demonstrate a concept after a PowerPoint-backed explanation. Surprisingly, a high number of students texted and surfed the internet during class. The ones that were off-task multitasked for longer durations than most observations. These students disturbed others as the classroom was darkened to view the videos. In addition, four females engaged in viral texting behavior. This behavior was social in two ways. Two females texted others outside the class and shared the text conversations. This behavior spread to two others who socialized in this manner. The four females engaged in this behavior as a group throughout the class.

Many students in Rebecca’s class who had laptops open and available took notes with pen and paper. This phenomena was observed in some large classes as well. Those who were surfing wrote notes when a PowerPoint bullet was discussed, or watched part of a video clip shown on the classroom screen, and then returned to off-task behavior on their laptops. Of the approximately fifteen students observed, eight were off-task with laptops. One watched a video with sound audible to others in the class. Further, three women heavily multitasked with phones throughout the class where two displayed QST behavior. One engaged in 14 long-term texting incidents during class.

**Class size: large.** The five large classes observed had medium to very high levels of ICT off-task behavior during class. No ICT off-task behavior pattern was detected in classes that had written policies when comparing those with and those without stated
penalties. However, the class with no written penalties had the highest amount of off-task behavior observed in the study.

One course, taught by Nicole, had a medium amount of off-task ICT use. She had written policies and no penalties in her syllabus. The researcher observed high multitasking behavior in classes taught by Mike, Monica, and Amy. Mike had written policies with penalties in his syllabus. Amy and Monica had written policies but did not have stated penalties. Russ had no stated policies in the syllabus class and had the highest amount of off-task behavior.

The first day of class Nicole advised students about off-task ICT use stating, "Don't do it. On the other hand I'm not going to babysit you." She also told the class, “It's not normal to look at your crotch all class” and, “If it's distracting anything, distracts my classroom, I’ll call people out.” Nicole did not talk to any students during the observed class about off-task behavior.

Nicole’s class was fun and informative. She had a unique think/pair/share activity that was a personal learning experience for each student. Approximately twenty students were observed in this large class of 200 students. While few incidents of texting were observed, those with laptops were often off-task. This class was rated at a medium amount of off-task behavior because the number of students engaging in multitasking was low. Of those who were off-task, one student surfed on his laptop for the first 10 minutes of class and shared his screen with the student next to him. Other students were distracted by his laptop as well. One case of presenteeism or cyberloafing (see definitions) was observed as the student surfed the internet the entire class period. Two more students surfed from time to time. A female wore headphones connected to her
laptop for the first 10 minutes of class and subsequently walked out. She may not have been a student in the class. Four students texted three to five times each and three others checked phones, but did not text during class.

Mike had a policy on his syllabus that laptops and tablets were approved for use in the classroom, however, phones were not allowed. The syllabus also contained a statement that he reserved the right to restrict laptop usage and to ask people to leave class who are not abiding by policy.

The observed class had over 200 students in attendance and a high amount of off-task behavior occurred. Of the approximately 20 students observed, 15 engaged in off-task behavior with ICTs. Most of these students texted two to four times in class. One of the students used her phone to text and her laptop to surf while concurrently taking notes with pen and paper. She spent over five minutes several times during class exclusively surfing the web. In addition, students were often checking their phones during class. Mike did not engage any student about off-task behavior during the observation.

Monica likes teaching her large class of freshman level students because they are new to the university as they are eager to be involved in class. “The students aren't as used to how college works.” It is important to her that they learn study skills as well as course material. On one hand she wants students to know she “supports them,” on the other, she needs to maintain control.

She taught a great deal of vocabulary in the observed class. She believed that students should take notes with pen and paper. The observed class was mainly PowerPoint supported lecture where she praised students who took written notes. Course written policies were based on professional workplace conduct and research. The syllabus
said the student should “please refrain from using telephones, laptops, and other
electronic devices in the classroom.” Penalties for use of ICTs in class were not included
in the syllabus.

Monica’s class had approximately 200 students in attendance. Approximately 15
students were observed engaging in a medium amount of off-task behavior with ICTs. In
general, students paid attention when the instructor gave examples of test questions, or
showed definitions of vocabulary words. Five students multitasked between phones or
laptops and writing in their notebooks. During think/pair/share exercises, three students
did not participate and were instead off-task with ICTs. Monica was not observed to talk
to any students about off-task behavior that occurred during the class.

Amy interspersed lecture with clicker questions during the observed class. This
class observation revealed many students multitasked between writing notes on paper and
surfing on laptops. She wore reading glasses while teaching and the teaching assistants
were supposed to watch for disruptive behavior. However, the assistants sat near the
front of the room. At one point during class the assistants walked throughout the
classroom handing out quiz participation slips to students who had not yet created clicker
logins on their ICTs. A student openly texted as a teaching assistant stood in the aisle
next to her.

In the interview Amy said that she requests students to put away phones during
class unless clicker questions are asked. However, she did not make the request during
the observed class. In the interview she also said, “I think most students just do it [put
phones away] automatically now.” Yet off task behaviors were rated as high in this class
where approximately 15 students were observed. Eight students were observed to be
texting during class. One student was observed to text at least seven times and another
texted at least ten times while simultaneously multitasking between surfing on a laptop
and writing notes with pen and paper. The syllabus stated that laptops should not be used
and that phones should be used only during clicker questions.

Russ’ observed class had over 150 in attendance with approximately twenty
students observed. He lectured the entire class period and used the overhead projector to
show images, emphasize points, and define terms and concepts. He uses class materials
that are easy to prepare and change. He lectured the duration of the observed class using
the overhead projector and PowerPoint. His class was by no means boring. He covered
controversial subjects in his straightforward style and conveyed difficult subject matter in
a way that was easy to understand. The class was punctuated with both premeditated and
off-the-cuff humor. Due to his sense of humor, style of delivery, and subject matter the
class very interesting.

This class had the highest amount of off-task behavior of all the observed classes.
Almost all students had phones out and available on their desks. Texting was viral in two
groups of students. One group was composed of four men, and the other was four
women. In each group when one person texted, a person next to him or her would begin
checking or texting. There was a social aspect to the behavior as the students would
show their phones to each other. The behavior then disrupted other students who
subsequently indulged in off-task behavior. The phenomena was witnessed once for the
all-male group, but was observed to occur four times with the group of women.

A number of people used laptops to surf while writing class notes with pen and
paper. In all, thirteen students were observed to be off-task with ICTs, however, the
quantity of activity made it difficult to note all of the behaviors of the students observed. Therefore, this class was rated as “very high” in ICT off-task behavior.

**Issues with using ICTs interactively in the classroom.** Guided use technologies were discussed with participants as their use may subsequently increase off-task behaviors in class. Students who use tablets and laptops to reference the text and guided use applications, and phones used as clickers may multitask during these activities and continue to be off-task after guided use ended. Observations showed that students rarely put phones away after taking them out to use as clickers.

Participants were asked if they incorporate ICTs as part of classroom activities. Many discussed how they used, or wanted to use, more technology during class. Gina said, “I am thinking about how to maybe incorporate electronic stuff in some way that's useful. As it gets better, I think there are ways to do that (pause) maybe.” Amy modeled the tech savvy behavior discussed in the Hwang and Jackson (2011) article. She said, “I like technology that saves time and I don’t like technology that is just being changed just for the sake of changing.”

Participants discussed their technological expectations of students. Mike assumed that students have access “twenty-four seven, and they can access web-campus on their phones, on their pads, on their laptops, whatever”, while Amy felt that using technology in the classroom may prod students who normally do not speak up in a large class to contribute their opinions. However, she worried that “students need to develop their oral expression skills and they can’t do that if you just allow them to discuss by texting all the time.”
Exosystem

The influence of communities where social and employment networks are formed because of the individual’s geographic location or organizational memberships is called the *exosystem*. Due to huge technological investments in university systems (Maddox, 2009), pressure to use technology in classroom emanates from students, administration and current literature (Aagaard, 2015; Clayson & Hayley (2013); Schmid et al., (year??)). The support of technological issues such as classroom connectivity, availability of applications, training, and support are exosystem issues. Also within this system is instructor perception as to whether departments, colleges or university policies should address free use of ICTs in the classroom.

A number of participants cited technological issues, lack of support, troubleshooting, and prep time as reasons why they currently did not employ interactive technologies. For example, Hugo would like to incorporate technology in the classroom but said that he does not have that option as the classroom does not have technology built in. Mike experienced problems with the technical support team. He said, “There is software around, [but] the university IT won't agree to install it or buy it.” Instructors also discussed available technology for guided use of ICTs in the classroom, and whether they wanted the department, college or university to set overall free use ICT policy.

Many instructors discussed the use of clickers in class. Some participants talked about using publisher guided use content and the university’s course management system for in-class guided use activities.

**Clickers as a guided use technology.** Instructors were mixed in their views concerning the use of clickers in the classroom. Some instructors liked that the clicker
data can be input automatically into the learning management system (LMS). About using clickers for in-class quizzes, Amy said,

I love the way that the answers come in straight away and [students] see whether they got it right… they’re automatically graded and so it does save a lot of time I think, as opposed to administering a paper quiz or a scantron quiz.

Nicole used clickers for attendance, quizzes, and exams. She said that she is better able to keep track of students using the devices. For example, she emailed students who missed more than a few days of class. She allowed three different types of devices which made the technology more difficult to manage. However, she found that in a large class of 200, giving students more options helped them to afford the technology. Despite all the obstacles, she said, “the cost/benefit for me is that I can track a lot of students.”

Lisa and Amy lost internet connectivity during in-class clicker exams. The new software the university put in place allowed three different types of clickers, and Amy said, “Half the time the clickers don’t seem to work and students are always emailing me.” She said it was making her gradebook “a mess.” Also, a number of students had not yet bought clickers or downloaded the software to their phones a month and a half into the four month semester.

Rebecca tried clickers but found the problems were insurmountable. “Instead of clickers [the students] get a note card for participation. But this actually is a lot less time consuming for me than all of the programming and the prep and those kinds of things that go into setting up the technology.”

Mike said, “I completely refuse to use clickers. [The technology] never quite works right all the time anyway.” Lisa thought clickers would save time, but was always
trouble shooting. She said, “At this point I think I'm giving [clickers] up in the class because the software has crashed on me. It's crashed on the students… [the clicker software] lost data.”

The positive impact of clickers was observed in several classes when students were exhibiting signs of boredom (stretching, yawning, and general restlessness) but would re-engage when a clicker quiz question was employed. However, no class observed used clickers for more than five quiz questions during a class.

The advent of technology to use smartphones as clickers is a relatively new phenomena and caused some unintended consequences. No instructor advised students to put their phones away after a quiz. Some students had not been exhibiting off-task behaviors before the first clicker question, but were subsequently off-task on their phones.

Other guided use technologies used in the classroom. Of all the participants, Heather had the most experience integrating publisher technology into the classroom. She used the university learning management system (LMS) quizzes in the classroom, but experienced connectivity and software malfunctions during class. She tried other software “with mixed success.” She spent two weeks doing a trial of publisher software last year and said,

You could sort things, or draw a trend on the graph, and then you can show the real time responses. It was pretty neat but, there were a couple glitches that made me decide not to implement it. They didn't have a library of questions for my topic. It would have meant hours and hours of me developing questions, which pay off eventually but there's so many hours in the day.
Rebecca tried publisher software in class for three years. She quit using it due to problems with the technology and expense for the students. She said,

I dealt with the [publisher] text and online support we've been using for the last three years. It never worked properly. It never worked properly for the students, it never worked properly for me. I didn't see any value added to it.

Several participants felt the time commitment was impractical to use publisher software. Lisa said, “There are many, many tools, but actually finding the time to use them [in class] is difficult. I also have found it to be more of a problem than actually a benefit.” And Rebecca said, “All this content that the big publishing houses were creating which wasn't that great, and it was getting more expensive, it was adding more [preparation] time and it wasn't adding value.”

**Control of policy.** All twelve participants believed that policies regarding student ICT use in the classroom should be left up to the instructor. Emma made an interesting distinction, “It seems like we see it on a binary level. We just see it as, technology, no technology.” Several commented that they do not want to ban ICTs as students use them as a resource for learning. Heather stated,

In an ideal world I would let them bring them (ICTs) and I think they would be great resources. There's a lot of promising things you could do with access to the internet, but what I found was, with some exceptions, most students who bring a laptop end up distracted.

Russ strongly felt that there were already too many policies on campus. And Heather said, “I don't think people ever like being told what they can and can't do in the
classroom. It's nice to give people the freedom to do different things but hopefully that includes the freedom to not use devices or to use them.”

**Macrosystem**

The *macrosystem* depicts the pressure exerted by cultural values and norms of the community. Therefore, current attitudes, habits, and societal acceptance of ICT use are addressed in this system.

In general, instructors believed that ICT use is ubiquitous in society today and that standards of social behavior have changed and negatively affected etiquette. Instructors were concerned about the negative effect of ICTs on literacy and critical thinking. Some participants felt that students were not prepared to properly use ICTs when they come to college. Students should already know how to ethically use devices and should not have to be taught proper ICT use in college. For example, Hugo said that students are not concerned about privacy. He felt that students give their information freely to others and that they had not been taught about data protection. Lisa was concerned that student use of ICTs was contrary to learning to be “engaged citizens in the world.” She said, “I walk around campus and everybody's just like this [looks at her hands], looking at their phone.” And Gina opined, “It's more social, but, because it's just this compulsive talking about nothing, endlessly.”

Participants discussed the lack of etiquette they see in society today. Hugo saw cell phones as “invasive.” Amy said, “Texting when someone else is talking to you is just rude and I would do everything in my power to discourage that.” Russ said, “Cell phones are just pervasive to the point of being rude, but that's just my age.” He went on to discuss cell phone use in family situations. He said that his wife was “on her cell
phone all the time. It bothers me somewhat." He also stated that he did not like that his children texted during dinner.

Some participants felt responsibility in teaching students proper etiquette. Rebecca felt she had a parenting role in curbing student cell phone use in college. Mike said, “Taking phone calls or actually texting… looking at the little device, I see as bad manners in any professional situation” and felt that it was a teacher’s responsibility to teach students how to interact professionally because their behavior with ICTs would not “serve them well in working environments.” He believed that students need to learn to work in teams and students need to have the social skills “to engage professionally with human beings face to face in the same room.”

Participants also discussed literacy and critical thinking abilities. Gina had a strong opinion that texting has “really decreased people's ability to write well.” She said, “It’s not really so much about the use of electronic devices, but the format of them: like texting. I mean students really don't know how to spell or write, or they don't even know what words they're using anymore.” Lisa said:

I get concerned with people's ability to think critically. They personalize their news feed and only engage with things they agree with. They don't know how to break down an author’s argument. They have a really hard time with that because there are stuck at this superficial level.

Lisa explained why she perceived students do not have critical thinking skills due to standardized testing in the K-12 system. She felt that students were memorizing “bits of information,” and that students had learned to ask Siri or Google for answers rather than thinking about the material.
Chronosystem

The chronosystem describes changing social norms that influence change in all of the other systems. Instructor perceptions about what the future may bring due to the challenges and benefits of ICT technology use in the classroom are issues relevant to this system (see Table 4).

A participant commenting on his or her own perceived acceptance of change is categorized in the individual system. Views about changes in relationships with peers or students are classified in the microsystem. For example, classroom engagement and modification of teaching methods are classified in mesosystem. Perceptions of issues at the university level are classified in exosystem. Changes in society are classified in macrosystem.

Overall, many instructors felt our culture, especially in the educational environment, is less social. Some felt that technology created more work and they did not like the expectation that they should be connected twenty-four hours a day, seven days a week. On the other hand, they appreciated the availability of information today, and discussed how they used technology in new ways. These views were explored by system according to the EST.

Individual system. The widely accepted unified theory of acceptance and use of technology (UTAUT) model was created based on eight user acceptance models (Venkatesh, Speier, & Morris, 2002). The model is used to estimate user intention, effort expended in comparison with performance expectancy, and takes gender, age, and experience into account in predicting the acceptance and usage of new technologies. The
UTAUT principles were used in analyzing how participants felt they would cope with change.

Emma was rated very high in adaptation as she “loves technology,” is enthusiastic about new technologies, and looks forward to learning about new advancements. Instructors who liked new technologies and were interested in their benefits without reservations were rated “high.” Many instructors did not mind change as long as it was positive. Those were rated as “ambivalent.” Instructors who were reluctant to change, but would if necessary or had low interest in technology were rated “low.”

Two participants were considered to be digital natives, nine are immigrants, and one was on the cusp between the two. No patterns were found in an analysis of digital native/immigrant status, adaptation to technology over time, position type, or class policies (see Table 7).

Table 7

*Instructor Adaptation, Demographics and Classroom Policies*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Adaptation</th>
<th>Digital Native or Immigrant</th>
<th>Gender</th>
<th>Position</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amy</td>
<td>Ambivalent</td>
<td>Immigrant</td>
<td>F</td>
<td>Asst. Professor.</td>
<td>Policies w/ penalties</td>
</tr>
<tr>
<td>Emma</td>
<td>Very High</td>
<td>Immigrant</td>
<td>F</td>
<td>Adjunct Prof.</td>
<td>Policies w/ penalties</td>
</tr>
<tr>
<td>Gina</td>
<td>Low</td>
<td>Immigrant</td>
<td>F</td>
<td>Adjunct Prof.</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Heather</td>
<td>High</td>
<td>Cusp</td>
<td>F</td>
<td>Lecturer</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Hugo</td>
<td>Ambivalent</td>
<td>Immigrant</td>
<td>M</td>
<td>Teaching Asst.</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>James</td>
<td>Low</td>
<td>Immigrant</td>
<td>M</td>
<td>Adjunct Prof.</td>
<td>No policies</td>
</tr>
<tr>
<td>Lisa</td>
<td>Ambivalent</td>
<td>Native</td>
<td>F</td>
<td>Asst. Professor</td>
<td>Policies w/ penalties</td>
</tr>
<tr>
<td>Mike</td>
<td>High</td>
<td>Immigrant</td>
<td>M</td>
<td>Lecturer</td>
<td>Policies w/ penalties</td>
</tr>
<tr>
<td>Monica</td>
<td>Low</td>
<td>Native</td>
<td>F</td>
<td>Asst. Professor</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Nicole</td>
<td>Ambivalent</td>
<td>Immigrant</td>
<td>F</td>
<td>Lecturer</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Rebecca</td>
<td>High</td>
<td>Immigrant</td>
<td>F</td>
<td>Adjunct Prof.</td>
<td>Policies/no penalties</td>
</tr>
<tr>
<td>Russ</td>
<td>Ambivalent</td>
<td>Immigrant</td>
<td>M</td>
<td>Professor</td>
<td>No policies</td>
</tr>
</tbody>
</table>
Opinions on change and worldviews on digital devices were distinctly personal. Heather and Mike were accepting of new technology and rated as “high”. For example, Heather said, “In order to be a good teacher you do need to change and adapt over time and you can't necessarily do things the way you did them ten years ago.” She evaluated and used a number of technologies in the classroom with varying results. Both Heather and Mike discussed the effort it takes to learn and use new technologies, but a willingness to learn them. Rebecca always made an effort to keep up with technology, however, now she says, “It's harder, I'm tired.”

“Ambivalent” participants were aware that changes will occur, but see these changes as both positive and negative. These instructors tended to feel pressure to change and were not overly enthusiastic about the benefits of new technologies. Amy stated, “There seems to be ever more technology and some things I really like, and then other things are a pain.” Hugo’s comments were similar. He was not concerned about embracing technology as it changes as he understood that there is an expectation that instructors should have basic knowledge about technology and use it to be accessible to students. Nicole liked the personal benefits of technology and likes to use social media for “intellectual conversations”. Yet she spoke of the pitfalls of distraction and frivolous content on the internet.

Some commented about the time and effort it took to learn new technologies. Lisa discussed the time it takes for students to learn new technologies and the time in preparation. She said that if the classroom technologies “worked better” she would be more willing to incorporate them in class. Russ was willing to adapt to new technologies as long they were “for the better.” He said, “I get a little bit annoyed by Microsoft and
the constant upgrading of programs that I use and then having to re-learn the new program and sometimes finding that it doesn’t really improve on the old version of the program.”

Rated as “low” on the acceptance scale, Gina recognized she must deal with change, but she did not “especially like it.” She was not interested in “pop culture things - with Twitter or whatever else [students] might do.” She felt it difficult to keep up with technology, but she wanted to incorporate technology in class as long as it was “some way that's useful.” Monica and James said they were “reluctantly accepting” of technological change. But James was rated low as he stated he is “not techy” and has little interest in change.

**Microsystem.** The microsystem relates to how instructors feel about individual student behavior and the behavior of their peers. When combined with the chronosystem, instructors’ comments regarding these changes included below are examples of changes instructors have experienced.

In regard to changes in student behavior, no teacher has been left untouched by the ubiquitous use of ICTs and the new technologies used by students in and out of the classroom. For example, some students use the website RateMyProfessor.com to decide which classes to take based on the “easiness” of the class and the “hotness” of the professor. Amy said that the use of this site, “saddens me that some students rely on [RateMyProfessor.com] to choose classes - which is insane.”

Instructors discussed the student expectation that they have knowledge of technology and that they be more accessible than in the past. Some felt that students wanted to receive immediate answers to their questions. For example, Rebecca
commented that students thought she should always be available and expected more personal attention than in the past. Her time communicating with students is spent differently than when she started teaching. She said, “My communication time with students in fielding their questions and concerns and problems and complaints and all has increased dramatically.” Before class sizes increased, Rebecca did not answer emails on the weekends. She also discussed students’ expectations that “they should know every single second of the day what their current grade is in the class.” Of that change she said, “I shouldn't do that. That piece has increased a lot.”

**Mesosystem.** Most of the instructors began teaching before ICTs were commonly used by students in the classroom. Ten of the twelve addressed change over time in student behavior with additions to syllabi to deal with student use of ICTs during class. Many have experienced using technology in the class and others wanted to add more technology to their teaching. Rebecca and Nicole discussed changes in class size.

When Rebecca started teaching she had 18 to 24 students per class. “I now teach [the] same class [with] 130 students in it.” I can't help [students] the same way I used to be able to.” Heather said, “I'd always said no phones but I just added laptops starting this fall.” She made the decision based on both teaching experience and research.

In an ideal world I would let them bring [laptops] and I think they would be great resources. There's a lot of promising things you could do with access to the internet, but what I found was, with some exceptions, most students who bring a laptop end up distracted.

Nicole states that as the university “is going to larger classes” and instructors will have to rely more heavily on technology. Because she already teaches large classes, she is well
aware of the new paradigm of student communication. About email she said, “I'm inundated because they have this speed. I'll be in class and I get emails that are flipping from class. Maybe they're missing a point [that I’m covering in class while composing an email]. Emails are just rampant. Rampant.”

Some participants talked about changes in how they teach class. For example, Nicole discussed the change over time in dealing with student use of ICTs in the classroom. She said,

The students who are in the back row texting - those were my focus. Finally I said, you know what? I don't think that should be my focus, I think I'm going to start to look more towards those who are bright, invested. I won’t use lecture time to deal with students being off-task because I have so much I want to share with them that I don't want to waste my time.

She changed her teaching style over time to adapt to new technologies. About classroom ICT policy, she said “a few years ago I was more dictatorial.” Her course policies were moderate as she allowed ICTs to be used as long as it was appropriate to class activities.

Many added multimedia to assist in teaching course material or added more discussion between students. Rather than lecturing for the duration of class, several instructors were observed to change from one type of teaching method to another often during classroom observations. Some of the teaching methods used technology, such as clickers, but most did not. In addition, most participants used the university’s LMS for grading, and had all or part of their course materials posted online.

Some participants felt the accessibility of information on the internet could be used during class. For example, Emma said,
I love the idea of the one of having students take out their phones and then answer polls in class. That's not really new, but I love stuff like that. Then just last week the students were really struggling with [a concept] and I said, “Well, okay, while you're in your groups, you are welcome to get out your phones, your e-readers, your laptops. Do some research. Start finding out what other people are saying because maybe there's a definition that's going to work better for you.”

Emma also commented that she wanted to impart the idea that technology can be used for more than communication and entertainment purposes. She said, “Sometimes I'm not so sure that they know that there's all this really neat information out there too.” She wanted to show students “how technology can be something that [they] can learn from too.”

Adding technology to the class may cause additional free use to occur. Emma asks, “How can we take these devices and make them into something that shows [students] how much is out there and how much [they] can complement their education and not be just seen as a hindrance?”

Instructors weighed prep time and technology problems against the benefits to teaching. Gina used photos on the big screen during class and thought it would be beneficial to use technology so that students would be able to study details up close, but felt this technology would be difficult to employ. Lisa stated that she had integrated technology more into her teaching but said, “I also have found it to be more of a problem then actually a benefit.” She said that she would not use clickers after this semester as the preparation and technological issues were not producing enough benefit.
Heather tried using a number of interactive technologies in the classroom, but found she was “often a beta tester.” She believed the software offered by publishers was not yet ready for instructors to confidently use in class. Moreover, her experience indicated that they were too distractive, i.e. they caused free use to occur in the classroom. And although Rebecca was technologically savvy, she used note cards rather than clickers to gauge student participation. She stated, “This actually is a lot less time consuming for me than all of the programming and the prep and those kinds of things that go into setting up the [clicker] technology”.

The participants were asked specific questions about how they will deal with future changes in technology affecting the classroom environment. Lisa found the question “stressful.” Most said they did not know how they would deal with classroom/technology issues in the future and that they would address the changes as they occurred. Heather said, “One day at a time. It's hard to know what will be the next thing and I'm sure there will be new adaptations required.”

No participants had experienced an in-class issue with students using Yik Yak. Most said they would not know what the app Yik Yak was if they had not received a campus email explaining the technology. They were asked how they would deal with issues like the one that occurred at Eastern Michigan University (Koenig, 2014). Few knew how they would deal with a situation where other students, teaching assistants, or they were being ridiculed online. Rebecca said, “They'll be giggling… I'm never quite sure whether they've created a hashtag ‘this class is boring’ and they're all [on Twitter] or they're on Yik Yak.” She also said, “I think my feelings would be really hurt if that happened.” Emma said, “The environment in which students would be compelled to do
something like Yik Yak…is an outpouring of maybe something else that's going on in that classroom.”

**Exosystem.** Instructors were asked if they were aware of wearable HCI technologies such as Apple Watch and other popular wearable human computer interfaces (Wasik, 2013). Nicole said,

> The watches, yeah, and how many students have Apple Watches? That's something I've not taken a look at. Isn't that interesting that none of us [are dealing with that technology?]. The university is going to larger classes and I think administration is baffled. How do we handle all the technology that's here? Still, as all instructors wanted administration to stay out of classroom policy decisions, they preferred to make their own decisions regarding new technology usage by students in the classroom.

**Macrosystem.** Instructors commented about acceptance of cultural changes they have experienced due to technological development. In observation of the ubiquity of devices Heather said, “Ten years ago no one had smartphones and now just about everyone has them” and “I think culturally there's just very few people who do not have [smart phones.]” Mike detailed the change in young peoples’ acceptance and desire for ICTs by saying, “When I was growing up, it was the car. The personal technology was your own automobile. Now automobiles aren’t a big deal, personal technology is your device… your mobile phone, maybe an iPad.” And Nicole said, “I think we are in a digital world and we're not going to go back.”

Participants had strong opinions about culture change and how it is affecting people both individually and culture as a whole. Mike stated,
I think that people are living more of their lives through [ICTs] than on them, so they're more addicted to them. It's hard for them to tear themselves away sometimes to interact with the environment. You go past a café these days, you've seen it, right? Anybody over maybe thirty-five or forty is talking, mostly. This is a generalization. Anybody under twenty-five is sitting there texting.

Gina said,

I really saw how people moved from walking along with their thoughts or sitting with their thoughts or reading a book, to constantly being on the phone with people. Now it's constantly texting or checking texts. I feel like it's good to just sit with your thoughts sometimes or read a book or just sit and think. I feel like it's less self-reflective and maybe even less social.

**Summary**

Bronfenbrenner’s EST guided the researcher to organize data regarding the views of instructors concerning student free use of technology in the classroom. Interview data were input into a database based on EST systems. Instructors discussed individual, classroom, policy, and overall cultural effects of student ICT use during class. The organization of data in this manner aided the researcher in answering research questions regarding instructor views. Discussion of these questions and other unexpected discoveries are covered in Chapter V.
CHAPTER V

DISCUSSION

This chapter includes a summary of the study that restates the purpose, study design and research questions. It is followed by a summary of the problem. Discussion of the findings that incorporates the research questions in Chapter I, the relevant research in Chapter II, the data reported in Chapter IV follows. Next, incidental discoveries beyond the initial research questions are discussed. Limitations in conducting the study are examined. Conclusions followed by practical recommendations and implications for further research are provided.

Purpose of the Study

The purpose of this qualitative study was to add to the research by focusing on instructors’ views of college student free use of digital devices during classroom instruction at a western university. The study also explored instructor acceptance or resistance to technological change and whether professors believe that ICTs are a benefit or detriment to student learning during classroom instruction.

Study Design and Research Questions

Instructors face internal pressure, pressure from students, administration, and society to use ICTs during class. Bronfenbrenner’s (1979) ecological systems theory (EST) was used as a lens to provide a conceptual scheme to study structures and processes that instructors faced due to progressive accommodation of technological change. The lens served as a blueprint to conduct in depth research of phenomena to view instructor perspectives through their interrelationships with students, peers, administrators, and the digital culture of today. It also captured change in participants’
perspectives over time. These data were captured by examining syllabi, observing student off-task ICT use in the classroom, and interviewing instructors. This study was of an exploratory and descriptive nature. It used a qualitative design with a phenomenological approach to find meaning that twelve participant instructors attribute to challenges they encounter in dealing with student ICT use in the university classroom (Creswell, 2014). Data was collected by interview, observation, and document analysis. Ecological systems theory (EST) was employed as a lens to organize data and find meaning to answer the following questions:

- What are instructors’ views concerning college student use of digital devices during class?
- What are instructors’ views regarding policies they or their institutions set forth regarding ICT use during class?
- How have instructors dealt with student free use multitasking with ICTs during class in the past and how do they view the challenges of the future?

**Summary of the Problem**

Due to the mixed results found in current research, and pressures that emanate from various entities, instructors have no clear direction as to whether they should allow the free use of digital devices during class. Researchers have studied student perceptions about ICT use in the classroom (Alsaggaf et al., 2013; Bjorklund & Rehling, 2010; Hirschy & Braxton, 2004; Hoffman & Douglas, 2014; Thompson, 2013; Lavin et al., 2011; Tessier, 2013), but few have investigated instructor views (Campbell, 2006; Langmia & Glass, 2014; Synnott, 2013) even though instructors have copious practical experience in the classroom and are knowledgeable about the issues regarding free use of
ICTs during class. Studies have shown that ICTs cause internal (Drouin et al., 2012; Wei & Wang, 2010) and external distractions (Bjorklund & Rehling, 2010; Goundar, 2014) leading to multitasking activities which interrupt the state of flow during class (Adler & Benbunan-Fich, 2013; Altmann et al., 2014, Csikszentmihalyi, 1990). These interruptions are detrimental to the optimal learning experience (Bradstreet Grinols & Rajesh, 2014; Ravizza et al., 2014) causing student anxiety (Benbunan-Fich et al., 2011; Brooks, 2015; Cheever, Rosen, Carrier, & Chavez, 2014) as “accuracy steadily decreases as multitasking behavior increases” (Adler & Benbunan-Fich, 2012, p. 166). In turn, academic performance is diminished (Duncan et al., 2012; Karpinski et al., 2013) negatively affecting grades (Karpinski et al., 2013; Rosen et al, 2013). Especially troubling for instructors, the incidence of multitasking is underreported by students (Duncan et al., 2012; Mark et al., 2014) and is increasing over time (Carrier et al., 2009).

Many researchers have explored the employment of ICTs for guided use to enhance teaching in the classroom (Archer et al., 2014). Maddox (2009) stated that the pressure to get instructors to use ICTs in class was partially due to substantiate the huge investments in technology made on most campuses today. Others said that instructors should incorporate ICTs in the classroom to “meet students where they are (Schmidt, et al., 2014). Also, research showed that students want to use ICTs during class for learning purposes (Gikas & Grant, 2013; Tessier, 2013).

At times, students turn to free use when ICTs are used as a teaching strategy (Aagaard, 2015). Students report more disruptions due to student texting during class than instructors, especially in large classrooms (Berry & Westfall, 2015). They believe that instructors are unaware of the quantity of text messaging that occurs during class.
(Tindell & Bohlander, 2012). Comparison of instructor interviews and researcher observations resulted in interesting results.

**Discussion of the Findings**

This study researched instructor views by triangulating interview, observation, and syllabi data. Some findings were in line with current research on student free use multitasking. Other findings were contrary to current research. In addition, a number of mismatches were found between instructor beliefs about student multitasking as compared with realities experienced in observations. These issues are discussed in general in this section, and in detail by research question.

Instructor views, opinions, beliefs, experiences, and adaptation to teaching in a digital world were garnered to add to current research. Participants discussed the challenges and responsibilities in engaging students, as well as the problems they encountered due to student free use of ICTs and how they handled the situations. Most instructors discussed their commitment to excellence in teaching, but the question of responsibility for student engagement was controversial among faculty.

Instructors were aware that academic dishonesty occurs. Some instructors changed examination techniques to address student use of ICTs to engage in academic dishonesty, however, they were not aware of current and future technologies that make cheating easier than in the past.

Instructors were unanimous in their belief that they should have autonomy in making policy decisions for their classes. These guidelines applied in classes ranged from having no policies at all to severe penalties for using the devices. Student ICT off-task activity was more dependent on class size than on policies (see Figure 8). Interviews
gave insight to the problems encountered by instructors in larger classes. Comparison of interviews to observations supported most research that instructors were unaware of the amount of off-task behavior occurring in their classrooms. However, it was apparent that medium size classes (those between 36 and 150 students) varied in off-task behavior.

![Observed ICT Off-Task Behavior](image)

*Figure 8:* Observed ICT off-task behavior. Three small, four medium, and five large classes were observed. The amount of student off-task behavior with ICTs was rated from low to very high.

As each class had a different set of policies, and some classes had penalties for off-task ICT use in class, students receive mixed messages from the university in general and the instructors in particular (Goundar, 2014). Students may simply use other students in the classroom as a guide for proper behavior.

Research regarding instructor adaptation to technology was not in line with instructor interviews. Instructor use of technology had no relationship to their respective gender, ages, teaching status or years of experience.
Many instructors were frustrated with the pressure to use technology. They felt that guided use causes more preparation time and takes up more class time. Consistent with some literature, observations found that student free use increased when guided use activities occurred. Instructors were frustrated with software bugs and problems with technology implementation, support, and training in both university- and publisher-sponsored software occurred.

Observations rendered two interesting findings not discussed in the literature and termed incidental findings in this section. One was that the quality of multitasking varies with students. Wei and Wang (2014) studied students who multitask with pen and paper notetaking and laptops. Students in this study were observed multitasking with laptops and pen and paper notetaking; however, they were more often observed multitasking with phones and pen and paper notetaking.

Literature discussed the issues of the length of time different students spend in off-task behavior (Gehlen-Baum & Weinberger, 2014). Yet, the behavior the researcher called quick succession task-switching (QST) was not in educational literature. Some students rapidly multitasked with ICTs between off-task and class use—particularly when taking notes. It is not known if QST allows the student to access working memory capacity (WMC) in a way that is not as disruptive to learning.

Another incidental finding was the observed phenomenon the researcher termed viral texting. The behavior started with two students who socialized by sharing their phone screens. The distraction spread to additional students who joined in the group behavior. Further the behavior disrupted other students outside of the group who tended
to check or text on their phones. These observations were an extension on the Sana et al. (2013) laptop research.

**Research Question 1**

What are instructors’ views concerning college student use of digital devices during class?

**Student multitasking negatively affects the teaching experience.** A number of discrepancies between instructors and between this study and current research were found. This may be due to the difference in quantitative versus qualitative methods as in-depth interviews may have rendered more granular data. Or the differences could have occurred due to the small number of participants as compared to survey methods.

Most of the interviewed instructors cared deeply if students were engaged during class. They discussed the importance of student learning and how off-task use of ICTs during class was inhibiting that learning. Most instructors expressed frustration that they must attend to student off-task behavior with ICTs. Another frustration was that instructors wanted to allow more ICT use in the classroom, however, they knew it invited student off-task behavior. Using laptops as a resource and phones as clickers resulted in free use surfing and texting behaviors.

Some participants felt the responsibility to teach students proper ICT use in class and beyond. However, many feel it is not within their subject matter, or that they could devote class time to the issue. Still, a number of instructors expressed concern that ICTs caused degradation of writing, verbal, and critical thinking skills among students.

Synnott (2014) stated that instructors are aware of the amount of off-task use of ICTs in the classroom which differs from the findings by others (Berry & Westfall, 2015;
Rehling & Bjorklaund, 2010; Tindell & Bohlander, 2012). The findings of this study supported the findings that most instructors were unaware of the amount of off-task behavior that was occurring in their classes. A number of mismatches occurred between teacher belief that students were engaged and observations of the classes. For example, one participant stated that she did not believe that students were distracted as she showed interesting videos and asked students numerous questions in class. However, observations for that medium-sized class showed high off-task behavior rates among students.

A number of studies found that students experience anxiety due to multitasking (Cheever et al., 2014; Rosen et al., 2013; Fox et al., 2009; Mark et al., 2014). Instructors are not able to correct the behavior as they do not recognize it happening in their classrooms. In addition, even though instructors are passionate about engaging students, Wei and Wang (2014) state that instructors are unable to overcome the draw of ICTs during class. In order for students to have flow experiences in the classroom, they cannot be distracted by their digital devices.

There were discrepancies of views concerning student engagement. One instructor said, “You talk more than eight minutes and you can lose anybody.” Conversely, another said that he did not see why the students could not stay engaged in a short (50 minute) class.

This study did not reproduce the findings in Synnott’s (2014) study. Synnott found that female participants had significantly different opinions regarding student use of ICTs during class to text, email, and engage in social media. Females agreed or strongly agreed that students were engaging in off-task ICT use during class where males
were neutral regarding this behavior. No differences were found in this study between males and females. Both genders were more accepting of ICTs than they were in the past citing their personal dependence, student preference, and overall change in culture.

**Academic dishonesty during class.** Instructor perspectives regarding cheating with ICTs during in-class quizzes and exams were complex. Many felt that students were cheating by using ICTs to look up materials during exams, but few had caught students engaging in the behavior. Some changed the types of tests they gave to minimize academic dishonesty.

Although aware that ICTs assist students in cheating during class, they were unaware of the technologies that students may use to do so. Wearable ICT devices that communicate with cell phones are available and the sales of these items are expected to rise (Wasik, 2013). Instructors in the study did not currently deal with wearables in class nor did they have plans for how they will deal with other new technologies in the future.

**Research Question 2**

What are instructors’ views regarding policies they or their institutions set forth regarding ICT use during class?

**Instructors desire to create their own in-class ICT policies.** Unlike previous studies (Langmia & Glass, 2014; Synnott, 2013), the participants in this study unanimously wanted autonomy in making policy decisions even though part-time instructors were well-represented. Synnott’s 2013 study found that part-time instructors were almost unanimous that there should be a campus-wide policy to curtail student ICT use in class. Also not upheld by this study were the Langmia and Glass (2014) findings that younger instructors and females were stricter than males with cell phone policies.
Rather than campus-wide policies, Junco (2015) recommends stronger statements in course syllabi, and Berry and Westfall (2015) recommends that instructors must find more punitive ways to curtail off-task behavior. These suggestions corroborated with this study in large class data (see Table 7), but not in medium or small class data. Also, some instructors in this study state that they did not want to address free use issues during class as it was not their responsibility to teach outside of their subjects. Some also feel that it would take time from class. If instructors stop periodically to deduct points from students that are off-task with ICTs they may be drawn from the flow of teaching.

**Policy and class size.** In this study some relationships could be made between strength of policy and student off-task behavior in large classes. Certainly, large classes showed a great deal more off-task behavior than small classes. The large class with no written policies had the most observed off-task behavior while the small class with no written policies had very low ICT off-task use.

The study’s findings were consistent with literature on policy and class size. Relationships could be made between strength of policy and the quantity and types of student off-task behavior in large classes. Certainly, large classes showed a great deal more off-task behavior than small classes. Medium- and large-sized classes were observed to have a different quality of multitasking behaviors than small classes. Berry and Westfall (2015) stated that students report they use cell phones less often in small classes and likely intuitively know they are less likely to be called out for using ICTs in a large class. In general, students in small classes were surreptitious when off-task with ICTs. Large classes were observed to have more blatant free use behaviors. A general continuum was found in off-task behavior from small to large classes (see Figure 8).
No relationship could be made when comparing policy to gender, approximate age, or instructor standing. However, medium-sized classes that had written policies with penalties had fewer incidents of student off-task behavior with ICTs than those that did not have penalties. In addition, the large class with no written policies had the most observed off-task behavior.

Although many instructors stated that they talk to individual students about their off-task behavior during class, none did so during observations. Many of the instructors that taught medium- and large-sized classes felt that they could not enforce ICT policies set forth for their classes. These findings support work by Tindell and Bohlander (2013) who purported that policy must be enforced to be effective, but that faculty are generally not verbally confrontational with students. Students report that verbal confrontation is not an effective deterrent (Berry & Westfall, 2015). Students perceive grade reductions and removal from class as the most effective policies to deal with cell phone offenders, followed by instructor confiscation or interception of student phones.

Observational studies that gather information about both the quantity and quality of free use behaviors (Gehlen-Baum & Weinberger, 2014; Ragan et al., 2014) may be more accurate than the myriad of survey studies (Berry & Westfall, 2015; Bjorklund & Rehling, 2010; Goundar, 2014; Tindell & Bohlander, 2012). Observation may be more effective in determining the type and actual amount of student distraction as the incidence of multitasking is underreported by students (Duncan et al., 2012; Mark et al., 2014).

**Variant policy.** For each observation the researcher checked the syllabus for the course to find out if she could use her laptop to collect data or if she must take notations with pen and paper. Half of the twelve instructors discussed their own dependence on
ICTs, with some showing concern about, and understanding of student dependence (see Table 6). Instructor claims that they were personally dependent or addicted to ICTs had no relationship to the strictness of policy. In fact, every class had a different set of policies that showed no relationship to class size, gender, or status (see Tables 5 and 6). Research said that policies vary by gender and teaching experience. While teaching experience may play a role in strictness of policy (see Table 6), in this study gender did not.

Some used clicker software and therefore allowed phones for that use, but not laptops. Some allowed laptops for notetaking, but did not allow phones. Some classes had stringent policies with heavy penalties for not following directives. Other classes had no policies. The variation of policy by class supports research by Berry and Westfall (2015) who stated that instructors use a “wide variety of tactics and generally believe that they are effective” (p. 70).

Often the researcher would go to observe a class where laptops were not allowed and find a number of students using the devices anyway. She thought, “If they are using them, why can’t I?” In every class, students used phones – whether or not there were policies or penalties for their use. The researcher experienced some external cues to check her own phone.

Students must be quite confused as to what they can and cannot do in each class. From experience, the researcher found that students rarely read syllabus policies. Consequently, many act on what they see and hear in class. They are getting mixed messages from the university in general and the instructors in particular. Goundar (2014) stated that the issue was resolved when a universal in class ICT policy was instituted at
the School of Business at the Bay of Plenty Polytechnic. In most cases, faculty have the power to affect policy. Therefore, the issue of variant policy is not likely to change.

**Research Question 3**

How have instructors dealt with student free use multitasking with ICTs during class in the past and how do they view the challenges of the future?

**Instructor adaptation to new technologies.** Many participants feel that culture change due to technological advancements is negative for society in general and students in particular. Most simply accept change as inevitable. One participant was eager to use new technologies, and one had a low acceptance of change. However, most were thoughtful about the negative aspects that can occur with new technologies. A number of studies have looked at instructor acceptance of technology as to why they were less than willing to engage in more guided use activities (Walker et al., 2011). The Walker et al. meta-analysis found that instructors were more concerned with preparation time, technological issues, and the lack of appropriate software as reasons they did not use technology in the classroom.

In addition, most participants were unprepared for future changes, and some were unaware of current technologies that could be used for academic dishonesty. No patterns were found in an analysis of digital native/immigrant status, adaptation to technology over time, position type, or class policies (see Table 5.)

**Perceptions of technology for teaching purposes.** A number of instructors used clickers for ICT guided use activities to break up the lecture and keep students on-task. One instructor used the learning management system to conduct quizzes as well. No other types of interactive technologies were used during observations. Many wanted to
use more guided use technologies in the classes to better engage students. However, instructors found a number of barriers to successfully use ICTs in class. Participants criticized the quality of publisher software and the preparation time required for clicker software, learning management software (LMS), and publisher software.

Examples of tech-savvy behaviors as discussed in the Hwang and Jackson (2011) article were found. Some instructors tried a number of technologies and made thoughtful decisions about whether to continue to use the applications. Due to connectivity issues, some instructors decided not to use clickers or LMS for in-class quizzes. One instructor used publisher software for three years and decided the lack of publisher support, errors in collected data, and the expense to students were insurmountable. Another found that using note cards to collect participation data was less work than using clickers.

Instructors criticized the lack of content available on publisher software. One participant felt as though she were a beta tester because the publisher software had bugs, and two other participants discussed how often they had to troubleshoot clicker software. Yet another participant felt that software was often changed, but that the changes were not necessary. Student training on the software, and the inefficient use of class time to employ technologies were also disincentives.

The researcher noted that student off-task behavior increased when ICTs were used as clickers in all sizes of classes. Students who were not using ICTs before a clicker question would often be distracted with ICTs during or after clicker questions were asked in class. In addition, students used them to multitask or to cheat during quizzes.

Fried (2008) stated that laptops can be beneficial when used for structured activities (guided use) but unstructured use (free use) was deleterious to learning.
Kraushaar and Novak (2010) discovered that students had non-course-related software applications open and active about 42% of class time. Karpinski et al. ((2013)) said that, “While educators and policy makers espouse the possible benefits of using such applications and tools for knowledge development, creation, and sharing, the inability of its users to limit themselves to using it for the prospective goals undermines their use for even legitimate reasons” (p. 1191). The observed data upheld this research that students are unable to control the urges to freely use ICTs during guided use activities.

Technology issues. Although millennial students want to use active learning methods in classes rather than lecture, active learning is difficult to employ in large classes and is more time consuming to prepare (Bonwell & Eison, 1991; Kirchner, 2015; Lam & Tong 2015). This study upheld these findings as only clickers and LMS were used in the classroom to take attendance, ask review questions, and to give quizzes and exams. Only one instructor employed clickers beyond the basic uses for anonymous participation and facilitated discussion as suggested by Quinn (2010). Still a medium amount of ICT off-task behavior was observed in her class.

Participants discussed a number of technological issues. Problems with implementation, support, and training for both university- and publisher- sponsored software occurred. Participant comments supported research that often quality materials were not readily available and that many instructors did not have the technological expertise, support, or training to use ICTs for teaching (Bingimlas, 2009).

Several problems emanating from campus technology support were mentioned by participants. One participant discussed the inability to add software he wanted to use for class to a classroom computer due to a lack of support from the university technology
team. An adjunct stated she did not know what technology and training were available. The most widely discussed problem was that of connectivity. Two reasons to use clickers or LMS for quizzes and exams are to automatically input data to the LMS, and to save paper. Due to experience, instructors who used clickers or LMS for quizzes or exams had to have paper copies available in case the internet went down in their classrooms. And one instructor lost important data due to a loss in connectivity during an exam.

**Incidental Discoveries**

Two incidental discoveries were made due to patterns emerging in the data that were collected in classroom observations. One was the discovery that students were multitasking more often with phones than laptops together with pen and paper notetaking and some students engaged in what the researcher called quick succession task-switching (QST). The other was the observation that phone use in class could take on a viral nature. These patterns either support current research or are not represented in current research and may be the basis for important research.

**Student multitasking between ICTs and pen and paper notetaking.** Three of the instructors had policies that students should take notes with pen and paper and prohibited all ICT use other than the use of phones as clickers. Three had specific policies against any ICT use during class. The other instructors either verbally or in written policy warned against the use of ICTs for off-task activities. Observations supported the Wei and Wang (2014) research that indicated students multitask between note taking with pen and paper and off-task multitasking on laptops. Some students accessed LMS or used laptops to write papers. However, in almost every case, students
used laptops to surf the internet, access Facebook, watch videos, or engage in other off-task behaviors while taking notes with pen and paper.

Observations showed more students in medium- to large-sized classes multitasking with phones rather than laptops while endeavoring to take notes with pen and paper. Mueller and Oppenheimer (2014) found that taking notes with pen and paper produced superior results and postulated that taking notes on a laptop results in shallower processing.

Most students multitasking between ICTs and taking notes on paper turned their attention from one to another with time between each activity, however, a phenomena was observed where some students would quickly look back and forth between devices. A student might attend to one task for only a few seconds, then go to the other for a few seconds repeatedly. These students were not copying material from their laptops to paper as the laptop would display obvious off-task material. The researcher coded this behavior as quick succession task-switching (QST).

Flow interruptions during QST behaviors may or may not be more disruptive to learning than longer term task-switching behaviors. The quality of multitasking behaviors affect learning due to certain activities accessing the same brain resources (Salvucci et al., 2009). It is not known if QST allows the student to access working memory capacity (WMC) in a way that is not as disruptive to learning.

Technology breaks during class may improve the length of time that students are able to focus which in turn may increase learning. If longer term focus on classroom activities is less detrimental to learning, the suggestion that the employment of technology breaks is a preferable strategy when ICTs are allowed during instruction
(Rosen et al., 2011). Little research exists regarding technology breaks as suggested by Rosen et al. (2011), however, the introduction of breaks in class would reduce the contact hours. A number of instructors told the researcher that they were loath to add technology to a class due to time constraints. Technology breaks may not be possible. Rosen et al. suggested that instructors give students two breaks two to four minutes in duration during a 45-minute class so that they can take care of outside disruptions. If instructors gave eight minutes of break time for a 45 minute class throughout the semester, students may not receive the number of hours required for accreditation.

Quick succession task-switching may be more disruptive to other students in the classroom due to its frenetic quality. A number of studies were conducted regarding the disruptive nature of ICTs for other students in the classroom (Berry & Westfall, 2015; Langmia & Glass, 2014; Rehling & Bjorklund, 2010) and some students were calling for professors to enforce stricter policies (Hoffman & Lee, 2014).

**Viral texting.** The researcher observed a distinct phenomenon she termed viral texting. It was a social behavior that was distinct from a student involved with his or her phone during class. The behavior started with two students who socialized by sharing their phone screens. The distraction spread to additional students who joined in the group behavior. Further the behavior disrupted other students outside of the group who tended to check or text on their phones. These observations are an extension on the Sana et al. (2013) laptop research. In that study students who were not multitasking, but could directly view those multitasking on laptops, scored lower on a test than students who were not secondarily distracted. It is likely that students were secondarily distracted by students multitasking on phones as well.
Limitations

The researcher communicated to the instructors that they may introduce the researcher to the class as a teaching observer if they wished, however, no introductions were made. This could be considered deception as students were not told that they were being observed. The omission of an explanation of the researcher’s attendance was necessary so that students would engage in normal ICT use.

Simply by interviewing instructors, the researcher may have activated opinions by showing interest in instructor views due to the Hawthorne Effect (Landsberger, 1950). Additionally, the Hawthorne effect (Landsberger, 1958) may have changed teaching and student behavior in the classroom during researcher observations. However, it was assumed that participants answered questions truthfully and accurately and were forthcoming with examples of their experiences. The researcher’s personal acceptance of technology may have influenced perceptions of the usefulness of technology. In addition, her experience, both positive and negative, in the classroom due to free use of ICTs may have affected perceptions.

Although the data may be compelling and allowed for considerable depth of analysis, the findings are not generalizable to other populations. The intent of the study was to analyze the findings so that they may be the basis for further qualitative and quantitative research regarding instructor views of classroom teaching in a digital world.

Conclusions

Using Bronfenbrenner’s ecological systems theory as a guide to uncover instructors’ views was useful for this study. Most participants felt pressure emanating from every one of Bronfenbrenner’s (1979) systems: internal pressure (individual),
pressure from students (microsystem), pressure to use new technologies in the classroom (mesosystem), knowledge that the university will have constant technological change (exosystem), and societal changes (macrosystem). The chronosystem also guided data collection about instructor change over time.

The design of the study was different than any studies found to date as it triangulated instructor interviews with syllabi and observational data. Information accumulated in this study supported some research, but was in direct opposition to other research. The findings provided practical recommendations and many new opportunities for future research.

**Practical Recommendations**

This section includes thoughts and ideas concerning student free use of ICTs in the classroom. It contains suggestions for both instructors and administrators.

**Instructors**

When the instructor considers that there are students who want a classroom environment that is not distractive, the onus is on the instructor to create an environment in which they can learn. As the instructor has little control concerning the number of students in a given class, he or she must either uphold policy or find creative ways to create a classroom environment for those who are there to learn.

The researcher taught many large classes in information systems and had the responsibility of teaching students about proper ICT usage in school and in business. Because the subject matter was technology, she agreed with Nass (Glenn, 2010c) that it is difficult to tell students not to use technology in a classes where technology is the subject matter. She tried a number of strategies and found that having an area for those who
were fully engaged and an area for those who used ICTs during class worked well. Consequently, any student who wanted to use electronics sat on the left side of the classroom and those who did not sat on the right. This allowed students (both those who were using technology and those who were not) to choose a seat in the front, middle, back, or on the aisles. As the semester went on, the non-technology area often grew. Students realized that the researcher (as instructor) would engage with those in the non-technology area at a higher rate than those in the technology area. Students had a choice of how they wanted to learn and the instructor was able to truly engage with those who were there to learn. Beyond the benefit to the engaged students, the strategy increased the instructor’s job satisfaction.

Another strategy is to wean students from their technology dependence. Some instructors work to have students increase the amount of time that they do not engage with ICTs during class over the semester. Teaching the tenets of mindfulness is one way to accomplish this. As students learn to be more aware of their behavior, they are able to change attitudes, mindset and perspective (Kuechler & Stedham, 2014). This strategy works best in small- to medium-sized classes. Fulton et al. (2011) created an in-class active learning exercise that can be used with any subject matter that demonstrates the impact of multitasking during learning. Another successful exercise is to challenge students to spend a day without electronics and write a paper or discuss the experience in class (Blancato, 2013).

Habitual distraction occurs as modern students seem to have difficulty with the traditional classroom environment and react “particularly strongly to the perceived monotony of lecturing” (Aagaard, 2015, p. 95). A number of “zenware” programs are
available to help students stay on-task. For example, the app StayFocused helps users organize their time and block out interruptions. SelfControl is a free app for Mac users where certain sites can be “blacklisted” for a selected period of time. Other types of zenware black out everything on the user’s screen except the current window. Instructors may encourage students to use zenware during class.

The researcher suggests that instructors receive training on how to better deal with their own dependence issues or to better use technology in their own lives. Some colleges have a department or administrator who helps instructors to be better teachers. Classes and workshops may be requested to learn better strategies for using technology to the instructor’s advantage or break their own bad habits. These strategies may in turn be taught to students.

Viral texting was an obvious social behavior beyond checking or texting phones. Students who try to remain engaged in class do not want to deal with this behavior (Hoffman & Lee, 2014). Tindell and Bohlander (2013) purport that policy must be enforced to be effective, but in general, faculty are not verbally confrontational with students as it is not an effective deterrent (Berry & Westfall, 2015). One solution to this type of disruption is to ask students to move seats and to ask them not to sit together during subsequent classes. The strategy could be accomplished by asking the group to meet after class. In a large class environment, a teaching assistant could deal with the behavior so that professors do not further disrupt class when confronting a student for engaging in off-task behavior (Langmia & Glass, 2014).

Administrators
The power structure is such that full-time faculty have the ability to set policy about in-class policy. As part-time faculty do not have the power to affect policy, it is doubtful that setting a college-wide policy is possible at most institutions. It would take strong leadership to accomplish that goal. However, it may be worth undertaking this task as student off-task behavior is likely to become worse over time (Zickuhr, 2011) and retaining adjunct professors may become an important issue as well.

It may be a task for administrators to educate instructors regarding new technologies and their potential hazards. Most institutions have a plethora of technology personnel that could be tasked to share technological updates and potential hazards to instructors to curb distractions and cheating in the classroom.

**Implications for Further Research**

As college and university class sizes increase, the ability to control off-task ICT behavior increases in importance. Due to the variation in ICT off-task behavior in medium size classes (those between 36 and 150 students) research may be conducted to ascertain the difference to create a higher quality learning experience.

Lisa’s concern that students “personalize their news feed and only engage with things they agree with” is interesting. Her concern is that college is a place to learn new and contrasting ideas and that students are not learning to think critically. It may be an interesting research area.

Observational and experimental research in the classroom may be more effective than student surveys as students underreport multitasking during class (Kraushaar & Novak, 2010). An excellent example is the experimental research conducted by Sana et al. (2013) with the finding that laptops create external distractions that negatively
affected test scores of students close by. No observational research was found in the classroom to better understand the secondary distraction that occurs when students multitask with phones. More research is needed on internal and external disruptions to flow in the classroom.

Research concerning learning differences in short- versus long-term task switches in terms of flow (Csikszentmihalyi, 1990) and working memory capacity (WMC) (Medeiros-Ward et al., 2015) is needed. Flow interruptions during quick succession task-switching (QST) behaviors may or may not be more disruptive to learning than longer term task-switching behaviors. It is not known if QST allows the student to access working memory capacity (WMC) in a way that is not as disruptive to learning. As research found, approximately 2.5% could attend to more than one task at a time with no mental switching costs (Watson & Strayer, 2010). Research delving into task-switching between phones and pen and paper note-taking is warranted as well.

Especially in medium- to large-sized classes, more students were off-task with phones than laptops. Kross et al. (2013) reported that students were most often on Facebook when off-task with laptops and that its use negatively affected life satisfaction. In addition, the incidence of multitasking is underreported by students, is on the increase, is causing anxiety, (Carrier et al., 2009; Cheever et al, 2014; Fox et al., 2009; Mark et al., 2014) and is distracting to learning in the classroom (Aagaard, 2015; Berry & Westfall, 2015; Kraushaar & Novak, 2010). But Facebook use may not create learning distractions that are as acute as texting due to pressure to immediately respond to messages. Is multitasking with phones more detrimental to learning than laptops? Do off-task
behaviors with phones cause more student anxiety due to stress or emotional responses than multitasking on laptops?

None of the instructors corrected student off-task behavior. Junco (2015) recommends stronger statements in course syllabi to curtail off-task behavior. The lack of enforcement may be incidentally teaching students that policies are meaningless making it more difficult for other instructors to enforce policies. More study regarding policy enforcement is needed. In addition, more attention regarding class-size and student off-task behavior with ICTs is justified.

Research in medium-sized classes to find how to limit off task multitasking is needed. One participant had a low rating of student ICT off-task behavior and had stringent policies with penalties. It is not known why her class had little off-task behavior compared to other medium-sized classes. If policies are not a deterrent to free use behaviors (Berry & Westfall, 2015), why are some instructors in medium- to large-sized classes able limit off-task behavior? A study to find practical advice based on successful instructors’ methods is warranted.

Maddox stated that more research is needed with “a widespread attitude of skepticism” to be sure that the expenditures in dollars and in teacher and student time is warranted (p. 184). In addition, future studies are needed as technology is continually evolving, governments and schools continue to invest in technology, and students are growing up more and more connected to devices.
References


*International Journal of Technology in Teaching and Learning, 5*(2), 182-190.


doi:10.1177/0018720812470842


Salter, D., & Lam Lai Ki, J. (2010, June). Approaches to teaching and technology use among international award winning university teachers. In *World Conference on*


doi:10.1016/j.compedu.2014.11.009


doi:10.1080/15391523.2014.925686


Wadhwa, V. (2012). Why I believe that this will be the most innovative decade in history. *Forbes.com*. Retrieved from


APPENDICES

Appendix A Purposive Sample

<table>
<thead>
<tr>
<th>Purposive Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>79 Identified Instructors</td>
</tr>
<tr>
<td>228 Sections</td>
</tr>
<tr>
<td>24 Classes from various colleges</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Needed for Study</td>
</tr>
<tr>
<td>15.19% In Sample</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classes in Core Curriculum Fall 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ART</td>
</tr>
<tr>
<td>100 BIOL</td>
</tr>
<tr>
<td>100 ECON</td>
</tr>
<tr>
<td>100 ENV</td>
</tr>
<tr>
<td>100 PHYS</td>
</tr>
<tr>
<td>100 THTR</td>
</tr>
<tr>
<td>101 ANTH</td>
</tr>
<tr>
<td>101 PSC</td>
</tr>
<tr>
<td>101 PSY</td>
</tr>
<tr>
<td>101 SOC</td>
</tr>
<tr>
<td>101 SOTA</td>
</tr>
<tr>
<td>101 WMST</td>
</tr>
<tr>
<td>103 GEOG</td>
</tr>
<tr>
<td>106 GEOG</td>
</tr>
<tr>
<td>110 AST</td>
</tr>
<tr>
<td>121 GEOG</td>
</tr>
<tr>
<td>121 MUS</td>
</tr>
<tr>
<td>121 NUTR</td>
</tr>
<tr>
<td>121A CHEM</td>
</tr>
<tr>
<td>123 MUS</td>
</tr>
<tr>
<td>201 CH</td>
</tr>
<tr>
<td>202 CH</td>
</tr>
<tr>
<td>203 CH</td>
</tr>
</tbody>
</table>
Appendix B Letter to Possible Participants

The following Letter was sent via email to possible participants:

From: Sandy Week  
Date: Monday, August 24, 2015  
To: <Participant Name>  
Subject: Participation in research request

Dear <Participant Name>,

As a doctoral student in educational leadership at the University of Nevada, I'm writing to ask for your participation in a qualitative study to complete my dissertation. The work is entitled "An Ecological Study of Instructor Views of Free Use Multitasking with Digital Devices in the Classroom." I'm especially interested in your views concerning the free use of laptops, tablets, and cell phones during class. It is considered "free use" when students use digital devices for note taking or to engage in off-task activities. On the other hand, "guided use" occurs when digital devices are used for specific, well-defined tasks during class.

While a great deal of research has been conducted regarding student views of digital device use during class, very little has been done concerning the opinions and experiences of those who teach in higher education. The data collected may be used as the basis for further study. You are being asked to participate as you teach a <100 or 200>-level class that is part of the core curriculum. Your time is valuable and your generosity in allowing me to view your syllabus, observe a class, and interview you will be much appreciated.

If you are interested in participating, please let me know via return email. I will then contact you with additional information. If you are selected to participate, the process I propose is to:

1. gain your written consent to participate in the study
2. ask you to provide a copy of your syllabus for your <course number and name> in any means that suits you, i.e., by URL link, email, or [postal] mail
3. work with you to find a date and time to observe a class meeting
4. work with you to find a date, time, and location for a 30 to 45 minute semi-structured interview
5. provide a transcription of the interview for your review where you can change, delete and/or add any comments you wish
6. provide you with the results of my findings

I hope you will enjoy the opportunity to voice your thoughts regarding the ubiquitous use of technology today and if it affects your classroom teaching. Please know that your anonymity and the anonymity of your students will be vigorously protected. Thank you for your consideration.

Sincerely,
Sandy Week, MBA  
Doctoral Student in Educational Leadership  
Lecturer Emeritus in Information Systems University of Nevada
Appendix C Participant Information and Consent Form

An Ecological Study of Instructor Views of Free Use Multitasking with Digital Devices in the Classroom

You are invited to participate in a project about teaching while students may be using digital devices in your classroom. I am conducting classroom observations and instructor interviews to gather data for my dissertation to complete a PhD in Educational Leadership in the Department of Education. Should you decide to participate in this project, you are asked to allow me to observe one of your classes where you plan to lecture at least 50% of the time, and to provide an interview about your views of student use of digital devices, policies at the university and department level, your teaching style, etc.

If you agree to participate, we will schedule a classroom observation date and time and a subsequent interview at your convenience. Only field notes will be taken during the classroom observation. No students will be personally identified and no digital documentation will occur. The interview will last approximately 30 to 45 minutes. If more time is needed, we can schedule a follow-up interview based on your availability. The interview will be audiotaped and I will take handwritten field notes. You will receive a copy of the transcript derived from the interview and be given the opportunity to correct, add to or delete any of your comments.

There are no anticipated risks associated with participating in this project. The observation and interview are completely voluntary and you may withdraw at any time. You also may refuse to answer specific questions for any reason. I am available to answer any questions you may have. My phone contact is 775-848-7424 and my email is smw@weekspace.com. You also may contact my dissertation chair, Dr. Rita Laden, at mladen@unr.edu with any questions.

Please indicate your willingness to participate by signing below. Please keep a copy of the letter and return a signed copy to me at your earliest convenience. Thank you for your participation.

Sincerely,

Sandy Week, MBA

I have read the above and agree to allow you to observe a class and to participate in an interview.

Agree ________________ Do not agree ________________
I give you permission to audiotape our interview.
Agree ______________ Do not agree ______________
______________________ __________________________
Printed Name          Signature

___________
Date
Appendix D Interview Questions

Proposed Interview Questions with Possible Probes (P-)

1. What is your opinion of digital devices use in the classroom?
   
   P-When a student is typing on a device – what do you assume he or she is doing?

2. Do you verbally prohibit their use?
   
   P-Why or why not

   P-Have you asked a student to stop using a device?

   P-Why? How?

3. Do you feel like you can tell students not to use technology in the classroom?
   
   P-Why or why not?

4. Is it an instructor’s responsibility to teach students when to use ICTs?
   
   P-Why or why not?

5. Do you think students cheat with ICTs?
   
   P-How?

   P-Do you have any personal experience with cheating with ICTs?

6. Do you think the culture around the use of cell phones and/or other technologies is changing?
   
   P-Do you have examples?

7. Have you seen any change in how you teach due to the advent of laptops in the classroom?
   
   P-Tell me about teaching before laptops.

   P-Have you changed your perception of ICT use?

   P- Do you think teaching is as rewarding?

   P-Are there any other approaches to the issue?

8. Have you or do you ever incorporate ICTs as part of classroom activities?
P-Do you have examples?

P-What were the outcomes?

9. Do you think the department or the university should have policies regarding ICTs in the classroom?

P-What would you like to see implemented?

10. Clayson and Haley feel that instructors have three options in dealing with ICTs in the classroom:

   a. Accept texting as part of the culture

   b. Incorporate texting in class

   c. Increase cognitive load

   Do you use any of the above? How?

11. With the advent of new apps that may be disruptive, Google glass and Apple watches as well as technology that you are unaware, how do you think you will cope?

12. Is there anything you would like to add?