The New Normal: Lived Experiences of Teachers’ Educating Students in an Always-on and Connected Middle School Environment

A dissertation presented to
the faculty of
The Patton College of Education of Ohio University
In partial fulfillment of the requirements for the degree
Doctor of Philosophy

Alexander R. Murray
April 2016
© 2016 Alexander Murray. All Rights Reserved.
This dissertation titled
The New Normal: Lived Experiences of Teachers’ Educating Students in an Always-on
and Connected Middle School Environment

by

ALEXANDER R. MURRAY

has been approved for
the Department of Educational Studies
and The Patton College of Education by

Teresa J. Franklin
Professor of Educational Studies

Renée A. Middleton
Dean, The Patton College of Education
Abstract

MURRAY, ALEXANDER R., Ph.D., April 2016, Instructional Technology

The New Normal: Lived Experiences of Teachers Educating Students in an Always-on and Connected Middle School Environment, (183 pp.)

Director of Dissertation: Teresa J. Franklin

Mobile technology has inundated modern society in the form of small always-on and connected devices that can be carried and accessed from nearly everywhere, enabling a wealth of continuous information. As society embraces this norm and technology-driven standards continue to emerge in education, preparing K-12 students for digital media use and information fluency is necessary. Also, finding ways to leverage always-on and connected devices that are already embedded in the lives of school-aged youth, advances opportunities for flexible classroom activities that are not only useful in presenting content, but learner engagement as well. Accordingly, this study explores the lived experiences of teachers’ educating students in a bring your own device (BYOD) middle school setting, by which students’ have access to and use always-on and connected personal technology in class.

The inquiry took place at a suburban science, technology, engineering, and mathematics (STEM) middle school in Central Ohio. The participants included five teachers of students from grades 5-8 and two facility administrators from the school. Data was obtained through semi-structured interviews; classroom and lab observations; and a follow-up teacher interview survey.
The findings revealed that teachers were open to using always-on and connected technology to support both personal and classroom activities. Teachers also embraced and leveraged Chromebooks and smartphones for content delivery, student engagement, and to access internet-based applications for learning. It was also found that the teachers attitudes toward educating students in the connected environment was primarily positive. However, they were more pessimistic about middle school students capabilities for self-guided learning by means of their always-on and connected technology.
Dedication

I dedicate this dissertation to my wonderful family. Your support, understanding, and patience during this journey have been nothing less than monumental. I especially want to thank my wife Neka for keeping me motivated every day and for steering the ship on many nights when I was away studying. There is no way that I could have done this without you.
Acknowledgments

I want to first acknowledge my advisor and committee chair, Dr. Teresa Franklin for all of her support, advice, and leadership throughout my Ph.D. journey. I also want to thank Dr. David Moore, Dr. Ward-Randolph, and Dr. Dwan Robinson for pushing me to explore new things and for giving me great research advice over the years. You have helped in making this a great experience for me and I am forever grateful.

I would also like to thank the Patton College of Education for taking a chance on me and for providing a great variety of resources to support my education and research goals.
Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>3</td>
</tr>
<tr>
<td>Dedication</td>
<td>5</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>6</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>7</td>
</tr>
<tr>
<td>List of Tables</td>
<td>9</td>
</tr>
<tr>
<td>Chapter 1: Introduction</td>
<td>10</td>
</tr>
<tr>
<td>Purpose of Study</td>
<td>12</td>
</tr>
<tr>
<td>Research Significance</td>
<td>15</td>
</tr>
<tr>
<td>Research Questions</td>
<td>22</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>22</td>
</tr>
<tr>
<td>Limitations</td>
<td>24</td>
</tr>
<tr>
<td>Chapter 2: Literature Review</td>
<td>26</td>
</tr>
<tr>
<td>Introduction</td>
<td>26</td>
</tr>
<tr>
<td>Generational Crossings in a Digital Society</td>
<td>27</td>
</tr>
<tr>
<td>Digital characteristics of Generation Z</td>
<td>28</td>
</tr>
<tr>
<td>Gen Z students taking a position as the ‘free agent’ learner</td>
<td>30</td>
</tr>
<tr>
<td>Using Technological Determinism to Understand the Digital Generation</td>
<td>32</td>
</tr>
<tr>
<td>21st Century Skills in Teaching and Learning</td>
<td>35</td>
</tr>
<tr>
<td>K-12 School Districts are Embracing Mobile Technology</td>
<td>38</td>
</tr>
<tr>
<td>Infiltration of personal student technology</td>
<td>38</td>
</tr>
<tr>
<td>1:1 computing technology programs in K-12: benefits and challenges</td>
<td>43</td>
</tr>
<tr>
<td>Teaching in a Connected K-12 Environment</td>
<td>47</td>
</tr>
<tr>
<td>How are teachers embracing classroom technology integration</td>
<td>48</td>
</tr>
<tr>
<td>Barriers to technology integration</td>
<td>51</td>
</tr>
<tr>
<td>Chapter 3: Methodology</td>
<td>53</td>
</tr>
<tr>
<td>Research Design</td>
<td>55</td>
</tr>
<tr>
<td>Data Collection</td>
<td>62</td>
</tr>
<tr>
<td>Phenomenological Data Analysis</td>
<td>73</td>
</tr>
</tbody>
</table>
Chapter 4: Results ............................................................................................................. 76
Introduction to the Always-on and Connected STEM School Environment....... 77
Early challenges in the connected school. ............................................................... 78
Observed school environment and administrative strategies. ............................. 80
Transition and complexities of the schools technology plan. ............................... 83
RQ1: Teachers’ Lived Experiences in the Always-on and Connected Middle School 84
Digital evangelist in the classroom ........................................................................ 84
Peer-to-peer collaboration ....................................................................................... 86
Modelers of digital-age learning to support student success. .............................. 88
Experiences managing student use of always-on and connected technology .... 94
Collaboration with the administration ................................................................... 97
RQ2: Attitudes Regarding BYOD and Student Technology Use ......................... 102
Setting boundaries for ubiquitous technology use in class. .................................. 102
Usefulness of acceptable technology use policies in the middle school ............... 106
RQ3: Teachers Understanding About Middle School Students’ Capabilities of Being ‘Free Agent’ Learners ................................................................. 110
Underdeveloped social skills. ................................................................................ 110
Research and writing behaviors. ........................................................................... 113
Minimal capabilities for self-directed learning. ..................................................... 117
Chapter 5: Discussion and Recommendations .................................................... 123
Analysis of Teacher Experiences in the Connected STEM Middle School .......... 123
Complexities of Overlapping Technology Plans .................................................. 125
Analysis of Teachers Understanding of Student Capabilities and Technology Influence ........................................................................................................ 131
Implications for Future Research ......................................................................... 139
References ............................................................................................................. 141
Appendix A. Preliminary Survey ........................................................................... 158
Appendix B. Semi-Structured Teacher Interview Questions ............................... 162
Appendix C. Administrator Interview Questions .................................................. 167
Appendix D. Follow-up Teacher Survey ............................................................... 169
Appendix E. Interview Consent ............................................................................ 170
Appendix F. Transcription Sample ........................................................................ 173
List of Tables

Table 1: BYOD Studies .................................................................21
Table 2: Sample of Teacher Responses and Themes.................................100
Chapter 1: Introduction

The modern educational landscape regards information, media, and technology skills to be an important component of teaching and learning for today’s youth preparing to compete in a global society (Partnership for 21st Century Skills, 2011). These skills are imperative for researching and producing knowledge, as well as having capabilities for presenting results in an individual or collaborative manner (Bellanca & Brandt, 2010). These skills are also necessary when entering an ever changing technology-driven world (Tucker, 2014) inundated with various forms of digital age media and interactive tools such as mobile tablets, smartphones, the internet, and networking to name a few (Daggett, 2010; Nichols, 2013). Digital age technology and skills are not only advantageous to the K-12 learning environment, but also essential for developing today’s youth for future workplace and higher education opportunities (Resnick, 2012; Rideout, 2012).

In the context of K-12 teaching and learning, mobile technologies such as smartphones, iPods™, and tablets have advanced as great supplemental tools to amplify classroom collaboration (Squire & Dikkers, 2012). For the affordances provided through these interactive tools has proven to be effective for multitasking, classroom engagement, and individual motivation toward learning for a generation of connected, tech savvy students (Clary, Kigotho, & Barros-Torning, 2013; DreamBox_Learn, 2014; Kee & Samsudin, 2014). Being able to implementing standards and methods that engage today’s youth, while preparing them for everyday life and the workforce is critical in K-12 education (The Partnership for 21st Century Skills, 2011) and educators are responsible
for ensuring today’s students are ready to thrive in the high-tech, global world (Lemke, 2010). In particular, organizations such as The Partnership for 21st Century Skills (P21), The International Society for Technology in Education (ISTE, 2015), and The Committee on Prospering in the Global Economy of the 21st Century (CPGE21C, 2015) continues to advance recommendations for student technical competencies, as well as suggestions for teachers’ to model digital age learning experiences to engage students’ in the classroom (CPGE21C, 2007; ISTE-NETS-T, 2008; The Partnership for 21st Century Skills, 2011).

Digital age learning experiences are beneficial to teachers and students (Tucker, 2014) and are those activities inclusive of, but not limited to using computers, technology applications, and the internet to strengthen school curriculum and technology skills (Alliance for Excellent Education, 2012; Downes & Bishop, 2012) for a generation of digital natives (Prensky, 2001).

The digital learning experiences and skills advanced for modern K-12 teaching and learning embody the tools that digital natives have been influence by, such as the internet (Carr, 2011) and ubiquitous internet-enabled mobile technology to name a few (Clary, Kigotho, & Barros-Torning, 2013). The connected tools students are familiar with may have the greatest potential of gaining their interest (Walling, 2012) and inducing attitudes and engagement toward learning (Block & Jesness, 2012; Rau, Gao, & Wu, 2008). As mobile technologies, supportive wireless network capabilities, and digital learning expectations continue to spread, so will the need for K-12 schools to adopt connected learning environments (Alliance for Excellent Education, 2014), such as those empowered through bring your own device (BYOD) or bring your own technology
(BYOT) policies (Center for Digital Education, 2011). A policy of this type permits students’ to bring and use their own personal mobile technology to school for educational applications (Burns-Sardone, 2014; Intel Education, 2014). In doing so it is implied that students may benefit from the always-on and connected capabilities of their personal mobile technology, which enables information retrieval on demand from the internet in both a formal classroom and informal out of school setting (Alliance for Excellent Education, 2014).

An example of this type of connected environment is present every day at one Central Ohio middle school that has adopted a BYOD policy. As such, students’ are permitted to bring their own personal mobile technology to the school and connect to the facilities wireless internet. When this occurs, the technology becomes always-on and connected and the student has the freedom to randomly access information via their device at any time inside the school.

**Purpose of Study**

Research on the diffusion of connected mobile technology in society is broad; as to are the advantages mobile technologies afford students’ within the context of K-12 teaching and learning (Franklin, 2011; Herro, Kiger & Owens, 2013; Hu & Garimella, 2014; Looi & Wong, 2014; Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013; Squire & Dikkers, 2012). For middle and high school aged youth, mobile technology can be empowering (Thackeray & Hunter, 2010) and yield opportunities for new social relationships, engaging entertainment, and self-directed learning opportunities (Crompton & Keane, 2012; Looi & Wong, 2014; Merchant, 2012; Project Tomorrow, 2014). The
power and mobility of personal mobile technologies such as smartphones, iPods, and tablets enable continuous consumption of online digital media when and wherever a wireless internet (Wi-Fi) or 3G/4G mobile network resides. Ownership of the aforementioned always-on and connected technologies are prevalent among the modern youth generation (Madden et al., 2013; Rideout, 2012) because they are leveraging them as mobile platforms (Rideout, Foehr, & Roberts, 2010), taking full advantage of the ubiquitous tools of this modern technology-rich era.

For example, an in-depth study of media in the lives of youth revealed that the 8-18 year old American demographic interacts with media 7 days per week and the development of enhanced mobile media, online capabilities, and content variety on the internet has encouraged them to consume even more (Rideout et al., 2010). In a similarly study, Madden et al. (2013) examined technology use for teens ages 12-17 and found that 78% are adamant users of cell phones, tablets, and other mobile devices that enable them to access and use the internet. Of this national response group, nearly 50% were smartphone users and 23% were tablet users (Madden et al., 2013, p. 5). Moreover, another national study of middle and high school teachers’ working in digital environments reported that students’ in their class use mobile phones to look up information and engage in other learning related activities (Purcell et al., 2012), which supports the frequent assertion that youth have embraced always-on and connected mobile technology for multiple uses. In a study of the digital future, Lebo (2013, p. 138) reported that 61% of youth age 18 and younger said the internet was a very or extremely important tool for their schoolwork and 77% of adults stated that children are online
while in the home. Adults reported an average age of 13 was appropriate for children in the home to own a cell phone and 15 was an appropriate age for a Facebook account. Consequently, it could be inferred that this modern school-aged generation are perpetual users of always-on and connected mobile devices, the internet, and are affixed to them as normal life tools for both education and entertainment of self.

In conjunction with the reality of youths’ acceptance for always-on and connected mobile technology in their life is the infiltration of the aforementioned Bring Your Own Device (BYOD) policies in K-12 schools (Chadband, 2012; Nelson, 2012), which continue to expand across U.S. districts. The Consortium for School Networking (CoSM) conducted national research on K-12 IT leaders and found that 14% of U.S. school districts have fully adopted BYOD policies; 58% are piloting or moving toward implementation initiatives; and 30% currently have no plans to adopt BYOD policies (CoSN, 2015, p. 17). The foundational tenets of BYOD policies are advanced to allow students’ to bring their own personal mobile technology to the school setting to serve as aid for learning (Halpin & Collier, 2012; Price, 2014). For instance, a students’ smartphone, tablet, iPod Touch, or laptop can be carried in and connected to the facilities WI-FI network for instant internet access. In essence, this gives students’ permission to interact with emergent mobile technologies of their own within the context of a formal classroom for school related activities (Project Tomorrow, 2013).

Now, of course at this point one may question how a teacher manages a student that has been empowered to openly use their own personal mobile technology that they are accustomed to, which in a BYOD setting is always-on and connected to the internet.
To this regard, does this imply that schools have not only embraced a 21st Century technology reform initiative such as BYOD, but have also conceded to the normal habits and tools of this school-age generation? If so, how does enabling student use of always-on and connected mobile technology affect the structure, planning, management, and overall flow of in-class learning activities that teachers’ continually struggle to balance?

This study was advanced to explore the potential daily nuances, complexities, and affordances that teachers experience as a result of integrating student personal always-on and connected mobile technology with the capabilities of a BYOD setting. A phenomenological case study approach will be used to gain in-depth knowledge from teacher perceptions of working within a BYOD middle school environment, where students have constant access to their personal always-on and connect mobile technology.

**Research Significance**

Though the inclusion of personal mobile technology may be useful and engaging in varying learning context for students’, teachers’ feelings and beliefs related to students’ use of always-on and connected personal technology, granted through policy in a BYOD middle school setting is moderately covered from a phenomenological perspective. As such, teachers’ broader views on student frequent use of technology in the classroom could potentially be more or less enthusiastic, or their behaviors less tolerant of what technology integration or a BYOD policy permits within a school. Especially, if policies are in place with minimal regard for teachers’ choice (Yilmaz & Kilicoglu, 2013), or if there are unfavorable opinions related to teachers intended role. For instance, Godsey (2015) expressed concern for the future role of teachers and felt that
the position was shifting from one that dictates or provides core knowledge, to one that facilitates digital content that students have 24/7 access to. On the other hand, Davison (2011) embraces the idea of technology integration and a classroom makeover by which teachers leverage the tools of this digital era to engage learners. Particularly those that prepare students for a digital world and doesn’t always require them to face forward or accept predetermined knowledge. Nonetheless, while assertions of teachers’ roles and learner engagement may differ from one teacher to the next, one must acknowledge that BYOD programs, connected 24/7 learning experiences, and student-controlled learning will become more entrenched in K-12 environments in the coming years (Terrell, 2015). This will certainly be the case of personal student technology in class as well, since ownership of ubiquitous internet-enabled devices such as smartphones and tablets has and will continue to increase (Madden et al., 2013).

The result of the aforementioned phenomenon engenders varying ideas of perceived usefulness in teaching and learning, especially when the personal technology is considered a classroom disruption (Norris & Soloway, 2009). O’Bannon and Thomas (2014) examining the differences between digital native and digital immigrant teachers that revealed multiple variations in their perceptions of incorporating mobile phones in the class (O’Bannon & Thomas, 2014). In particular, the teachers support for mobile technology when engaging in classroom activities, as well as the usefulness of mobile features. While teachers age 32 and younger were supportive of mobile phones in the class to support learning, teachers older than 50 were less supportive (O’Bannon & Thomas, 2014). Perceived usefulness also varied by age, but the teachers found cheating,
cyberbullying, and disruption to be barriers of mobile phones in class (O’Bannon &
Thomas, 2014). Moreover, another study reported issues such as loss of class time due to
technology issues; minimal visibility of what students are doing in class with technology;
and lack of professional development as barriers that could lessen teachers’ views on
student frequent technology use in the classroom (Digedu, 2014). For example, Crichton,
Pegler, and White (2012) studied the opportunities and challenges that exist when
students and teachers use school issued iPods and iPads in a connected K-12 elementary,
junior high, and high school environment. Both teachers and students preferred a variety
of devices for completing everyday tasks, but management of the technology as well as
understanding how it would fit in a daily routine was challenging for teachers (Crichton,
Pegler, & White, 2012). It was found that the high school teachers and students struggled
to find educational use for the iPods and iPads, while elementary and junior high levels
embraced the technology in the classroom (Crichton, Pegler, & White, 2012).

This study will explore in-depth, teachers’ lived experiences of student use of
always-on and connected personal technology in a ‘bring your own device’ (BYOD)
middle school setting. The BYOD policy permits use of personal technology and instant
access to the school’s wireless internet connection throughout the day. In regards to this,
the researcher will delve into teachers’ attitudes, feelings, beliefs, and lived experiences
concerning adolescents’ frequent technology use; the influences it has within the context
of a middle school setting; and how it contributes to a student’s continuous development.
Exploring the teacher group of the BYOD middle school setting is of great interest to the
researcher and will expound the information needed to understand how teachers perceive
personal student technology in a connected environment. It is also anticipated that the analysis derived from a phenomenological case study will identify perceptions, best practices for managing students in a BYOD classroom, and attitudes related to personal technology use and student development. It is anticipated that the findings will inform the K-12 education community of the benefits and challenges associated with managing always-on and connect personal student technology in school. The researcher also expects the finding to add depth to the literature surrounding BYOD inclusion and technology reform in middle schools.

Educational reform in public schools has not always been met with acceptance (Tyack & Cuban, 1995; Yilmaz & Kilicoglu, 2013). While ideas for better curriculum, educational equality, and school size are often championed by political and school administration officials, new policy often becomes layered within existing policy and doesn’t always transition well within the formal classroom (Tyack & Cuban, 1995). There is a potential that teachers’ may only adhere to the portion of policy that they believe best fits the needs of their students. Advocacy for increased technology use in K-12 education continues to prevail through educational reform organizations, community, parents, researchers, and students (Alliance for Excellence in Education, 2014) and individuals within the school environment have to adapt to the structure and policies that have been introduced (Yilmaz & Kilicoglu, 2013). As an example, Burns-Sardone (2014) recommended greater BYOD preparation in teacher education programs, with the implication that teachers should be better prepared to incorporate personal mobile devices such as smartphones into teaching and learning. In a similar manner, Bruder (2014)
asserted that both the school and student will benefit from personal mobile technology, for it will allow students to participate in interactive assignments and enable school funds to be allocated to other areas of need. These arguments illustrate an apparent recognition of the influences that personal technology and a connected environment has on K-12 teaching and learning.

Furthermore, there is a substantial amount of research and discussions surrounding the idea of digital literacy and citizenship that is directly connected to student technology use and how teachers’ should teach these skills in school for the digital-age demographic (ISTE-NETS-T, 2008; Rideout, 2012; The Partnership for 21st Century Skills, 2011). For instance, Davidson (2011) argues for a classroom makeover and attention adjustment from a twentieth-century teaching style that no longer works for a twenty-first generation. In other words, attention should be given to incorporating the modern technologies of today, such as iPods and other digital media into teaching and learning, for these are the tools that they will leverage in the ever-changing workforce of tomorrow. With this in mind and the fact that students now have increased access to personal mobile technology (Project Tomorrow, 2014), as well as constant access to an internet source evokes my interest in wanting to explore teacher perceptions of working with students within the context of a BYOD middle school.

Secondly, what occurs when a teacher’s instruction is met with distraction from a student’s always-on and connected personal mobile technology? For instance, do teachers’ agree with middle school students’ random use of personal mobile technology to self-educate and proclaim themselves as ‘free agent’ learners (Project Tomorrow,
2010)? In this case, students’ are taking a self-directed approach to educating themselves by using tools such as online assessments for self-evaluation; social networking technology for collaboration and information sharing with peers; podcasts for course assistance, and cell phone applications to stay organized and to enhance productivity (Project Tomorrow, 2010). While the internet does provide a wealth of content on-demand through Google ®, YouTube, and Khan Academy, the invasion of information provided by students’ through random inquiry on their personal devices may not always fit neatly within the context of what is being delivered during a class activity. Especially if teachers’ have strong feelings on generational behavior differences, or beliefs that frequent immersion in digital technology and the internet alters intellectual abilities or researching habits (Bauerlenin, 2009; Carr, 2011; Purcell, 2012). As such, an exploration of teachers’ perceptions of student use of always-on and connected technology could also bring awareness to ways in which technology influences middle school aged youth and how it contributes to their development.

As it currently stands, very few studies give an in-depth qualitative view of teachers’ perceptions regarding their students’ use of always-on and connected personal technology in a BYOD middle school environment. Although, research seeking student perceptions, attitudes, and feelings of mobile technology use in K-12 settings were plentiful. For example, research database inquiries through EBSCOhost and from ERIC and EdITLib specifically, returned the following results regarding teacher perceptions and attitudes:
Table 1

*Teacher perceptions of personal always on and connected technology in a BYOD environment*

<table>
<thead>
<tr>
<th>Phrase entered</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of BYOD environments</td>
<td>1</td>
</tr>
<tr>
<td>Teacher perceptions of BYOD environments</td>
<td>0</td>
</tr>
<tr>
<td>Teacher perceptions of mobile technology in K-12</td>
<td>1</td>
</tr>
<tr>
<td>Perceptions of mobile technology in middle school</td>
<td>1</td>
</tr>
<tr>
<td>Teacher attitudes about personal technology in K-12</td>
<td>1</td>
</tr>
<tr>
<td>Teaching in a wireless environment</td>
<td>7</td>
</tr>
</tbody>
</table>

In stating this and when considering what a BYOD environment permits, does a teacher’s feelings or concerns become disregarded and does their pedagogical strategy now become mundane in comparison to what a student can do and access on their personal mobile technology? For example, when a student uses personal always-on and connected mobile technology, they have a constant connection to an internet source and the ability to engage in a broad array of activities that may include collaborating with friends through online social media; accessing entertainment sites such as YouTube or internet Radio; and even researching random topics of interest for self-directed education. How is this perceived from teachers managing the learning and activities on a daily basis? In this regard, the intersection of a connected environment and use of always-on and connected technology proceeds as the phenomenon for formal investigation.
Research Questions

The following research questions are advanced to guide this study.

1. What are the lived experiences of teachers educating students’ in an always-on and connected BYOD middle school environment?

2. What are teachers’ attitudes towards the middle school’s BYOD policy and student frequent use of always-on and connected technology?

3. What do teachers understand about middle school students’ capabilities of being free agent learners?

Definition of Terms

This section will describe the terminology that will be used throughout the study.

Administrator: The administrator is an individual that administers or manages (Merriam-Webster's Collegiate Dictionary, 1997). In this study, administrator refers to individuals that manage the teachers in the middle school setting.

Always-on and Connected Personal Technology: In this study, always-on and connected personal technology is inclusive of mobile cell phones, smartphones, tablets, e-readers, and iPod devices. These devices are portable and contain as much power as a computer. They are also capable of downloading a variety of interactive applications that can be used for communication, entertainment, and educational purposes. There will also be references to Apple’s iPad, which is also a mobile tablet device for which applications are downloaded from the internet. Always-on and connected also refers to the capabilities for the aforementioned mobile devices to connect to the internet by means of a wireless router within a facility or mobile network signal, which means the user doesn’t have to
turn them off and can interact with them all day. Some of the applications within these mobile devices can be used when there isn’t a WIFI or mobile network present.

**BYOD:** The term BYOD refers to bring your own device, or in the case of this study, your own mobile device. BYOD policies allow individuals to bring their own personal mobile technology to the school setting to serve as aid in learning (Halpin & Collier, 2012; Price, 2014).

**Middle School:** The middle school refers to an institution that educates students’ in grade levels 5-8. It is the intermediate school level between elementary and high school (Webster’s new world dictionary, 2004).

**Personal Technology:** For the purpose of this study, the term personal technology and personal mobile technology is used interchangeably. Personal technology takes on a broad meaning, so this study uses it as a way to inform the reader of the personal mobile technology that students carry in their hand or pocket. Because there are so many names for mobile devices, the term personal technology will encompass all of the always-on and connected devices listed in the definition above.

**STEM:** In this study, the acronym STEM refers to (science, technology, engineering, and mathematics) education competencies that students within the middle school focus on as a primary discipline (Committee on Science Engineering and Public Policy U.S., 2007).

**Teacher:** The teacher refers to the instructor, or a person who teaches as a profession (Webster’s new world dictionary, 2004). For this study, it will refer to the educators of students within the middle school.
Technology: For the purpose of this study, the term technology encompasses all of the modern tools, science, processes, and knowledge systems that are used to collect and analyze information (Halverson, 2015; Lane, 2006).

WIFI: The term WIFI refers to a wireless internet signal by which internet-enabled devices can connect to and is a wireless version of an Ethernet network (“Definition of WIFI,” n.d.).

Limitations

The researcher acknowledges that there are limitations pertaining to the design of this study, which include:

1. Focusing on one single group of teachers and administrators and not exploring several groups in multiple locations. This study will follow a single phenomenological case approach and binds everything within the context of one middle school environment.

2. Not including the perceptions of the student population at the school that are using their personal always-on and connected technology on a daily basis. In an effort to align to a reasonable scope (Baxter & Jack, 2008), this study will only include a single group of adult teachers.

3. The responses of the participants could become distorted due to their personal bias regarding youth and technology. Patton (2000) stated that interview data could be a limitation due to a participant’s personal bias, anger, anxiety, and even politics. In this case, the response data becomes distorted as a result of the emotional state that the participant was in during the time of answering questions.
4. The researcher’s bias could inadvertently affect the study, although his experiences and perspectives will be bracketed to focus on the participants' perceptions. Moustakas (1994) advanced this as a first step when approaching a phenomenon with a fresh and open sense and requires the researcher’s everyday understanding and judgments surrounding a particular topic or occurrence to be set aside.

This research has a potential of presenting the challenges that middle school teachers’ may face when planning a curriculum for connected digital age learners. For instance, a Project Tomorrow Report (2014) found that K-12 students’ are using connected mobile devices for both school and home learning activities and one-third of middle school students’ prefer reading digital materials in lieu of books. The realization of school-aged youths’ preferences, wide acceptance of always-on and connected mobile technology, and the inclusion of BYOD policies in K-12 schools further affirms the relevance of this research and the decision to explore teachers’ perceptions.
Chapter 2: Literature Review

Introduction

This study explored the lived experiences of teachers’ educating students in a connected middle school setting, by which students’ have access to and use always-on and connected personal technology in class. This literature review is advanced to provide an overview of how modern school-aged youth are currently using always-on and connected mobile technology in the context of school and home. Since technology use in American youth culture is widely accepted, an analysis of how they perceive, interact with, and rely on personal mobile devices and the internet is essential for understanding the significance of always-on and connected technology in their lives. The analysis will help to understand how technology contributes to varying behavioral changes in teens, intellectual capabilities, and how they perceive its usefulness in formal and informal learning support. This phenomenological case study seeks to gain an understanding from middle school teachers’ lived experiences, a review of current schools employing BYOD initiatives and teachers’ feelings on student technology use will present the benefits, as well as disadvantages associated with permitted use of always-on and connected personal technology in the classroom and beyond.

Furthermore, a review of what BYOD is and what is permissible in a BYOD school setting will be presented to acknowledge the tools and structure of what constitutes a 21st Century reformed learning environment.
Generational Crossings in a Digital Society

It is more than fitting to first give a description of the generations that cross paths every day in this modern society and/or exists within today's K-12 settings. Schullery (2013) categorized generational differences based on distinctions and findings from several scholars describing employees in the workforce and students within the classroom setting. These categories include Silent or Traditionalists generation born 1925-1945; Baby Boomer generation born 1946-1964; Generation X (Gen X) born 1965-1981; and the Millennials or Generation Y (Gen Y) born 1982-1999 or later (Schullery, 2013). Also, Generation Z (Gen Z), the cohort following millennials should also be added to this categorization since their time of entering college and the workforce will be coming soon (Higginbottom, 2013). Gen Z’s birth years range from the mid 1990’s through 2010 (Renfro, 2012; JWT, 2012). They are children of the Gen X cohort and have no memory of a society without smartphones and Facebook (Lyon, 2010) to name a few.

Each generation listed herein conformed to various standards of living and differences within their era of birth, which separates them from other age groups in society. Within each generation are similarities in social, historical, and popular culture phenomenon that have influenced them and others who grew up during their time (Twenge, Campbell, Hoffman, & Lance, 2010). These influences, rather it be music, politics, economic events, and even war may seem critical to a Traditionalists generation, but maybe not as meaningful to Gen X, or those separated by a span of 30 years or more. For instance, Twenge et al. (2010) referenced the Baby Boom generation, who were plagued with problems associated with civil rights and assassinations of powerful leaders
of their time. Consequently, what society had to endure during that era may not be of significance to subsequent generations because it is beyond what they have yet to experience.

Differences also exist across who some would call Generation Me (Twenge, 2006), a popular name given to those born in the 1970s, 1980s, 1990s, and 2000s. Ironically this range of birth years crosses multiple generations that include Gen X, Gen Y, and Gen Z. Twenge (2006) believed that this category of young Americans placed emphasis on self-needs, while defying traditional rules of social normality. Individuals within the latter of this category (Gen Y and Z), have been given the title of Digital Natives (Prensky, 2001), which refers to individuals born into a society of interactive digital media and multiple technologies such as television, computers, and video games.

**Digital characteristics of Generation Z.**

The Gen Z cohort, which inhabits the environment of this research study haven’t known a life disconnected from mobile technologies, 24/7 internet, and online peer-to-peer (P2P) sharing (Palfrey & Gasser, 2008) to name a few. They have never known a world by which anytime-anywhere communications were not available (Tulgan, 2013) and they are highly engaged in social media and online information about the world beyond their borders (Tulgan, 2013). For this reason, Lyon (2010) referred to Gen Z as true digital natives, which implies that the technologies they are accustomed to using were already existent in the world they were born into. For example, mobile phones are key tools within Gen Z’s collection of personal technologies and a constant connection to the world through the internet; social networking interactions; and texts chatting with
friends are components of their tech-fluency (JWT, 2012). To this regard, they are not restricted to a home desktop computer, since the internet can be carried around in their pockets and accessed on-demand through personal mobile technologies (Brotheim, 2014).

Conversely, the generations that preceded Gen Z, Y, and X were given the title of digital immigrants (Prensky, 2001), a phrase used to describe a generation that were not born into the digital era of ubiquitous personal computing devices and a constant internet connection. They either had to adopt and/or learn how to use tools such as email and online social networks later on in their lives, but still rely on some traditional forms of interaction (Palfrey & Gasser, 2008). The majority of digital immigrants hail from the ranks of Traditionalists and Baby Boomers. Their experience with digital aged technology and relationships with the social pervasiveness of the internet may not be as prominent as Gen Y and even the Gen X population. As a result, such deficiencies may require relearning of skills that includes digital aged technologies (Davidson, 2011), something that is not always accepted or easily accomplished by generations preceding the Gen Y era (Smith, 2014). For instance, a recent Pew Internet Research (year) study on generational internet use reported that 59% of adults 65 or older are internet users, but skeptical attitudes toward technology benefits, as well as challenges associated with learning how to use smartphones, tablets, and social networking sites on their own are barriers to adoption (Smith, 2014).

On the other hand, a report on teens’ use of technology revealed that 95% of teens are internet users and 74% are accessing the internet through their mobile devices
It was also reported that 23% of teens have tablet computers, 78% own cell phones, and 47% own smartphones (Madden et al., 2013, p. 6). Another study surrounding the topic of teen technology use revealed that 87% of teenagers age 13-17 engage in heavy use of digital texting for communication and 75% are users of online social networking sites such as Facebook, Twitter, and Google Plus (Rideout, 2012). According to Madden, Lenhart, Cortesi, and Gasser (2013), teens within the Gen Z category are more likely to download games and other social media applications (apps) to their personal mobile devices than previous generations. It was reported that reported that 58% of American teens engage in downloading apps to their mobile devices (Madden, Lenhart, Cortesi, & Gasser, 2013), in comparison to 34% of adult mobile users (Purcell, 2011).

**Gen Z students taking a position as the ‘free agent’ learner.**

The phrase ‘free agent’ is often times associated with professional athletes that are at a point in their career and/or contract which they can begin to seek-out options to join other teams. This standing gives the athlete an opportunity to transition out of their present organization’s contractual agreement with an option to sign with another team that may be a better fit for their needs and professional ambitions. Therefore, the freedom of choice does not bound the athlete to one place, or one team’s ways of further developing their professional career. Within the context of education, the phrase ‘free agent’ is given to an individual that takes control of their own development and leverages tools such as the internet, mobile technology, and an abundance of online applications to follow what they are interested in (Project Tomorrow, 2010). This can also be referred to
as self-directed learning, for which one would direct their own activity with minimal or no guidance. Gen Z embraces self-directed, do-it-yourself education on a broad scale (Brotheim, 2014; Northeastern News, 2014) and it is not uncommon for this digital cohort to access web-based education activities on their own to learn about topics. Media-rich web applications such as Khan Academy, YouTube, and Twitter have inundated the internet as supportive reinforcement for self-directed learning (Saxena, 2013) and personal mobile technology enables Gen Z to access these sites informally while on the go. In this case, the anytime anywhere digital infrastructure of today, along with ubiquitous connected mobile technology supports learning that does not necessarily have to happen in a formal classroom or by direction of a teacher (Alliance for Excellence in Education, 2014; Clary et al., 2013). In fact, national research findings by Project Tomorrow (2010) reported that today’s K-12 students were adamant about being free agent learners. They are taking control of their education through self-directed technology-based methods; leveraging online communication; electronic mobile devices; and social media tools to support their own personal development and are empowered to find the information they want to know (Project Tomorrow, 2010).

The assertion of Gen Z’s self-directed abilities was reflected in Northeastern University’s study on older Gen Z students’, ages 16-19 (Northeastern News, 2014). These students, some already in college, were described as being highly self-directed and even placed emphasis on wanting to design their own programs of study in college (Northeastern News, 2014). An idea as such clearly reinforces the ideas and practices of a free agent learner who wants to take control of their personal development. As a result,
schools, textbooks, and teachers’ are not exclusive authorities of the knowledge that Gen Z desires to gain (Project Tomorrow, 2010). At the same time, Gen Z’s digital characteristics and their ability to leverage personal technology and the internet for self-directed learning, definitely supports McCrindle’s (2013) assertion that Gen Z is the most technologically saturated generation known to this world.

Using Technological Determinism to Understand the Digital Generation

Technological determinism is a theory that positions technology as the primary driver that determines a culture or societal changes (Chandler, 2014). It examines relationships between varying technologies throughout history such as a mechanical printing press, technical developments, and/or computer technology as determinants that caused change within a system. Technological determinist would posit that the aforementioned technical contributions were independent phenomena that impacted society, thus causing it to conform and/or change (Mackenzie & Wajcman, 1999). For instance, a modern mobile device such as an eReader, iPad, or smartphone can potentially hold multiple electronic books within one device, which if desired, negates the need to line a room and shelves with hardbound books. This functionality has been incorporated into many mobile devices and has changed the way in which many approach reading and book purchases (Maloney, 2015). Therefore, it has become a technological factor of social change and human behavior (Popitiu, 2011).

To further expound the ideas of technology determinism it is fitting to first discuss technology and determinism as separate terms. Technology as a standalone term is very broad in meaning and interpreted differently by many. Merriam-Webster’s (2007)
collegiate dictionary defines it as the science or study of practical or industrial arts and 
applied sciences. It has also been defined as any human created tools or processes used to 
solve problems (Halverson, 2015). Lane (2006) stated that technology will be given a 
different meaning depending on a person’s viewpoint and context. As such, he posited 
that technology involves understanding how knowledge is applied to task that entail 
people and machines (Lane, 2006). While technology is interpreted differently by all, 
each meaning places some emphasis on knowledge that will be applied in some manner. 
On the other hand, determinism is also broad and interpreted differently within many 
disciplines. Shafique and Wyne (2015) discussed types of determinism from a theological 
and philosophical point of view. From a theological point of view, God initiates and 
decides upon each action in the Universe. In this manner God is the independent cause of 
every historical occurrence and will also determine the future. From a philosophical view, 
human decisions and actions, as well as events and state of affairs cannot be avoided and 
will proceed in order (Shafique & Wyne, 2015). However, a more generalized meaning 
of determinism would suggest that everything, including individual actions are a result of 
a sequence of causes (Webster’s new world college dictionary, 2014). 

Several ideas surrounding technological determinism has been put forth in the 
literature and some even suggests that there is minimal agreement or confusion 
surrounding the concept (Bimber, 1994). As a foundational point, Thorstein Veblen has 
been credited with advancing one of the first concepts of technological determinism in 
his theory of institutional change (Brette, 2003; Popitiu, 2011). In this theory, technology 
is autonomous, self-determinant, and an independent force that changes society (Popitiu,
2011). For instance, in McLuhan’s (1958) *Speed of Cultural Change*, he spoke on the benefits of electronic media, instantaneous movement of information, and how it creates new patterns of learning. He also discussed advances in highway and automobile technology that created a means for connected city and country. As a result, goods such as clothing are transported rapidly, which results in status (McLuhan, 1958). In this manner, as the technology advances, rather electronic media or highway improvements, society will change as a result. Veblen’s theory also posits that human behavior responds to determinants of impulse of instinctive factors and also conforms to habits of thought at the social level. As such, habits will begin to form under the material conditions in which the society lives (Brette, 2003). Similarly, Smith (1994) positioned two versions of technological determinism as *soft* and *hard view*. The soft view follows the idea that changes in technology will drive social change, but will respond discriminately to social pressure at the same time. The hard view of technological determinism contends that technology is an autonomous force and is independent of any social constraints (Smith, 1994).

Further, a technological determinist approach can be used to help understand social institutions, by exploring the changes that occur when humans and modern technology interact (Ray, 2013). For this reason, technological determinism theory could be positioned as a pertinent framework to assist one in understanding the complexities of teaching digital-age youth in an always-on and connected learning environment. Some scholars such as Davidson (2011) argued for an embracement of technology to move modern education beyond the industrial era and into the digital. When doing this,
teachers are leveraging technologies that have not only changed the way in which we research and review content in class, but have also become socially acceptable by the youth in which they are teaching. For instance, allowing students to use mobile devices, the internet, and Google in class could lead to exploratory self-directed activity and potentially form patterns of intellectual experimentation (Davidson, 2011). On the other hand, if a hard technological deterministic view was taken on this, it could be argued that the internet and devices alone have caused this alternative means for learning and eventually everything will conform. This reflects back to Veblen’s ideas and the manner in which the individual will conform under the societal conditions. As such, technological determinism has a potential of assisting with understanding the connected learning environment and the tools for which teachers and students conform to using.

21st Century Skills in Teaching and Learning

The connected K-12 environment embraces 21st Century ideas put forth by advocates such as the International Society for Technology in Education (ISTE), Partnership for 21st Century Skills, and the Society for Information Technology in Teacher Education (SITE) groups, whom all disseminate knowledge; foundational tools; and conceptual research to guide curriculum design with the inclusion of information technology (ISTE, 2008; “SITE,” 2016; The Partnership for 21st Century Skills, 2011). For example, they call for teachers to exhibit knowledge of technology integration to enrich learning and to engage students in the classroom, as well as support their use of digital tools and resources (ISTE, 2008). In this regard, the classroom is expanded beyond the typical chalkboard and printed textbook reading, and is inclusive of mobile
tablets; digital writing; online textbooks; and laptops to name a few (Project Tomorrow, 2014). Also within this context, information technology, system operation, and digital citizenship are an essential set of modern skills that students will need to learn to succeed in an ever changing digital world (The Partnership for 21st Century Skills, 2011) and teaching and learning must support these goals (“Connected Initiative”, 2013). Since the modern connected society requires an inclusion of information technology literacies, basic educational components of the past is no longer sufficient enough for the school curricula (National Education Association, 2012)

According to National Education Association (NEA) and The Partnership for 21st Century Skills (National Education Association, 2012; The Partnership for 21st Century Skills, 2011), information, media, and technology skills are among the components that students will need to succeed in work and life. They will need to leverage the aforementioned tools to access ubiquitous information channels and to collaborate with others and become individual contributors. These needs were also recognized by scholars such as Fisher and Frey (2010), who spoke on the Framework for 21st Century Learning and the necessity to adjust technology policies to include students’ digital devices. It was stated, “they are going to enter a world of work that is very different from ours, one in which technology is used to solve problems and locate information” (Fisher & Frey, 2010, p. 227). In this regard it was recognized that the average mobile device, such as a cell phone is more powerful than a common computer was ten years prior. As such students should recognize the power of their devices, be digitally responsible in operation, and learn how to use them for learning activities (Fisher & Frey, 2010).
Similar to the P21 framework, the International Society for Technology in Education pushes for both teachers and students to have the skills necessary to function in a digital society. Their standards for teachers are set to promote creative thinking in the classroom and to engage students through digital-age learning experiences (ISTE, 2008). Further, as benefactors of the digital experiences, students are positioned to use digital media and other information technologies as communication and collaborative tools for research and analysis to name a few (ISTE, 2008). Also, as digital natives (Prensky, 2001) in this society of ubiquitous devices and information access, students are not only expected to be effective with integrating technology into their lives, but also effective digital citizens, demonstrating responsibility in the manner in which they use technology (ISTE, 2008; National Education Association, 2012).

The standards as noted above sets a foundation for this school-aged generation to leverage the tools that are not only normal in their lives, but for the most part more commonly available in schools. 21st Century Skills in teaching and learning also mirror what some would consider a necessity for today’s learner, as new learning environments and digital tools gives the classroom a much needed makeover from the past (Davidson, 2011; Pearlman, 2010). For example, Davidson (2011) presented instances in which integrating mobile iPods and applications in class to support learning shifted the manner in which students could explore information in class, thus negating a reliance to “always face forward and learn from on high” (p. 69). Teachers are then embracing a tool used by the modern generation and are rethinking how their generation of students are learning,
while building upon core content knowledge with a 21st Century skill (The Partnership for 21st Century Skills, 2011).

**K-12 School Districts are Embracing Mobile Technology**

As technology continues to influence the world, schools are beginning to embrace the affordances of mobile devices, wireless internet connectivity, and facility-wide technology initiatives such as bring your own device (BYOD) and one-to-one (1:1) (McLester, 2011; Panagos, 2013). This section discusses the basic meaning of BYOD and how it is being used in K-12 schools. Similarly, 1:1 technology programming is explored, as well as examples of how it has been implemented within various school districts across the U.S. and abroad. Lastly, the topic of free agent learners’ are presented to expound how students are interacting with technology to guide their own self-development.

**Infiltration of personal student technology.**

The inclusion of K-12 bring your own device (BYOD) policies are becoming more prevalent within U.S. school districts (Panagos, 2013; Schaffhauer, 2014; St. George, 2014), resulting in the infiltration of personal student owned technology for learning and usage throughout the school day. BYOD is a technology initiative that permits individuals to bring their own personal mobile laptops, smartphones, e-readers, and tablets into a connected environment to use for work, school, or for entertainment purposes (Center for Digital Education, 2011; Intel Education, 2014; Johnson, 2014; Troni & Silver, 2014). When doing so, the school and/or organization supports wireless mobile device connectivity to the internet as a service to its members through an internal
WIFI network. Within the context of teaching and learning, BYOD supports educational activities in and outside of the traditional classroom (Halpin & Collier, 2012; Intel Education, 2014), while giving students’ a choice of using their own personal mobile device to access educational content on-demand.

Many K-12 school districts across the nation are beginning to lift bans on personal mobile devices (Ribeiro, 2013) and are including BYOD for learning engagement and 1:1 technology solutions for their students (Impulse, 2011; Roland, 2014; Wong, 2012). In fact, a recent survey by Bradford Network explored the impact of BYOD in education and reported that 85% of educational institutions are allowing some form of BYOD for their learning institution (Bolkan, 2013; Bradford Networks, 2013). The Bradford Network’s research entailed gathering responses from 500 college, university, and K-12 school IT professionals. Out of this group, 44% of K-12 education IT professionals responded that they currently permit students to bring their own personal technology to school for use (Bolkan, 2013; Bradford Networks, 2013). Another clear depiction of personal technology infiltration and adoption in education was illustrated through Thomas, O’Bannon, and Britt’s (2014) exploration of teachers’ from seven K-12 school districts across Kentucky and Tennessee. Their study examined teachers’ perceptions toward using mobile phones in the class; the barriers and benefits associated with mobile learning; and flexibility of their schools mobile phone policy. Through exploration of teacher responses, it was noted that while the schools were open to allowing students’ to bring mobile cell phones to school, the extent to what they could use them for varied between districts in the aforementioned region. For example, 91.4%
of the teachers surveyed reported that their school has policies permitting students to bring cell phones to school, but not all of them allow use throughout the day (Thomas et al., 2014). It was also found that 20% have policies that require phones to be off at all times; 41.8% have policies that allow before and after school use only; 18.6% have flexible policies allowing before school, after school, and lunch time use; and 11% allowed use throughout the day for educational use (Thomas et al., 2014). While almost 60% of the research participants indicated that student learning is supported by mobile phones, only 39% support usage of the device in the classroom (Thomas et al., 2014).

The researchers noted that frequent distractions, lack of teacher training, and equity for all students were perceived barriers that would impede the acceptance and/or integrating personal mobile phones into class. In this case, personal student technology has infiltrated the schools, but there are clear variations in teachers’ acceptance of personal technology, administrative BYOD policy, and attitudes toward classroom usefulness.

Furthermore, it is implied that BYOD affords a new generation of students’ access to anytime, anywhere learning solutions within the school setting (Cisco, 2014), as well as opportunities for teachers’ to incorporate students’ personal devices into class activities (Ullman, 2012). For instance, Nelson (2012) chronicled the efforts of one suburban Minneapolis K-12 school system and their integration of BYOD, known as the Copernicus Project. This was a BYOD initiative supported by the district that first began as a voluntary program for teachers to incorporate mobile devices into the classroom. The district gave initial support of 3 devices per classroom, wireless access points throughout the facilities, and training for the teacher participants. Additional options for students to
bring in their own devices were also at the discretion of the teachers. As a result students’ were able to access their devices for learning throughout the day in the school and teachers were able to leverage multiple Web 2.0 applications and mobile devices for use in the classroom (Nelson, 2012). The BYOD policy allowed for netbooks, iPods, and cell phones, which was used for teacher-student communication and collaboration. The students’ found them to be useful for anytime, anyplace learning, which resulted in the district expanding the BYOD program to additional elementary facilities throughout the suburban school system (Nelson, 2012). The Copernicus BYOD project was found to be a positive impact within their elementary and senior high schools.

A similar program took place in a Wilmington, Delaware high school, by which BYOD was embraced as a one-to-one initiative, giving each student a school issued iPad device of which they could keep with them at all times (Comcast Business, 2014). By doing so, each class was turned into a lab and students’ benefited from continuous access to technology. The school provided WIFI access and also used various mobile device management (MDM) applications to secure network access and to enable teachers’ to deploy schedules, apps, and assignment to students’ iPads. The BYOD program also proved to be cost effective, given that the investment focus could be placed on technology infrastructure and less on device updates (Comcast Business, 2014). With this in mind, it can be affirmed that even K-12 IT professionals are embracing the normality of personal technology infiltration in school. Though, they will have to continue to expand their internal technology capabilities to support content delivery to both teacher and student devices (Halpin & Collier, 2012; Ullman, 2012).
Other examples of technology infiltration and BYOD inclusion exists within school districts across Ohio, the focal state of which this study’s school resides in. Multiple K-12 districts in Ohio are currently operating with BYOD policies in place that allow students to bring and use personal devices to school facilities. It should also be mentioned that the State of Ohio supports a STEM Learning Network (OSLN), which is a pipeline of school hubs throughout the state with an overarching goal of incorporating 21st Century skills and innovative technology into K-12 curriculum (http://www.osln.org/hubs/). To this regard, programs such as Metro Early College High School, a public STEM school in Central Ohio promotes the use of connected mobile technology to engage students in a 1:1 computing environment (Ash, 2013; http://www.themetroschool.org/future-students/one-to-one-computing/). Comparatively, school districts like Oak Hills, the third largest school system in Ohio and located in the western Cincinnati area, have embraced personal student devices since the fall of 2010 (Veen & Cole, 2012). It was stated that since the students’ were already using personal smartphones, laptops, tablets, and iPods, it would only make sense to leverage the devices for use within the context the educational setting. They had goals of creating a culture of technology-embedded instruction, both in the classroom and beyond. As a result and in compliance with their acceptable use policy (AUP), students, staff, and guest can access the internet, various online services, and the schools information technology network via their mobile devices for educational purposes (Veen & Cole, 2012). There was also mention that the combination of Oak Hills BYOD initiative and other eLearning technology supports, were attributable factors for students having anytime-anywhere
access to course materials; efficient staff feedback to students; and a positive effect on student performance (Veen & Cole, 2012). Oak Hills developed a framework, which other schools can follow when considering the implementation of a BYOD policy.

In a similar manner, Reynoldsburg, another Central Ohio school district, has embraced BYOD at both the middle and high school level and are allowing students to bring in personal mobile technology (http://www.reyn.org/TechnologyRules.aspx) that they can access and use throughout the day for learning. In the same region, the Dublin public school system encourages their students’ to bring and use their own personal devices to school to use for educational purposes. It was noted that employing these provisions in the Dublin City school district will help students’ become comfortable with technology use, while providing another alternative to facilitate learning beyond the formal classroom (http://www.dublinschools.net/6-8tech.aspx). This was a common statement given within other K-12 school district BYOD policies around the nation and further implicates that personal technology infiltration is recognized from a district level. Nonetheless, challenges associated frequent texting during class time, cheating, cyberbullying, and distractions from entertainment media (Common Sense Media, 2012; Lenhart, 2012; Thomas, O’Bannon, & Bolton, 2013) are a few of the concerns advanced from K-12 teachers in the classroom.

1:1 computing technology programs in K-12: benefits and challenges.

Similar to the aforementioned BYOD initiatives, 1:1 technology programs exist in K-12 as a reform initiative to equip each student with a school or district-supplied mobile computing device such as laptop, tablet, netbook, etc…to support their learning activities
(“One-To-One”, 2013; Sauers & McLeod, 2012). As society continue a shift toward embracing ubiquitous technology, educational institutions should push programs that enable adolescents to leverage digital tools to explore and learn from rich and varied resources (National Middle School Association, 2010). Accordingly, 1:1 technology programs provides the incentive for school districts to provide digital-age learning opportunities, while affording students’ access to information at school and home (McLester, 2011).

The assertion that using digital tools engender information and communication literacy, as well as critical thinking skills are prevalent in school standards (ISTE, 2008; The Partnership for 21st Century Skills, 2011) and the writings of multiple scholars (Alliance for Excellent Education, 2014; Bellanca & Brandt, 2010). However, the impact of 1:1 technology programs on K-12 student achievement and the educational environment can be either rewarding or arduous. For instance, some studies researched 1:1 technology as tools for learning and engagement. Broussard, Hebert, Welch, and VanMetre (2014) explored instructional strategies and levels of student engagement that derived from a newly implemented 1:1 technology plan that gave each student access to a tablet PC. Through qualitative inquiry, it was found that teachers incorporated technology-rich internet applications to support learning, as well as online classroom management software to organize instructional materials. Teachers also found that the 1:1 initiative improved communication between students and teachers; access to Google and research databases; and reduced material usage per course to name a few (Broussard et al., 2014). On the other hand, distractions related to playing games on the device during
class; academic dishonesty via the internet; slow internet connectivity; and computer malfunctions were a few of the challenges that plagued students and teachers during the day (Broussard et al., 2014). Although embraced and useful for engagement, the technology did present some challenges that would need improved.

Blackley and Walker (2015) reviewed the use of laptops in a 1:1 technology program across two middle schools in Australia, exploring how the devices were being incorporated into mathematics and teachers intersecting beliefs. While half of the participants indicated that the laptops were definitely integrated into their mathematics teaching practice, there were less than positive responses for using the devices with student productivity activities. For example, using laptops to construct spreadsheets were listed at 43.75% for seldom or never and drawing concept maps and diagrams were only listed at a frequency of 12.5% each (Blackley & Walker, 2015, p. 107). Consequently, teachers’ decisions to leverage the 1:1 laptops for productivity applications in class for mathematics were either seldom or never used. However, the laptops were frequently used for textbook access; emails; and has made it easier for teachers’ to provide feedback to students on assessment tasks. Also, from a professional development standpoint, it was noted that teachers had learned how to do laptop activities informally from colleague collaboration, in lieu of structured development sessions (Blackley & Walker).

Another study of a 1:1 laptop program in two Swedish secondary schools revealed how students’ used their laptops for both sanctioned and unsanctioned activities in the classroom (Tallvid, Lundin, Svensson, & Linstrom, 2014). The students in this study were given unrestricted access during class, no filters were applied to the network, and
they were responsible for their laptop use twenty-four hours a day. Instead of allowing teachers to impose restrictions, the 1:1 steering group recommended that teachers have discussions with their students regarding the ethical use of the technology. Through interviews and observations it was found that students engaged in either sanctioned or unsanctioned activity (Tallvid, Lundin, Svensson, & Linstrom, 2014). For instance, sanctioned activities were education related or accepted by the teacher, such as internet research, digital presentations, and even listening to music occasionally. Unsanctioned use of the 1:1 device was activities that were deemed less tolerant by the teachers and non-educational in nature, such as chatting, playing games, or pointless web browsing. Over a period of three years students’ sanctioned use of their 1:1 laptops increased from 43% to 90% (Tallvid, Lundin, Svensson, & Linstrom, 2014, p. 241), but unsanctioned use still remained steady during that period.

Furthermore, while 1:1 laptop and tablet programs are becoming more prevalent in K-12 education, districts should be mindful of implementation strategies that align to curriculum goals and those that are less wasteful of resources (Warschauer & Tate, 2015). Collaboration with colleagues on technology integration and critical planning time for how it’s going to be incorporated in the daily curriculum is also beneficial to successful programs. For example, teachers’ implementing a 1:1 wireless laptop program in a Vermont middle school discussed the importance of proper planning so that students will have a better experience with technology-rich projects (Downes and Bishop, 2015). Incorporating tools such as Google Docs for collaboration provided an electronic workflow, thus providing a common language for students. However, collaboration with
a broader teacher network and professional for ideas was still desired by the educators involved in the study. A similar need of teacher mentoring was cited by Hechter and Vermette (2013) while exploring barriers to technology integration in a Canadian Province K-12 district.

**Teaching in a Connected K-12 Environment**

The connected K-12 environment leverages wireless high-speed network capabilities for teachers and students to connect to the internet (The White House, 2015; Motorola, 2014). The internet has progressed beyond a webpage viewing medium, to a full collaboration portal for users to research, share content, and interact with people from all around the world. To this end, wireless connectivity is an imperative tool for learning, as it enables a school to enrich learning by providing interactive experiences for students (Motorola, 2014; The White House, 2015). It also strengthens the facilities capabilities to operate bring your own device (BYOD) and one-to-one (1:1) technology programming (Downes and Bishop, 2015; McLester, 2011), which are initiatives that prompt schools to either provide students with mobile devices, or allow them to bring their own. Consequently, over the past decade personal technologies such as mobile phones and iPods have evolved from simple communication and MP3 music devices, to portable hand-held computers with potential instructional applications (Thomas, O’Bannon, & Bolton, 2013). Tablets, laptops, and smartboards are also among the arsenal of evolving wireless tools with potential instructional applications. All of which, are put in place to support teachers efforts in educating the modern digital-age learner.
At the same time, educational and government organizations such as ISTE, P21, and The White House ConnedEd Initiative continue advance standards and a framework for leveraging the aforementioned technologies into K-12 education and naturally, teachers are expected to conform. As such, this section discusses how some teachers are integrating technology into their class; their feeling related to adoption; and the barriers that may keep them from using technology successfully.

**How are teachers embracing classroom technology integration.**

Teachers that are on the forefront of education are often expected to align to changes that may not always transition well to the classroom (Tyack & Cuban, 1995), but when the demand for reform is high, K-12 teachers and administrators are expected to take action (Committee on Prospering in the Global Economy of the 21st Century, 2007). Especially when reforms are handed down by elected officials, such as President Obama, who in a recent plan called for upgraded K-12 technology infrastructure and teacher training to improve digital age student learning (“Connected Initiative”, 2013). Since teachers are a vital resource to schools, they are given the critical task of improving student outcomes through effective instruction (Schwartsbeck, 2012). Integrating tools such as 1:1 mobile devices, digital content, and high-speed internet connectivity supports technology reform in education (Alliance For Excellent Education, 2012; Schwartsbeck, 2012) by transforming the classroom experience for teacher and student (“Connected Initiative”, 2013).

According to Chen (2010), teachers’ who use technology are viewed as normal, but those who “doubt or resist technology are seen as anomalies who need to be treated”
Although, some recent studies have revealed that teachers are embracing technology (An & Reigeluth, 2012; Grant et al., 2015), making resistance is less of an issue. For instance, recent findings by Digedu (2014) demonstrated that nearly 90% U.S. K-12 teachers reported that both they and their students use technology in class, but there are barriers that prevent meaningful use. In particular, barriers related to lack of training, support, and class time for technology integration (Digedu, 2014). To this end, this section reviews the varying practices and perceptions of teachers using connected mobile technologies and computer based applications in the classroom, as well as the barriers that prevent full embracement and/or effective use.

Teachers who have embraced the affordances of a connected K-12 environment spoke of both the benefits and challenges associated with integrating mobile technology in the class. For example, researchers’ Grant et al. (2015) explored the manner in which a diverse group of teachers’ in various K-12 districts integrated mobile technology into their connected classroom. Mobile technologies inclusive of iPods, iPads, and iPhones advanced as the prominent devices the study groups used for supplemental content delivery. One teacher spoke of using his iPhone to document student work and behavior and often uploaded scanned assessments to an online collaboration tool for the students to see (Grant et al., 2015). Other teachers used the iPad as an instructional tool to engage students and leveraged the wireless capability of the device to stream online videos; deliver alternative student assessments; teach foreign language concepts; and enable electronic feedback on student papers (Grant et al., 2015). Similarly, Liu, Navarette, and Wivagg (2014) explored a mobile learning initiative in a large southwestern U.S. school
district. Within their K-12 elementary and middle school settings, teachers and student English Language Learners (ELL) were given access to their own iPod touch devices, for which they could use at school and home. The teachers found various positive means for integrating the iPod devices into their daily teaching activities. All of which would support language and content learning. For instance, some of the teacher participants mentioned the benefits of adding apps and other resources to the device that would allow for differentiated levels of language and academic support (Liu et al., 2014). In this manner, the learning would advance as a customized and appropriate intervention for students with specific language levels. The teachers within the study also used the iPod touch as a collaboration tool, allowing students to collaborate, gathering and sharing information with other students during classroom discussions, as well as use it for homework activities (Liu et al., 2014). These finding align in a similar manner to Hu and Garimella’s (2014) research with a group of K-12 teachers’ activities using iPads during professional development. Teachers within the study were required to learn and use multiple iPad productivity tools and applications such as iElements, Voicethread, Dropbox, and iCAD to name a few and then create a lesson plan, incorporating the iPad and some of the aforementioned applications (Hu & Garimella, 2014). Consequently, the teacher participants considered the iPad to be an effective tool for teaching and learning and 89% planned to incorporate the tool into future classes.

Moreover, another study lead by Cristol and Gimbert (2014) presented the positive effects that a school district’s BYOD policy and student mobile device use had on standardized test performance. Within this study, the researchers’ collected student
test data and individual teacher interviews from middle and high school level environments that used connect BYOD strategies. Emphasis was placed on teachers that consistently used mobile devices inside and outside of the classroom, as well as those who used them infrequently (Cristol & Gimberts, 2014). It was found that eighth grade level students from classes using mobile technology in the connected environment scored higher on the standardized state assessment, in comparison to those with infrequent use. The findings presented higher overall district standings of 25.5% for those who frequently used technology in the connected BYOD setting (Cristol & Gimberts, 2014). It was concluded that the connected environment and students’ use of mobile technology did have a positive effect on student standardized test performance.

**Barriers to technology integration.**

Despite the efforts from technology advocates and organizations seeking digital age reform in K-12, there are barriers that often prevent seamless integration technology into teaching and learning. For example, when researching the barriers that exist when teachers attempt to incorporate technology into K-12 science classes, Hechter and Vermette (2013) revealed access, time, lack of resources, training, and support as the top challenges for integration. The responses came from 433 Canadian K-12 science educators that were located in urban and rural school settings. More than half of the participants cited professional development was needed to assist them in gaining experience and comfort with using technology in class, but it was currently lacking in their school (Hechter and Vermette, 2013). On the other hand, in their study on learning and technology in education, An and Reigeluth (2012) found that even when professional
development was offered to the teachers, many perceived the programs to be very broad or non-subject specific. In this manner, the teachers didn’t find the relevance in how some items would be integrated into their specific content. The participants also reported that too much information was crammed into training sessions and no time was given to practice using the tools demonstrated tools (An & Reigeluth, 2012). From the teachers’ perspective, this was a barrier that needed to be improved.

Device and connection errors are cited as barriers in some instances were mobile technology and the internet was being incorporated in classes. For instance, in Lee, Messom, and Yau’s (2013) research on the use of electronic textbook technology in class, it was noted that software compatibility across devices; readability of electronic media on a screen; and high bandwidth consumption when downloading and uploading content from the internet could pose as problems in the class. These challenges were consistent with those found in another study (Liu et al., 2014) were teachers were attempting to use mobile technology in the class.
Chapter 3: Methodology

Introduction

This study explored the lived experiences of teachers’ educating students in a BYOD middle school setting, by which students’ have access to and use always-on and connected personal technology in class. Through inquiry, the researcher explored teachers’ experiences and approach to managing the environment, as well as attitudes surrounding the school middle school’s technology policies. The research was conducted using a phenomenological case study design. This form of qualitative research will permit the flexibility needed to understand how individuals within various social settings make sense of the environment they are in (Berg, 2001), while providing a method for analyzing the meanings of their lived experiences (Patton, 2002). From this inquiry, teachers’ attitudes, beliefs, and feelings about what they are experiencing in the classroom when students are free to use their own personal mobile devices will be explored. The open WI-FI enabled BYOD setting forms the context of which the teachers in this study work and interact with students on a daily basis.

While a BYOD policy gives student’s the freedom to use and bring their own personal technology to class, teachers’ attitudes, feelings, and beliefs about adolescents’ frequent technology use; the influences it has within the context of a middle school setting; and how it contributes to a student’s continuous development is not always known and is of great interest in this research. For instance, teachers’ beliefs about their middle school students capabilities for being free agent learners (Project Tomorrow, 2010) by means of their personal connected technology. In this manner, students’ are
leveraging technology and the internet to engage in self-directed education and assessment activities that they feel are important for their development (Project Tomorrow, 2010). The free agent learner uses this approach to educate themselves beyond the borders of the classroom. Activities as such are already changing the higher education landscape, as teacher and student roles are continually shifting with the inclusion of technologies such as mobile tablets, smartphones, and digital learning content hosed on the internet (Franklin, Sun, Yinger, Anderson, & Geist, 2013).

Godsey (2015) describes free agent learning as teachers shifting from content expert or subject matter dictators, to facilitator of openly accessible content found on the internet. To this end, learning and instruction becomes a 24/7 endeavor supported by technology and moves beyond the formal classroom and traditional pedagogical styles. Especially ones in which teachers’ are sole bearers of information and students’ the recipient of teachers’ exclusive solution. Reviewing this phenomenon in a middle school environment, where students are at a transitional age and academic success is critical for subsequent phases of secondary education (Eccles, 1999; Maryland Middle School Steering Committee, 2008), could potentially help others to understand how teachers’ are managing the normality of always-on and connected personal student technology. In particular, those teaching in a BYOD environment were 10 to 14 year old students have open and anytime access to the internet through WI-FI enabled personal technologies such as smartphones, tablets, and iPods.

Consequently, teachers’ aren’t always advocates, and/or the creator of policies such as BYOD that are imposed to reform schools. Nonetheless, they are still required to
adhere to the changes that are set forth by reform agents (Tyack & Cuban, 1995) and have a potential of being blamed for things that go wrong. To this end, a phenomenological case study would illuminate the deeper feelings, attitudes, and beliefs that a single group of teachers’ have about teaching and learning in a BYOD environment and their thoughts regarding students’ frequent use of their always-on and connected personal technology, within the context of a middle school.

**Research Design**

This researcher conducted a case study, in which a transcendental phenomenological approach was used. It provided the strategies that enabled in-depth exploration of teacher’s perspectives, beliefs, and feelings within the context of the BYOD middle school environment. Phenomenological research describes commonalities for individuals lived experiences as it relates to a phenomenon (Creswell, 2013). For every perception is necessary and adds significance to those experiences (Moustakas, 1994). The collection of teachers’ textural descriptions expounding their attitudes, thoughts, feelings, and individual examples provided the knowledge needed for the researcher to understand the dynamics of what they experienced when students would bring and use personal technology into the BYOD middle school setting.

Previous phenomenological studies have been useful in researching the ways in which youth interact with mobile technology (Madden et al., 2013; Rideout, 2012; Sauers & McLeod, 2012). For instance, in a study that explored teenagers’ perceptions of learning and engagement on mobile connected devices, Kee and Samsudin (2014) found that teens were comfortable with performing ubiquitous learning activities via their
personal mobile device, yet the absence of such devices evoked unease. A similar phenomenological approach was used to investigate the lived experiences of 16-19 year old Malaysian high school and college students’ learning with smartphones (Chan, Walker-Gleaves, & Remedios, 2013). The researcher was able to gain rich and dense descriptions from participants that related to how they were consuming technology resources using smartphones; how they perceived the nature of their learning with the smartphone; and how the learning related to their identity and concept of self (Chan, Walker-Gleaves, & Remedios, 2013). Their study, with the assistance of structured in-depth interviews with 12 students’ over a 4 month period found that this demographic was highly reliant on their mobile devices on a daily basis. It was found that having the ability to multi-task for information retrieval and knowledge gain was valuable, as well as the need to develop and maintain personal relationships through online social media outlets (Chan, Walker-Gleaves, & Remedios, 2013). Using a phenomenological approach for this study will assure that the voices of each participant are heard, documented, and analyzed to find similarities across the entire group. It will enable the subjective knowledge gained from the group to be analyzed and reduced to textual and structural descriptions to exude the overall essence (Moustakas, 1994).

In this study, teachers’ everyday experiences when interacting with and managing students’ using personal always-on and connected mobile technology in the BYOD middle school environment formed the foundational components to guide the researcher toward understanding the essence. This essence embodies the core meanings and nature
of the phenomenon that is understood as being common among the study participants (Patton, 2002).

**Single-case study.**

A group of 5 teachers and 2 administrators within the BYOD middle school setting was the single case study of this research. Creswell (2013) describes this as the real-life, contemporary bounded system from which multiple sources of information will be collected. Binding the case for this single group of teachers within their BYOD environment enables an analysis of the contextual conditions, as well as ensures some form of a reasonable scope (Baxter & Jack, 2008). According to Yin (2003), the contextual conditions should be covered if it is believed that they will contribute to the study.

Case studies can be used in qualitative inquiry to describe a person, event, innovative program, or organization (Patton, 2002; Stake, 1995). The researcher can incorporate both quantitative and qualitative evidence if desired, as well as choose a single or multiple-case to explore (Yin, 2003). The challenge in case study research is determining what the case may be, or approaching a topic with too many objectives (Baxter & Jack, 2008). To counter challenges that may arise, the researcher should identify a case that can be situated within bounded parameters and develop a reasonable scope. Liu (2007) leveraged a single-case study approach to explore factors affecting teaching and learning by wireless technology in a K-12 wireless learning environment in Taiwan. One focus class of sixth graders and a teacher with ten years of experience was used as the case. The researcher observed mathematics lessons being taught via wireless
tools and technology and collected interview data from both the teacher and students regarding their beliefs surrounding the teaching practices and technology. The students had overall positive responses toward using wireless technology, but there were some negative aspects related to minimal opportunity to express their own ideas, as well as instances of the teacher being too strict (Liu, 2007). The case study revealed that the instructional strategy of the teacher didn’t change with the inclusion of wireless tools (tablets) and wireless connections (Liu, 2007). The researchers’ analysis of interviews, observations, instructional documents, and journal entries from the single-case were critical components to revealing the minimal effects technology had in the bounded environment.

Hu and Garimella (2014) used case study methods to investigate whether iPad professional development would positively influence K-12 teachers’ proficiency and decision to use the mobile device as a supportive tool for student learning in STEM. The researchers used a mix of open-ended and Likert-type surveys, observations, and lesson plan analysis to investigate the teacher participants, as well as triangulate results. All of the teachers found the iPad to be an effective tool for teaching and that it would encourage students to interact more (Hu & Garimella, 2014). While the two aforementioned studies used variations of one individual, to several individuals as the single-case, the researchers were still able to collect a substantial amount of in-depth information within the one bounded system to speak on the participants’ experiences.
Research setting.

The research was conducted at a science, technology, engineering, and math (STEM) middle school in Central Ohio. There are approximately 630 students from grades 5-8 enrolled at the school and 50 teachers’ licensed through The State of Ohio. The teachers were responsible teaching at least 5 periods (classes) per day and their specializations varied between Mathematics, English, Science, Technology, and Social Studies to name a few. There were also additional specialized classes that aligned to the STEM core projects, such as computer programming, robotics, the art of math, and design. The level of teaching experience in the facility ranged from 4 months to 20 years. Further, there were three administrators that held the responsibility of managing the middle school. Similar to the teachers, the administrators all have broad teaching backgrounds.

Moreover, the school opened as a traditional junior high school in 1994, but has been operating as the only STEM middle school in the district for the past 4 years. The school’s technology plan promotes a BYOD environment, which allows students to bring and use their own personal mobile technology devices such as smartphones, tablets, and iPods throughout the day and enables teachers to leverage them as learning tools. The policy permits acceptable internet use for anyone who chooses to bring a device into the school. Students’ and teachers’ have facility wide freedom to connect to the school’s open WI-FI connection, giving them full access to the internet at any time while in the building. Because students’ always-on and connected devices contain internal wireless technology, it enables students’ to log-in using a unique user name and password given to
each student. In class, teachers’ have the discretion to manage how and when students may use their devices, with emphasis on learning activities.

**Transcendental phenomenology.**

Transcendental phenomenology places emphasis on subjectivity and investigates the appearance of things and/or phenomena, as they appear to human consciousness (Moustakas, 1994). In return, the researcher gains knowledge and understanding from the textural descriptions of the participant’s conscience experience. Van Mahen (2014) describes this as the ordinary experiences in which we live in or through during our daily existence. Transcendental implies that knowledge will be discovered through the subjective sources of individual everyday occurrences, which are inclusive of the perceptions, thoughts, and feelings that constitute an experience (Moustakas, 1994).

The transcendental phenomenological approach outlined in a subsequent section will provide the proper framework needed to research and analyze the perspectives of middle school teachers’ that will stand as the primary source from which knowledge will be gained. Through inquiry of the teachers’ point of view, the researcher anticipates that their information will offer a significant amount of in-depth knowledge related to their experiences, as well as what they know of adolescents frequent use of technology and learning in a BYOD middle school setting. The knowledge that they provide would otherwise be unknown if not approached in a manner that would yield rich, in-depth explanations drawn out through this phenomenological approach.
Participants.

The participants in this study were teachers N=5 and administrators N=2 administrators of students’ in the middle school environment. The students’ who they teach are in grade 5 through grade 8 and their ages range from 10 to 14 years old. The teachers’ experience in K-12 ranged from 4 months to 20 years. The participants were recruited through the final questions of a preliminary internet-based survey that is listed in Appendix A. They were also recruited during the researcher’s facility observation.

Site access and informed consent.

A preliminary meeting was held with the lead administrator and assistant to discuss basic facility rules and procedures that would be used for survey distribution, interviews, and classroom observations. They were both provided a project description that outlined the research intentions, as well as the profile of the investigator. These descriptions were discussed in person and forwarded through email to both of the site administrators and all teachers’ at the site prior to sending out preliminary surveys, conducting interviews, and doing onsite observations. Access to the site was granted from the lead and assistant middle school administrator in the form of a letter that gave consent for conducting research at the middle school. The letter from the principal was included with the researcher’s project outline and submitted to the institutional review board (IRB) prior to sending surveys and performing fieldwork. The board required advanced notice of the human subjects that were interviewed, as well as the questions that were asked (Patton, 2002). This insured that proper procedures were being following in an ethical manner for conducting the study and working with participants.
Data Collection

Research data was gathered following the transcendental phenomenological method outlined by Moustakas (1994), which suggested a process of Epoche, Phenomenological Reduction, Imaginative Variation, and Synthesis of Meanings and Essences. See the steps below:

**Epoche & the researcher’s suppositions.**

The concept of epoche advances as an essential first step to bracket the investigators experience. In doing so, the everyday understanding and judgments surrounding what the researcher may know about a particular topic or occurrence are set aside (Moustakas, 1994). Once this occurs, the phenomena can be approached with a fresh and open sense. As such, the inception of my inquiry is the assertion that teachers’ of students using always-on and connected personal mobile technology on a daily basis have a front seat view of the phenomenon in question. The data derived from their reflections have a potential of formulating the rich, in-depth descriptions that are needed to present a greater understanding of the phenomena that they are experiencing in the classroom. In particular, the information needed to understand how teachers’ feel about middle school aged students’ use of always-on and connected personal mobile technology in an environment where internet access is open and at their fingertips at all times. The researchers’ own experiences must be bracketed out to fully describe the participants view on the phenomenon (Creswell, 2013). In stating such, I will have to abstain from my own biases and preconceived ideas related to adolescents and frequent
technology use and rely on the reflections given by those teachers’ that are experiencing it on a daily basis.

**The researcher and the researcher’s beliefs.**

The researcher of this study is a graduate Instructional Technology student at a Midwestern university who has taught both online and face-to-face courses in the department. He also holds a Master’s degree in Industrial & Systems Engineering from a Midwestern university, as well as undergraduate degrees in Industrial Technology and Mechanical Engineering Technology from a Midwestern university. With an engineering technology background, he has had the opportunity to work in multiple environments that promoted technology use, creativity, and innovation. He has used several computer-based tools to support engineering design, programming, and training of workforce associates. After several years of working in the field of engineering, he entered higher education as a department leader and instructor for technology and design at a small, but nationally known technical college in Ohio. This allowed him to continue to explore new digital technologies and computer-based applications conducive to a STEM work environment, while fulfilling a desire to educate others. Ultimately, this role as educator and digital technology enthusiast lead the researcher to doctoral studies that embraced technology use, the development of optimal learning solutions, and methods for instructors to deliver instruction. The researcher is currently employed as an instructional designer in an organization in which he leverages computer-based software applications, mobile tablets, and learning theories to create training solutions for employees.
While my background, use of, and views on digital age technology are broad, my arguments as it pertains to youth and technology use typically stems from personal beliefs that modern technology such as smartphones, tablets, and other personal touchscreen devices are great and have empowered youth, but has the potential of diminishing their intellectual abilities when used too often. I do believe middle school aged adolescents’ abilities and interest for connecting to the world socially are unmatched by older generations who were not born into this digital era of ubiquitous mobile devices and high speed internet access. The depth of information that is made available instantly via the internet, in concurrence with their personal mobile devices does not require an abundance of intellectual discipline or critical thought. For instance, ask and it will be revealed with the help of a personal device. Or, search for a new social group of interest and they are instantly connected to a new online community that adds minimal to no depth of a foundation for future development. This, consequently, has to have an effect on the middle school aged demographic, as well as the educational environments they learn in. At this point in their life, middle school years, they are beginning to build a foundation for their future and the technology has a great potential of transitioning from an engagement toy, to a necessary aid that could engender unhappiness, or unease when left at home or taken way. Of course this presumption instills the belief that researching a traditional hardcover book or taking the advice of an adult will not replace, nor satisfy an adolescent’s desire for connecting to their online communities, as well as using and finding an answer by means of their personal technology. From my experiences of raising a middle school aged child, I have both observed and experienced the nuance of attitudes
and expressions that are a result of frequent personal technology use. Nonetheless, in aligning to the transcendental phenomenology process to the teacher case, my aforementioned beliefs and experiences of interacting with middle school aged adolescents and their use of technology in an always-on and connected environment will remain bracketed to capture the perceptions of the research participants. Their reflections will be captured through phenomenological reduction, reinforced with qualitative survey data, interviewing, and observations.

**Phenomenological reduction.**

The second step of inquiry will rely on phenomenological reduction. During this process the participant openly describes the phenomenon in which they have experienced in its totality. Moustakas (1994) posits that individual experiences and variations of perceptions, thoughts, and feelings are expounded to derive at a textual description. The researcher commenced to a process of reviewing the experiences, the phenomenon, and self repeatedly to derive at an essence. At this point the data is being analyzed and identified in a pure form, thus removing the worldviews and presumptions (Patton, 2002).

In this study the researcher engaged in one-hour in-depth interviews with each teacher and administrator to collect information about their experiences and learn about everyday occurrences in the research setting. Their textural descriptions added to the meanings and essences of what teachers’ experience working with students in a BYOD middle school environment and their thoughts on student capabilities for being free-agent learners by way of their connected personal technology. The concept of the free-agent learner was explained for the participants within the initial research description. The
surveys, interviews, observations, documents, internet, and researcher advanced as the primary tools for gathering the required information to complete this study. The researcher leveraged all of the aforementioned tools for data collection and explains them in further detail below.

**Survey.**

The first stage of the data collection in this study consisted of open-ended survey questions that were forwarded through email to all of the teachers within the middle school setting. The open ended questions gave the participants an opportunity to respond the way they choose (Rubin & Rubin, 2012) and in an anonymous manner. Marshall and Rossman (2011) noted that researchers may leverage the internet and email to distribute surveys to participants, allowing more time to reflect. Internet methods are also useful for gathering information from participants that are difficult to reach or unwilling to talk publicly (Rubin & Rubin, 2012). This format was chosen as the initial method to gain information from the teachers, since their days and schedules were continuously strained with lesson planning and classroom management. Thomas and Britt (2014) used a similar strategy to gather information from teacher participants responding to questions on their perceptions mobile phones in the class. Their intent was to receive responses from everyone invited to participate in the study, but there was only a response of 15%. Nonetheless, a great amount of data from the surveys proved to be useful in their final findings (Thomas & Britt, 2014).

For this study, researcher coordinated the distribution of a preliminary survey link for the teachers to complete, with the school administrator. The survey questions were
created in Qualtrics, which is an internet-based software application. It can be found in Appendix A. The school administrator sent the survey link out as an external link in the teachers email on two separate occasions. The first link was sent to all of the teachers in the spring, at the end of the 2014-2015 school year. Then, at the request of the researcher the survey link was sent a second time at the beginning of the 2015-2016 school year.

While it was hoped that sending a survey in this format would be the most efficient methods for gaining preliminary information, the teacher responses proved to be somewhat lackluster. Out of 50 potential teacher respondents, only 8 completed the preliminary survey, a low return rate of 16%.

**Interviews.**

The second stage of data collection in this study included in-depth 1-hour qualitative interviews conducted with 5 of the schools teachers to gather their reflective information about their experiences in the BYOD middle school environment and their feelings regarding student capabilities for learning by means of always-on and connected personal technology. The teacher interview questions are listed in Appendix B.

Interviewing is a primary data collection technique used for qualitative inquiry with the purpose of gathering in-depth responses about participants’ experiences, perceptions, and overall knowledge (Patton, 2002).

In-depth, 1-hour Interviews were also conducted with 2 of the schools administrators to gather information related to their management of the BYOD middle school environment. The questions were open-ended and semi-structured and prepared in advance to provide guidance around the main question of “What are the lived experiences
of teachers’ educating students’ in an always-on and connected BYOD middle school environment”. The administrator interview questions are listed in Appendix C. Semi-structured interviewing was conducted in a responsive style that was flexible, evolving in response to what was said, and emphasized trust between the interviewer and interviewee (Rubin & Rubin, 2012). Sub-questions were explored to evoke additional information regarding the aforementioned phenomenon and included the following as a basis:

1. What are the lived experiences of teachers educating students’ in an always-on and connected BYOD middle school environment?

2. What are teachers’ attitudes towards the middle school’s BYOD policy and student frequent use of always-on and connected technology?

3. What do teachers understand about middle school students’ capabilities of being free agent learners?

Moreover, reflective experiences from the interviews gave meaning to and provided the basic understanding of what is perceived and what occurs daily in a BYOD middle school environment. Their knowledge provided the information needed to understand what was experienced in the middle school setting when teaching and learning intersected with frequent always-on and connected technology use and the ways in which it contributed to student development.

Finally, a post-interview survey link of open-ended questions was forwarded to each teacher interview participant as a follow-up to the interview. The researcher felt that it was a necessary and efficient means for capturing additional information that would assist in understanding teacher experiences. It was also used to corroborate some of the
feelings surrounding educating students in the always-on and connected environment. The follow-up teacher survey questions are listed in Appendix D.

**Data collection tools.**

Semi-structured interviews, a preliminary and follow-up survey sent through internet and email, field notes, documents, and self was used to collect data from the teachers. The researcher was the primary instrument for which data was collected and analyzed. This places responsibility of mediating the data with the human researcher in lieu of machines (Atieno, 2009). An iPad™ and smartphone was used as supplemental tools to capture the audio responses from each interview participant. This allowed the researcher to capture any information that may could have potentially been forgotten or skipped while taking hand written notes and asking questions. The interviewee will be notified of the interviewer’s intentions to record the interview to maintain trust between both parties. The recorded audio will be kept confidential and saved on an external storage device, only to be used by the researcher. Additionally, each participant will be given a pseudo name to protect their identity, as well as a final transcript to dispel any discrepancy between what was stated in the interview and what is written in the transcript. Moreover, all online survey data will be kept confidential, as well as the identity of the respondent, since they will not be required to give their names when accessing the digital form.

**Observations.**

The third phase of data collection took place during facility and classroom observations. There were a total of 8 teachers that agreed to have the researcher observe
their class. In an effort to minimize classroom disturbance, each classroom observation was limited by the administration to a set time of no more than 30 minutes. The administrators were strict regarding the amount of time in which an observer could remain in a class while they were in session. The researcher engaged in a total of (8) 30 minute classroom observations over a period of 2 months to witness the everyday interactions and behaviors of teachers, students, and usage of technology. Additionally, one of the administrators conducted an hour long detailed tour of the facility to give the researcher a look into the programs, labs, and technical infrastructure. The researcher was permitted to take field notes, as well as ask questions to of teachers during the tour. It must also be noted, that once the teachers and administrators gained a trust with the researcher, additional observations of the facility was permitted.

Observations are an important qualitative data collection method that entails taking detailed descriptive notes of events and behaviors within the research environment (Marshall & Rossman, 2011). Patton (2002) describes this as fieldwork descriptions of actions, interactions, and aspects of observable human experience. In this study, the researcher used the observations as both a triangulation and validity component that adds another layer of data that would otherwise be unknown and unseen outside of the BYOD learning environment. Although, entering the newly created foundry lab and investigating the machinery and 3D tools is reminiscence of a time in which the researcher himself was an engineering student. It must be noted again that the researcher carries an extensive amount of technological knowledge into the observed environment and in the past, has used many of the tools presented. Therefore, it is only natural that these experiences may
influence how some of the findings are interpreted. Creswell (2013) describes this as reflexivity, which speaks to the manner in which a writer is conscious about the experiences they bring to a study.

**Triangulation.**

Triangulation is a validation strategy and involves gathering information from multiple sources and using multiple methods for research (Patton, 2002). In doing so, the researcher is strengthening the credibility of the study by corroborating evidence found within another source that will support a theme (Creswell, 2013). This idea of triangulation was supported in Liu’s (2007) case study which reviewed a K-12 teacher’s instructional practice in a wireless technology environment. Information from interview notes, observations, instructional documents, and student journals were compared to support conclusions made about the case teacher (Liu, 2007). In a similar manner, the researcher of this study will set aside time to be present in and be a non-participant observer in one fifth, sixth, seventh, and eighth grade class session. Close attention was given to instructional strategies used while incorporating personal mobile devices and management of classroom while students were engaged in using always-on and connected technology. Field notes were used to record what was visually seen and heard from the teachers and students during the observations.

**Documents.**

Documents were collected from the schools administrator to gain knowledge about the school structure, program offerings, and overall long-term planning. The researcher also collected technology plan information from both the school and district
site. All of the documents were downloaded from the school districts technology site. Documents are written material inclusive of records, reports, memoranda, and even photographs that can be collected and used as qualitative data (Patton, 2002). They can advance as another primary data source that tells a story. In this study, some of the teachers’ experiences are documented through what they have written in their open-ended survey responses. Also, the collected and downloaded documents reinforce the administrators’ spoken strategies by illustrating the overall structure of the STEM and technology planning for the middle school.

**Imaginative variation.**

The next step of transcendental phenomenology, as stated above, involves imaginative variation. During this phase the researcher is tasked with describing essential structures of the phenomenon to present the causal elements for the experience. The data is viewed from varying perspectives of the researcher, giving way to expanded versions of the themes. Patton (2002) described these as invariant themes, which have already been delimited through phenomenological reduction. Therefore, after discovering the invariant themes from the teachers’ within this study, the researcher engaged in imaginative variation to uncover the common truths that emerged and that were associated with essences and meanings of their experience. Moustakas (1994) advances the following 4 steps of imaginative reduction that were used in this study:

1. Systematic varying of the possible structural meaning that underlie the textural meanings;
2. Recognizing the underlying themes of contexts that account for the emergence of the phenomenon;

3. Considering the universal structure that precipitate feelings and thoughts with reference to the phenomenon, such as the structure of time, space, bodily concerns, materiality, causality, relation to self, or relation to others;

4. Searching for exemplifications that vividly illustrate the invariant structural themes and facilitate the development of a structural description of the phenomenon. (Moustakas, 1994, p. 99)

**Synthesis of meanings and essences.**

The final step used in the transcendental phenomenological approach was synthesis of meanings and essences. It will be used in this study to find deeper meanings related to the collective participants experiences. During this phase the participants’ textural and structural descriptions are combined to evoke a combined essence for the whole (Moustakas, 1994). In other words, the teachers’ individual essence, the nature of what and how they have experienced the phenomenon have been exhausted and materialize at a point of true meaning. At this point the researcher gaineded a significant amount of knowledge about the teachers’ experiences educating students in a BYOD middle school setting, thus resulting in detailed findings from the research participants.

**Phenomenological Data Analysis**

In following Moustakas (1994) procedures for analysis of data, the survey data, transcribed interviews, and observation field notes will be organized through horizontalizing; clustering data into common categories; and removing the overlapping
and repetitive statements. Moustakas (1994) advanced a modification of van Kaam’s (1966) method of analysis, for which the researcher of this study will use to include:

1. Listing and preliminary grouping. This is an organization process of horizontalizing, which treats each initial statement as equal value to disclose its nature and essence. The meaning units from the data will be listed.

2. Reduction and elimination. At this point the researcher will eliminate any statements that are irrelevant to the study questions and/or repetitive to create the horizons. These are the textual meanings of the phenomenon that remains unchanged. Each expression should answer two questions of does it contain a moment of experience necessary to understand it and is it possible to label and abstract it? In this requirement is met, it will be labeled as a horizon of the experience.

3. Clustering and thematizing the invariant constituents. At this point of the analysis, the horizons will be clustered into themes. Each horizon that is related will be clustered into theme labels. The researcher will position the thematic labels as core themes of the participant experience.

4. Final identification of the invariant constituents and themes by application. There is a process of validation during this stage by which the researcher will corroborate the elements of textual meanings, the accompanying themes, and the participant to assure all information is clear.
5. Use the relevant, validated invariant constituents and themes and construct an individual textual description of each participant experience. Use exact examples from the data.

6. Construct an individual structural description of the experience for each research participant that is based on both the individual textural description and imaginative variation.

7. Construct a textural-structural description of the meanings and essences of the experience for each participant that includes invariant constituents and themes.

A composite description of the meanings and essences of the experience were developed from the individual textural-structural descriptions, which represents the group as a whole. (Moustakas, 1994, p. 120-121)
Chapter 4: Results

This study explored the lived experiences of teachers’ educating students in an always-on and connected STEM middle school environment and was guided by the following research questions:

1. What are the lived experiences of teachers educating students’ in an always-on and connected BYOD middle school environment?
2. What are teachers’ attitudes towards the middle school’s BYOD policy and student frequent use of always-on and connected technology?
3. What do teachers understand about middle school students’ capabilities of being free agent learners?

The result of this research revealed that the teachers within the middle school environment were advocates and frequent users of always-on and connected technology. Teachers’ were also modelers of digital-age learning experiences in the classroom and leveraged tools such as laptops, the internet, and cloud-based applications for activities. Further, to stay abreast of strategies for integrating technology for teaching and learning, teachers within the school collaborate with their tech savvy peers to learn best practices.

Moreover, when discussing teachers attitudes toward the school technology policies in a middle school, their responses were primarily positive and they found technology to be useful. However, they did agree that when students engage with using always-on and connected technologies in class, teachers should set boundaries to assure that work is being done.
Lastly, while always-on and connected technology are useful for learning activities and student engagement, there are instances in which skills appear to be diminished as a result of frequent technology use. It was revealed that several students exhibit underdeveloped communication, writing, and researching skills, when doing assignments or engaging in a one-on-one conversation with the teacher. The teachers also felt that the middle school students abilities for being free agent learners were minimal because they are still developing characteristics that would make them disciplined enough for self-directed learning exploration. The teachers believed that this activity would need to be directed by an adult and would have to be planned for the student.

The first section of this chapter provides a general overview of the STEM middle school and administrator discussions, as well as the researcher’s observed account of the setting. Then, in-depth descriptions of the teachers’ experiences will follow, expounding the themes that materialized from their surveys, interviews, and classroom observations. The themes were positioned to answer each research question. Further, each teacher and administrative interview participant in this study were given pseudonyms to protect their identity.

**Introduction to the Always-on and Connected STEM School Environment**

Nestled within a suburban area of Central Ohio, this middle school educates students’ in grades 5 to 8, with ages ranging from 10 to 14 and operates on quarters that run from August to June. Moreover, the school exists as part of a district-wide STEM K-12 pathway and is a member institute in the Ohio STEM Learning Network (OSLN). OSLN is consortium of 7 regional hubs across the state that advocates for STEM
education and provides resources to partnering schools within each hub. Furthermore, the schools within this network are backed by the Ohio Department of Education; Ohio Board of Regents; and the University System of Ohio to name a few. The middle school site in which this research takes place, like many other schools within the OSLN engages its student population through transdisciplinary problem-based learning (TPBL) with a mastery-based learning overlay; innovative quarterly design challenges; and multiple STEM course electives. The school also leverages digital-age mobile computer technologies, cloud-based applications, and a wireless networked infrastructure to support students and staff.

From 1994 to 2011 the school operated as a traditional Junior High school within the district, but in 2012 was converted to the districts first STEM middle school.

**Early challenges in the connected school.**

Now in its fourth year operating as a designated STEM school within the district, the site has experienced multiple successes, as well as some challenges that were inclusive of a district-wide teachers strike in fall of 2014; three administrative changes in a four year span; and various updates to the schools technology acceptable use plans. In fall of 2014 after a contract dispute, the teachers’ in the district staged a strike, which lasted for nearly three weeks. Of course this did cause some disturbances to every school in the district, but not enough to negate the goals and practices of the STEM middle school, which by many standards was still in an infancy stage. Another challenge exists in the fact that this setting has experienced lead administration changes three times in its four years of existence. For instance, the first two head principals of the STEM middle
school only served one year each. Meaning that by the time a fifth grader who entered
during the 2012-2013 year got to their seventh grade year, they would have already
experienced a third principal leading their school. In fact, Mrs. Patton, a teacher who has
been with the district long-term and has experienced the facilities transition from
traditional middle school to an always-on and connected STEM school discussed the
early challenges by stating,

Well, they thought it was going to be a switch. They thought we’re going to call it
a STEM school, bring in all new STEM teachers, bring in a new STEM principal
and use all the same resources that we give the other schools. And it doesn’t work
like that. Our first year was latent proof of that and the district looked at it a little
more, then they were like, why isn’t it working?

Given that the STEM model demands tools, teaching capabilities, and planning beyond
the traditional school model, the administration had to be willing to work through the
early challenges and accept the fact that it wasn’t going to be just an easy switch from the
traditional school that it was to a STEM school. They also had to begin looking ahead to
the future to form a sustainable plan. Mrs. Patton gave an illustration of this plan, stating,

We had a year of ‘oh, it’s not a switch’, to ok, it didn’t work, to a year of looking
at what we could change and how it could happen. Then a year of beginning to
implement some of those changes and now we’ve got a plan to make it happen.

This year was conceptually done last year, but this year it physically got done.

This conversation of planning was also reinforced by Mr. Jefferson, one of the middle
school’s administrators, whom during a one-on-one tour of the facility shared the schools
new 3-year plan for students in grades 5-8. This plan begins in the 2015-2016 school year and incorporates STEM electives, transdisciplinary problem-based learning, mastery grading rubrics, quarterly design challenges, and layered math courses to name a few. This structure, with inclusive activities is planned out until the 2017-2018 school year.

**Observed school environment and administrative strategies.**

As we walked through the halls of the school, Mr. Jefferson was enthusiastic about the current and future structure of their STEM program. One of our first stops on the tour was the newly developed Foundry, which is a large creative learning space integrated with technologies such as a 3D printer, a laser cutter, CNC machine, and several student computer stations. Prior to this year, the Foundry was occupied by the school’s library. Mr. Jefferson shared that the need to convert this space was evident, as dust began to build on the old books and shelves that once lined the walls. Now the area is filled with modern tools that are incorporated into the students’ curriculum, as well as examples of finished project models. For example, the teacher responsible for the Foundry activities displayed artistic laser trimmed objects completed by the students that could be attached to their personal school supplied Chromebooks. There were also objects displayed that had been built on the 3D printer technology. This creative learning space is a true testament and result of a digital era, where re-thinking and re-tooling of a learning space was needed to reengage students by incorporating 21st Century tools into their curriculum.

Further, as the facility tour continued, it was evident that seeing a student walking down the hall with a mobile device such as a laptop, smartphone, or tablet was just a
normal everyday thing within this always-on and connected environment. The policies of this facility allow responsible use of school-issued and personal student technology.

When discussing the nature of what students’ and teachers’ do with their devices and how they may be managed and used for learning, rather in the classroom or hallway, Mr. Jefferson was very adamant about the manner in which these tools can be used to supplement learning. When asked about some of the strategies he uses to manage the digital connected environment he affirmed that,

> It’s there to supplement the instruction, but not to be the instruction. A trick is to make sure that the teachers’ are not overusing it, so that it’s not just screen-time all day long where the kids are just staring at a screen, but instead intentionally implemented into the instruction, so that they still have their direct instruction and that they still have their group work and discussion.

Mr. Jefferson also mentioned that he himself takes advantage of affordances of the always-on and connected environment by using a personal laptop to take notes and provide instant feedback to teachers during classroom observations. He stated,

> When I go to observe a class it’s all digital. So, I’ll take my laptop with me and sit there and watch the class and look for certain things. What’s nice about it is I can immediately punch it out and submit it to the teachers. So by the time I walk out of the room, the teacher already has instant feedback.

From the standpoint of a busy administrator, he doesn’t have to go back to the office, summarize everything and submit his comments to a mailbox. Everything is done immediately and sent to the teacher’s online account. This is not only a strategic way for
using his personal mobile tools in the connected environment, but it also aligns to their overall goal of using less paper in the school. There was great mention of the fact that both teachers and students contribute to paperless initiatives through their use of always-on and connected technologies. From a strategic standpoint, Mr. Jefferson mentioned that,

> It allows us to pretty much go paperless. Back in the day they would have all of the worksheets and all of that stuff and now the teachers can just create a classroom on Google Classroom and the kids can just submit their work there, so you don’t have to worry about that and teachers can have their rubrics online.

This strategy is also reinforced by many of the teachers within the facility, for they too give mention of the ability to be paperless. One the 7th grade teacher, Ms. Macy discussed the manner in which paper is managed and how they are restricted to only 1500 printed copies per year. The students’ view learning content online from either a school-issued or personal device, which concurs with administrative goals. She leverages internet-based applications for every class, stating “what I’ll do is create a Google Doc and put it on Google Classroom”. Both of these tools are cloud-based and are used online by students in the classroom. They negate the need for writing things out on paper, as long as there is a constant connection from the device to an internet source. This satisfies the administrators’ paperless strategy and is an example of how administrators and teachers are working together with the support of always-on and connected technology in the middle school environment.
Transition and complexities of the schools technology plan.

A discussion with two of the facilities administrators revealed the existence of two technology plans that intersect with teaching and learning at the school. Upon opening, the school implemented a BYOD (Bring Your Own Device) policy for students within the facility as a way to enhance and enrich learning. This policy was a sub-component and in addition to the districts overall technology Acceptable Use Policy (AUP), which allow students to bring personal mobile devices to this school and use them for teaching and learning under the direction of the teacher and staff. Consequently, the complexities of ubiquitous student mobile devices and applications proved difficult to support. This resulted in a recent alteration of the middle schools technology plan to a 1:1 school-supplied Chromebook technology plan. Although leaving the option for students to still bring in and use their tablets and laptop, as well as use smartphones while in school. As such, traces of the original technology plan intersect what is currently in place with 1:1 laptops.

When discussing the transition with Mrs. Ryans, one of the schools administrators, she revealed that, “the platforms were too complicated for our teachers to support and keep the learning reverse”. Since there was no guarantee that each student would have the same type of technology, the manner in which learning apps would operate during class activities was not guaranteed. Mrs. Ryans argued, “the tools are so prolific and the app options are so prolific and depending on the type of device it changes the functionality and that’s why we went to 1:1 Chromebooks”. The transitioning from a standalone BYOD policy assures that all 630 students, regardless of what type of
personal technology they bring to the school, will have the same school-issued portable Chromebook device.

The current, updated strategy requires students to carry and use their Chromebook in every class throughout the day. The device stays with the students’ throughout their time at the middle school. Furthermore, the plan presumably has an advantage over the previous BYOD only approach since 1:1 assures that each student not only has a personal device to use, but has one that functions and connects in the same way when accessing online content via the school’s WIFI network.

**RQ1: Teachers’ Lived Experiences in the Always-on and Connected Middle School**

When exploring the teachers’ lived experiences in the always-on and connected educational setting, several themes expounded to reveal the manner in which technology was being embraced in the middle school. It was that teachers’ were frequent users of always-on and connected technology for both personal and classroom activity. They also used peer-to-peer collaboration strategies to learn new ways of incorporating technology into classroom activities, as well as several management strategies to monitor student use of personal devices.

**Digital evangelist in the classroom.**

The digital evangelist theme derived from the teachers’ enthusiasm toward and frequent use of always-on and connected technologies, rather in the class or outside of the learning environment. The ages of teachers within the facility varies from early twenties to late fifties, as does their years of teaching service, from 2 months and beyond. But the manner in which they use technology inside and while away from their classrooms are
similar in nature. For instance, when discussing how their personal technologies are used throughout the day, Mr. Smith, a technology teacher mentioned that he interacts with personal social media and email on a daily basis, but also manages the school’s Twitter and Facebook page from his laptop and phone. In like manner, Ms. Long who teaches English discussed her frequent use of personal technology while at home. She mentioned that, “when I’m not at school I’m on my phone all the time. I use Facebook, pictures, Instagram, and email. Both my work and Yahoo email are also on there”.

Moreover, the comfort with technology use was again revealed through Mrs. Macy, who uses a MacBook and cell phone daily, while also enjoying the pastime of social media use while not in class. She shared that “for my personal use, I use the social media sites and a lot of banking”. She also leverages her own device as a teaching tool by integrating various Google applications.

Similarly, Mr. Brooks a new science teacher mentioned that he typically uses a variety of personal technology such as a phone, iPad, and computer to class with him, stating, “I always have a device”. Not only are they used for personal activities, but he spoke of how he uses them as tools to support teaching and learning. Since the school requires that teachers’ use Engrade and PowerSchool for grade and classroom management, Mr. Brooks added them to his laptop for easy access. He also stated, “I’m trying to integrate a classroom Twitter page and a Quizlet page so I can send them questions on their devices”. In doing this, the students can receive questions through a Twitter or Quizlet app page and answer them via their Chromebooks or other personal mobile technologies.
On the other hand, while the teacher participants are comfortable with using technology and some integrate personal devices into their teaching and learning, Mrs. Patton chooses not to bring a personal phone or tablet to her class. She is comfortable with technology use and facilitates class in a highly engaging lab filled with digital-age learning tools, but refrains from using her personal technological devices at school. When discussing this, she gave reference to possible legal issues that may arise when teachers’ personal devices are brought to school. She said, “I do not, for legality issues. I would not want them to say that it is a public device”. Her belief is that a personal device could be view as a public device if used in the public school setting. As such, she does not bring her own personal technology to class.

None of the participants, regardless of age or years of teaching service in K-12 seemed to have any difficulties using technology for personal activities. The generational divide between the teacher participants’ did not make a difference in their ability or comfort level with using typical everyday devices and internet-based applications for personal things. When discussing the influences in which technology has in their personal life, all of the teacher participants exhibited a strong comfort level with using smartphones, personal laptops, and the internet. They were particularly comfortable with using social media applications such as Twitter, Facebook, and Instagram. All of which most interact with daily, either at home or in class.

**Peer-to-peer collaboration.**

Peer-to-peer collaboration was a theme expounded from the teachers’ experiences working in the connected STEM middle school setting and the manner in which they
support each other. Peer-to-peer collaboration was revealed as a critical component for keeping the teachers in the facility abreast of the latest digital learning applications and curriculum enhancement tools. The teachers within this middle school are gaining comfort and understanding of how to integrate technology into their daily routine, by learning from and teaching one another. While the school and/or district mandates the use of certain tools such as Engrade and PowerSchool for real-time grading and parent collaboration, the teachers within this always-on and connected environment choose to use alternative applications that can be easily accessed from most devices that students use, particularly their portable school-issued Chromebooks, or smartphones as a secondary device. Since every student within the facility has been issued a Chromebook that connects to the facility WIFI, teachers can leverage a variety of cloud-based applications for seamless integration and students’ can interact with content from school or home.

The teachers that are more tech-savvy, or whom have learned to use a specific technology, have taken the position of helping others get up to speed with using tools such as smartboards, internet learning apps, and Google Classroom for content integration and activity management. Google Classroom is popular cloud-based tool that teachers use in this school and enables them to create a learning area, or classroom site for each class. The supplemental hands-on training shared by teachers’, brings an awareness to effective collaborative applications for learning and is aside from what would typically be offered in an administrator led professional development. It has been embraced within the setting as an alternative development opportunity. For example, Mr.
Smith, a technology teacher spoke of his willingness to always help out. He shared that “usually the other teachers will call me and I go around and help with technology issues”.

Moreover, when asked about collaborating with the administration on learning and technology integration ideas, Ms. Long, a 7th grade English teacher commented, “the biggest thing I use is Google Classroom, but I didn’t hear about that from the administration. I heard about it from other teachers”. Similarly, Mrs. Macy mentioned that another colleague in the building spoke of the benefits of Google Classroom to her and trained her on the specifics within the application. She stated, “The Google Classroom was something that I stumbled upon from another colleague. We didn’t really get trained in it because it’s not a district thing”. While the district does mandate the use of certain programs, they do allow teachers’ to have some flexibility for choosing supplemental learning tools, such as a classroom website where parents could view activity requirements. She was very enthusiastic about the supplemental tool, as well as the helpfulness of other teachers in the building. Now, of course this doesn’t diminish the professional development efforts of the administration or district, but it does speak of the willingness of teachers’ to collaborate with one another for classroom success.

**Modelers of digital-age learning to support student success.**

This area of support was articulated by all of the research participants and was highly favored for teaching and learning in the middle school. Students’ accessibility to Chromebooks and personal always-on and connected technologies affords teachers’ the ability to leverage these tools for the creation of engaging learning experiences. As noted above, the teachers in this middle school are comfortable with using technology and are
also advocates for peer-to-peer collaboration. The previous section gave reference to the teachers’ frequent use of cloud-based applications for teaching and learning. Particularly Google Classroom and other Google apps that enable students to collaborate, review external links, and access assignments from school or home. In fact, since student Chromebooks operate on Google-based technology, the inclusion of online apps, especially Google apps, makes incorporating video and spreadsheets for digital learning experiences easy. For example, Mrs. Macy described her use of these cloud-based tools for student collaboration and to satisfy the schools paperless initiatives. She stated,

I actually use Google Classroom as my class site. So because we are the technology school, we are influenced to not use as many prints. We actually have a print limit, which is 1500 and I have 150 kids, so if I wanted to do a worksheet I can really only do that 10 times during the entire semester. So it really limits me for that. So instead what I’ll do is create a Google Doc and put it on Google Classroom. The kids have their own Google classroom, so each of my periods have their own webpage. I’ll post it on their and they can open it from their Chromebooks, type it into their Chromebook and then submit it into that file in Google Classroom. So, it’s all electronic and it goes into a nice file instead of emailing 150 papers to me. It’s pretty nice when you get to use it.

She also spoke of the manner in which online applications connect with the students’ always-on and connected Chromebooks, allowing them to write research papers and submit their papers directly online. She revealed,
Chromebooks are used daily in my room. We do daily writing, so they are writing in a Google Doc based on a language art standard with social studies content. So they are addressing context clues. Right now we are doing, using commas correctly in a sentence, but it’s based on social studies content. So I’m integrating ancient Greece in comma work, so they have to fill in the blank with a social studies vocab word, as well as put in commas. So that’s the daily writing and they are using Google Docs for that and then they submit it to me every two weeks. Google Classroom is used quite frequently the way I described. They can do any type of assignment on there. I post announcements, I post homework and then they use it for a lot of research-based programs as well. The kids use their Google Drive for everything. It’s kind of like, their own version of a Windows folder.

Mr. Brooks described how his science students used iPads to create videos related to what they learned about minerals. He often leverages technology to enrich the daily lessons and allows students to use their skills in operating always-on and connected technology to support their understanding of course topics. As an example, he indicated,

Right now we’re using iPads. My students just made videos about healthy minerals in foods. That was one of our minerals projects. They found out what a mineral is. A physical mineral, like a chunk of quartz, then we talked about having things like iron and potassium, things in your food. So we kind of made those connections and compared and contrasted on that video they made. It surprises me how much some of these students can do on a device. They can make a really good product, a really good video in two hours on a device. And I
just recently learned how to do it, maybe a year ago. So I always find that interesting and intriguing.

Similarly, Mrs. Macy discussed the interaction capabilities student always-on and connected technology and cloud-based applications. Since students Chromebooks and other personal devices are connected to the school WIFI, she can sync Google Classroom with the smartboard at the front of the room to see student responses to discussion posts. Mrs. Macy noted her experience of using these technologies as teaching and learning tools as such,

As we did a discussion post question the other day they had a topic and they had to free-write on it for 2-3 minutes. We went through everybody’s and you could see it as they were submitting them. You could scroll through them and it had their name to it. So there are a lot of features and different applications that we use to make sure they’re on top of it.

The inclusion of these tools are not only engaging for the students, but are helpful in keeping teachers’ aligned to the standard of using digital tools for student collaboration. In this manner the teacher exhibits technical skills and knowledge indicative of this modern age. Mrs. Macy spoke of a time in which always-on and connected technologies weren’t as prominent in school, stating “I grew up in a school where it was paper, pencil, and textbook”, a reality experienced by many of the other teachers as well. Nonetheless, her pedagogy and mindset has shifted to align to the needs of the learning environment.

The newly developed Foundry in the school allows the teachers to model digital-age learning, by engaging students through hands-on applied mathematics and art
projects. Mrs. Patton, a 9-year teaching veteran, instructs students from each grade level 5-8. The Foundry is a large creative learning space that prior to 2015-2016 was the middle school’s library. It now houses multiple digital-age learning tools, such as a 3D printer; a laser cutter; vinyl cutter; CNC router; robotics lab; and a variety of hand-tools for students to measure and build with. Mrs. Patton teaches students how to use a variety of design software that is integrated into the machinery for product development. When discussing how some these tools are integrated into the curriculum she stated,

I teach pretty intensive design software. We use Adobe Illustrator, Ink-scape and Word. We use technology specific software. We use Cut-Studio, its specific to the vinyl cutter and Adobe Illustrator. We have to have SVG saved files. Those can only be done on certain software. So the CNC router, the 3D printer, and laser have to have a SVG file.

Not only are the students being introduced to industry standard software, but they are also being shown how to manipulate data, with the result of a product. For example, one student project involved using the vector software to create a custom design that is formed into an object to fit over students’ mobile Chromebooks. When asking about the objects, Mrs. Patton said, “We use a vinyl cutter. That is how they make their individual Chromebook skins”. This personalizes them and makes them easier to find if the student puts them down. Mrs. Patton discussed other ways in which new and older tools are incorporated into the curriculum to evoke critical thinking for applied math topics. When describing the tools and how students use them to break away from traditional methods of learning, she said,
I have the old tools. Old school tools like the drill press that I’ve used. My sixth graders built outdoor gardens. So we were just doing a lot with circular saws and drills and drill bits. For many of them that the first time ever holding a drill or pulling a trigger. I had one young lady pull the trigger and scream. It wasn’t even anything in it, but she had never handled anything like that with electricity in it.

After learning exploring these tools, students’ can then create objects. When asking Mrs. Patton if the students are excited about her non-traditional approach to teaching math and art she said,

Oh yes, because it’s applied math. That’s the whole premise of art in math. It’s taking the concepts and applying them to a real-world problem. So when they start cutting wood and they realize that, oh yeah, if I’m off by a quarter inch it actually doesn’t fit together. And my constraint is, I only have this much wood and I can’t make this longer, so I have to shorten everything else to make it fit. That’s where, finding out that you’re building a garden, the perimeter is, how long does each side need to be? Your building a garden and you’re cutting it, so how big does everything need to be? I’m thinking that it’s hitting the goal and the kids are excited about it.

The Foundry has a host of desktop and laptop computers that are managed by Mrs. Patton, but students also bring in their always-on and connected Chromebooks and other personal devices that are only used when needed. While she does embrace technology in many forms, the importance of keeping students’ on task is vital in the
Foundry. When discussing her experiences with engaging students with technology, student devices and rules in the foundry, she stated,

In my classroom a device will only be out when needed. Acceptable use means that a student can bring it to school and use it when needed. So beyond that I don’t know what you would do. When they walk into my classroom if we are using it great, if we aren’t using them, then they shouldn’t be out. But I think that’s the schools policy, so that’s maybe just my interpretation of it. I don’t really have a cell phone jail like some of the teachers have. And all of the phones will get dropped in the jail when they come in. Or they put pockets up on the side of their room, so you see the phones in there. I tell the kids, out of sight out of mind. Make sure the ringer is off. Put it in your pocket. We may need it later in class, so just put it away.

While Mrs. Patton does model digital-age learning and is one of the more extensive users of technology in the building, she does recognize that keeping students on task, while managing inappropriate technology use is essential for success in her class.

**Experiences managing student use of always-on and connected technology.**

When discussing what the middle school teachers’ are experiencing when students are using ubiquitous always-on and connected technology during classroom instruction, most of the participants described management strategies that they use to keep everyone on task. For example, Ms. Long described her monitoring strategies that are used during tests. She stated,
They took a test today. I basically sit behind them and my chair is up higher so I can see all of their screens, especially for test and quizzes. That way I make sure that even if they have that game app, or the game tab open, that they don’t switch back and forth. That they actually focus on that one thing.

Mrs. Macy uses a similar monitoring strategy, but frequently circulates the room to assure students are doing what they are supposed to be doing. She mentioned that,

Most adults have this perception that a teacher just sits at their desk and hands out a piece of paper. No, I’m constantly walking around the room, making sure they are on a Google Doc and that they are in Google Classroom.

She integrates Google Classroom with the smartboard, and leverages the real-time assignment completion functionality of the tool to report student completion. She gave a demonstration of how this would work from the teachers’ side and said,

I can pull it up on my smartboard here and it tells me 2 of 30 are done and they have turned it in. Then it actually updates as they submit it and I can say, ok I am waiting on X, Y, Z to turn in this project. What are you doing that you shouldn’t be doing?

Since the students know that she can track their progress, they are more likely to complete their assigned tasks. It is beneficial for her to know which student is lagging behind, so that she can monitor them more closely. Closing the Chromebooks to direct student attention back to the lecture is a strategy used to assure that a writing task is completed and that they’re not constantly on the internet. Mrs. Macy added,
I do have them close their Chromebook when they are done with that activity so I know that they are not on the internet at all. They do have daily writing in the morning and it should take 5 minutes max to get them in and settled. The Chromebook goes down immediately as soon as you’re done writing so that I know that you’re done. I will say, I know your done writing when your Chromebook is closed.

In doing this, Mrs. Macy knows that the class is ready to move on to the next activity and is not navigating the internet.

Mr. Brooks recognizes the difficulty in monitoring everything that students do, especially when they engaged in using instant messaging on their laptops, or texting from other personal devices. He stated, “It’s hard to notice and it’s hard to track down.” Sometimes students will appear as if they are doing work, but are actually communicating with their classmates via their technology. As a result, Mr. Brooks will continually walk around the classroom to monitor what they are doing. He jokingly added, “I’d really love to install the old slanted mirrors that you might have had in your science lab back in the day. We need those. Just constantly to make sure they’re not doing something that they shouldn’t be”. This comment definitely speaks to the changing times and tools like reflecting mirrors that may have been used as a class monitoring device in the past, but rarely present today.

On the other hand, while there is a need to monitor student activity during lectures, Mr. Patton does advocate for the use of technology and doesn’t mind students
using their connected devices in class when appropriate. For example, there are instances when he does give some groups free time on their Chromebooks, he stated,

I have one group that gets an extra free minute or so if they do well and they can get on their devices and do what they want as long as it abides by what you can search on your Chromebook. If they go off of that strain and do something that they are not supposed to be doing. Well, I gave them their warning and they need to be respecting school policy.

From observation and questioning it was apparent that most of the teachers were open to students using always-on and connected technology of any kind, but the preference leaned more toward Chromebook usage for class integration purposes. It was also a necessity to form strategies to keep students on task, balancing the learning and screen time.

**Collaboration with the administration.**

Aside from training on the district-mandated tools such as Engrade and PowerSchool, the teachers’ participation in technology integration professional development was minimal. It is likely that the required tools may not always work for everything that teachers want to do in class. As such, they are prompted to explore alternative teaching and learning tools that are conducive to usability and student engagement. While it may not always be introduced by administrators in the facility, it is likely to be supported if it’s beneficial for everyone. For example, Mrs. Long discussed her use of the required tools and added,
The biggest one would be PowerSchool for grades. Obviously they want the grades to be accurate and uploaded. The biggest professional development we had as far as technology would be grades. We had a small one on Engrade for like testing and creating your own quizzes. I don’t like that website.

In a similar manner, Mrs. Macy described her experience with the required tools as,

Yes, one example is we need to have a class website. They want us to set it up on Engrade, but it really does not have the accessibility for a teacher. It doesn’t have multiple pane windows, they can’t go to different things. I can literally just post one. It’s like a Facebook wall. You can just post one thing and move on. Until they said you need to link out to different technology, a different type of application. You can certainly do that, as long as parents can get to it from Engrade. So as long as we have one common ground we can go wherever we like with that. So they are really open to allowing us to explore, as long as we are all reaching the same goal.

In her example, the use of the mandated tools seemed to be somewhat limited in functionality, so she will exercise her options to seek alternative teaching and learning tools, which the administration gives some latitude on. For instance, Mr. Brooks discussed his experience with this as,

We have to use Engrade and PowerSchool as a technological online device. However, we can add anything else we like. So we have some restrictions, but at the same time we have some free range to use any pedagogical tools we see fit for our classroom.
As a whole, teachers are afforded the flexibility to manage the manner in which any technological tools are incorporated for teaching and learning and the administration is open to this. This also applies to curriculum components. When discussing rather or not teachers are expected to conform to everything handed down, Mrs. Patton shared that as a teacher in the environment, they can be as creative as the want. She said, “We have to create our own curriculum, we are 100% creative here.” All of her courses take place in the schools foundry, so this is definitely a beneficial directive from her view. On the other hand, Mr. Smith finds this open, hands-off approach to be somewhat inefficient, stating, “It’s kind of a little disorganized here. There definitely should be some sort of system to handle things, but we just go with the flow to fix things as we go.” This assertion leans toward a preference for more administrative presence in planning of curriculum and technology integration.
### Table 2

*Findings: Sample of Teacher Interview Responses*

**Q1. Teachers’ lived experiences in an always-on and connected middle school.**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Digital Evangelists</th>
<th>Peer-to-peer collaboration</th>
<th>Modelers of digital-age learning</th>
<th>Experience managing technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1-Macy</td>
<td>I have my Macbook and cell phone every day. Use social media and banking sites a lot.</td>
<td>Google Classroom was something that I stumbled upon from another colleague.</td>
<td>Kids have their own Google classroom, so each of my periods have their own webpage. I’ll post it on their and they can open it from their Chromebooks. Chromebooks are used daily. We go into Google classroom first thing. I have 3-5 questions for them to do. Google Classroom’s easy. Kids know how to use documents. If there is a reading, I upload the reading and below it I actually attach a Google document.</td>
<td>I’m constantly walking around the room, making sure they are on a Google Doc and that they are in Google Classroom.</td>
</tr>
<tr>
<td>T2-Long</td>
<td>When I’m not at school I am on my phone all the time. Using Facebook, pictures, Instagram.</td>
<td>Biggest thing I use is Google Classroom, but I didn’t hear about that from the administration. I heard about it from other teachers.</td>
<td></td>
<td>I basically sit behind them and my chair is up higher so I can see all of their screens.</td>
</tr>
</tbody>
</table>

(continued)
Table 2 (continued)

Findings: Sample of Teacher Interview Responses

Q1. Teachers’ lived experiences in an always-on and connected middle school.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Digital Evangelists</th>
<th>Peer-to-peer collaboration</th>
<th>Modelers of digital-age learning</th>
<th>Experience managing technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3-Smith</td>
<td>I use a laptop and phone. I use email and social media for personally.</td>
<td>Teachers will call me and I go around and help with technology issues.</td>
<td>I Teach Tech core. Intro typing, PowerPoint. They are using the internet every day for research topics.</td>
<td></td>
</tr>
<tr>
<td>T4-Patton</td>
<td>We take some of the stigmatism away. By letting them bring their own devices, or by using devices in your classroom, you free your classroom up to a much higher order of thinking</td>
<td>We are 100% creative here. We share a lot.</td>
<td>I teach pretty intensive design software. We use Adobe Illustrator, Inkscape and Word. We use technology specific software. We are at the blend of old and new tools</td>
<td>I’m not setup like a traditional, all of the screens face me all of the time. That is my monitoring</td>
</tr>
<tr>
<td>T5-Brooks</td>
<td>Phone, iPad, computer, I always have a device.</td>
<td>I’m big on Google Classroom. It’s very helpful to me. I’m big on technology and big on getting them to be able to use the technology.</td>
<td>We’re using iPads. My students just made videos about healthy minerals in foods. They can make a really good product, a really good video in two hours on a device.</td>
<td>I have one group that gets an extra free minute or so if they do well and they can get on their devices.</td>
</tr>
</tbody>
</table>
RQ2: Attitudes Regarding BYOD and Student Technology Use

Technology use by students within the middle school setting is frequent and technology plans are in place for acceptable use. As such, teachers are expected to not only use technology, but to manage student use on a daily basis to make sure they are on tasks with required assignments. While the teachers’ attitudes toward student technology use and policies in the middle school are positive, they did feel that boundaries should be set when students are using always-on and connected devices in the classroom.

Setting boundaries for ubiquitous technology use in class.

Since the school’s technology plan has transitioned to include 1:1 Chromebook, each student now has a personal Chromebook laptop for class. The former standalone BYOD policy for personal technology has been updated to a (computer and technology acceptable use) policy AUP, which exist as a sub-policy for personal device usage at the middle school. Similar to the BYOD policy, the AUP permits students to bring and use personal cell phones, smartphones, laptops, or tablets to school for learning support. Consequently, the manner in which Chromebooks are accessed and used are similar to other ubiquitous always-on and connected technology that students may bring from home, which only increases what teachers have to monitor in class. However, since the STEM middle school has always embraced the idea of students bringing in their own personal technology, using them in conjunction with Chromebooks are acceptable depending on the activity. Most of the teacher participants are accepting of and recognize
the benefits of student technology use in the middle school, but impose boundaries to negate distractions.

As an example, Mrs. Macy sets boundaries for students to use their Chromebook first, as a primary learning tool in class. Their personal technology is positioned as an alternative in class if their school-issued Chromebook stops working. She stated,

I always say Chromebook first, cell phone second. That’s my policy, so I shouldn’t see your cell phone. I shouldn’t see you using your cell phone unless your Chromebook goes down and you’ve let me know that your Chromebook is down.

Mrs. Macy understands that if permitted to use both at once, students will become distracted with games or social media interaction. She added,

I actually see that when we have them with their own devices, specifically cell phones, I think they are a little more distracted with cell phones. Because I think in previous years they’ve been a little more available because the Chromebooks are still new to them and my understanding is that they just got them last year. So they don’t know that they can go to their Chromebook first for the answers. They want to use their phones, which I think they did a couple years ago before the Chromebooks. So when they use the phones, it’s hard for me to monitor thirty kids in one room to make sure they are on Google and researching rather than Instagram and Twitter. A one-to-thirty ratio does not work well with social media. Because of this, she leaves other devices open only as alternatives to their Chromebook, which as a main device can be immersive enough. Mr. Smith, a technology teacher and
avid user of multiple connected devices is open to student use of technology, but urges teachers to refrain from letting students do what they want, when they want with personal connected technology. He asserted,

It’s manageable, you just have to execute it and carry it out in the right way. You can’t let them do whatever they want. They can’t think that if they don’t have it they can’t learn. It’s like they are going to die if they don’t have their phone, so if you can get them out of that mindset.

Mr. Smith understands that students often have an emotional attachment to their personal devices, but contends that just because students have access to always-on and connected technology doesn’t exactly mean teachers should just let them do what they want with them. He also felt that while he has to be stern at times to set boundaries for technology use, students should also take personal responsibility to be productive and manage their technology use. He stated,

I’m kind of stern, but I’m also cool. Honestly it has to be half integrity for them. No matter how hard I try I can’t always run around and make sure someone isn’t on a site. Even if I am, they will just exit out and make it look like they aren’t doing what they are doing. It’s kind of hard sometimes because I am a one man team. But it has to be some integrity on their part, if they want to learn and apply themselves 100% they do. But some do slip through the cracks.

Mr. Brooks shares a similar philosophy, arguing that he is ok with managing always-on and connected student technology, but students have to be responsible in managing themselves as well. 40-50% of his students may bring additional technology to
class daily and while it may be difficult managing them all, they are expected to take part in policing their technology use. When asked about ubiquitous technology use by students in his class, Mr. Brooks said,

I’m ok with it. I believe they can handle it. I always expect the very best from my students and I think they’ll surprise you. Students are constantly surprising you. But I can manage it, we can manage it. They can do what’s expected of them, but it takes time, because in this world, now where we are going, what’s going on, they have to be able to manage it.

Mrs. Patton, an advocate for technology integration in teaching and learning is open to students using always-on and connected technology in class, but maintains that they have to be managed. She often discusses this with newer teacher mentees so that they are aware of her strategies for setting boundaries in a classroom filled with computers and personal always-on and connected devices. When discussing her feelings surrounding student use of technology in class she stated,

They do need to be managed a little bit. Basically in my classroom when I’m mentoring other teachers I always tell them “set your line”. So, if it’s ok to have your technology out, that’s fine, but tell your students, if you have your technology out when it’s not appropriate time to have your technology out, then yes, you are crossing that line and I will be happy to hold it for you. It does need to be managed.

In doing this, Mrs. Patton and other teacher participants are setting boundaries to control what could become a total classroom distraction with the inclusion of both Chromebooks
and other personal always-on and connected technology that a student may bring to school.

**Usefulness of acceptable technology use policies in the middle school.**

Each teacher participant weighed in on their thoughts surrounding the middle schools acceptance of student always-on and connected personal technology. When discussing the usefulness and necessity of the middle school’s policy that enables students to bring in and use personal always-on and connected technology, Mrs. Macy commented, “I think it has enhanced learning, allowing them to have their own Chromebooks at all times.” She realizes the benefits of working in this type of environment and knows that placing a device in every student’s hand affords some flexibility in the classroom. The fact that students are already familiar with using various always-on and connected technologies and various tasks can be streamlined wirelessly makes things easier. For instance, Mrs. Macy stated,

I can’t explain what a benefit it is to not have to have them get out a piece of paper every 5 minutes and have to make copies of everything. It can just be in one nice neat area and the kids can access it faster than half the teachers in this building because they just know how to work these applications and they know exactly where to go before I even tell then. Because they know exactly where things would be in there brain.

When discussion the policy usefulness with Mr. Brooks, he gave a positive response, but spoke of possible challenges, stating,
It can enrich the curriculum. It can definitely provide more options. It can provide options for educators to streamline their time usage, which is nice. And I guess it can widen our options. It can also distract and it can also become a crutch, which is probably the worst negative. And it can also demean the value of education sometimes.

Mr. Brooks acknowledges the benefits gained from technology and everyone in the class being connected, which may give the teacher time to dwell deeper into the subject matter, but asserts that it could lead to misconceived thoughts regarding the teacher’s role. He added,

> When I say something like “well, you can put that better educator on the video screen and you can help dive into deeper detail”, people automatically think that it’s taking away the teachers role in the classroom, but I see it totally differently. It might take me forty minutes to manage a class, do what I need to do on the computers, send my attendance, deal with the student council, and pass out slips. All that stuff. I have to do all that stuff and you also have to start lecturing, not lecturing, but give them an activity were their figuring this out. That forty minutes, I can condense that into five minutes in a video that’s already made, give that to them and they have their ear buds in, it’s cool and their interested in what this guy or girl have to say. They’ve got the information and now we can do an activity, we can dive in deeper into the detail, where there’s more critical thinking, there’s more hard learning, and there’s more tactful timing usage. So all those things interwoven, it has to be a positive in my mind.
Mr. Brooks argues that, while positive and useful, the integration of technology in education and in this environment has to be used correctly. He stated that, “overall, it by far enhances the classroom. But it’s a double edge sword, it’s dangerous.”

Ms. Long, who teaches English expressed positive feelings for a facility-wide acceptable use policy, but doesn’t think students should be exposed to technology 100% of the time. When asked about her overall feelings related to the facility wide policy that allows students to use always-on and connected technology, she stated,

I love them, but not 100% of the time. When the WIFI is down, Google is down.
If a student’s Chromebook is broken or lost, anything like that, it just kind of hinders what we can do. I don’t think it’s good for students to be stimulated 100% of the time and them looking at a computer all the time all day in their classes when their brains are developing as rapidly as they are. For certain things, absolutely, research papers, typing papers, looking up information, but if it’s just a group activity, they don’t always have to make a PowerPoint or whatever.

While totally immersing students’ in screen devices aren’t good, Ms. Long did feel that the facilities technology policies were useful.

Furthermore, Mrs. Patton also felt that the schools technology policy was useful and that if parents are able to send their kids to school with a device, then it would be beneficial to leverage them. This would give students the ability to access content on a personal student device, as well as on a school-issued Chromebook. She stated,

Why not have that ability to be able to tap into all of those resources? We’re very good about supplying technology, so if a student doesn’t have a phone, or they
don’t have those things, it’s not like blatantly obvious, like everybody is pulling out their phones except two students in the back of the class. It’s not set up that way. That’s why we have the Chromebooks. But its free access for everybody and what a way to level out the playing field. If you can all get the same information, why not level it.

On the other hand, Mr. Smith expressed mixed feelings around the schools acceptable technology use policies and felt that student grade level and age makes all the difference of rather they should be allowed to bring and use technology in class. He stated,

I don’t think any of them at this level, maybe at the eighth grade level. But fifth and sixth graders and everyone having their own laptop is just insane to me. If they drop them they don’t care. I can tell them a million times that if you break this you are going to pay for it and it just seriously goes in one ear out the other. I definitely think that it is useful to a lot of students that may need visual hands on learning. There is benefits to technology and learning like this, but there are pros and cons. Overall I think there are more cons to it. Now, I am open to new things because I use technology every day, but in this environment in the educational world I don’t see a place for it at this age.

While Mr. Smith feels that there are more cons than pros related to students using always-on and connected technology in this connected environment, the majority of teachers do feel that the middle school’s technology policies are useful and beneficial to learning.
RQ3: Teachers Understanding About Middle School Students’ Capabilities of Being ‘Free Agent’ Learners

When exploring the teachers understanding of their middle school students’ capabilities for being free agent learners, it was revealed that several students exhibited underdeveloped social skills; poor research and writing behaviors. Teachers also felt students’ capabilities for being free agent learners, by which self-directed exploration via their mobile device occurs, would be better implemented under the direction of an adult. These themes are further explained below.

**Underdeveloped social skills.**

This theme is a result of the participants shared views on various ways in which always-on and connected student technology affects their social skills. From their responses, it is understood that their students’ social skills aren’t being fully developed as a result of their frequent interaction with always-on and connected technology. For example, it has contributed to difficulty having one-on-one communication without a device; an inability to communicate intelligently; and a lack of overall human interaction.

Mrs. Patton described the lack of social skills that is observed daily from her students and contends that it is a skill that she often has to teach. She stated,

> What I’m finding is that I am having to teach social skills. To be in sixth grade and not be able to have an intelligent conversation with somebody is a skill that is totally not in their skillset anymore. Many of them have not been taught how to agree to disagree and they instantly want to go to their media and “I want to post this and say this.”
As a result, their ability to sit down and have a conversation with someone is somewhat diminished, because they are constantly interacting with their always-on and connected technology, texting and posting on social media. Consequently, any social interaction that needs to happen outside of this is limited. For this, Mrs. Patton said, “that is a skill that I find I am having to teach, because of their devices.”

Moreover, when discussing the manner in which always-on and connected technologies contribute student abilities with Mr. Smith, he clearly stated that,

“It ruins human interaction. These kids could literally sit at home and never talk to a person. They could just text them, message them. You would never have to see any one. Some of these kids are impaired with their reading and social skills because they don’t use them.

Mr. Smith’s argument was similar to that of Mrs. Patton, who also recognized that student social skills and human interaction are lacking areas of concern. He later added that this dependency on personal always-on and connected technology at the middle school level, may affect them later on beyond high school, stating “I think it will start to affect them once they get pass the high school level and have to go to job interviews and have to stand in front of the man and have to answer questions.” In this discussion, Mr. Smith gave a critical view of how vulnerable students’ are at the middle school level and warns that lack of social skill development with his students’ could be detrimental to future career opportunities since they are so reliant on technology.

Mrs. Macy equated students’ frequent use of technology as having the world in your hands and if a student wanted to know the name of a song on the radio, they
wouldn’t be required to talk to anyone because pushing a button on your device will tell you the answer. She said,

People didn’t use to get to order what this song was called and hold up Seri. You use to have to have a conversation with a person and say hey, I was thinking about this song, do you know what it’s called? Then you would have to ask the next person. So I think you almost lose a little bit of human communication with the use of all this new technology that we have. While it’s a valuable resource, I think there are some negatives and as a generation which includes myself, we are a little too reliant on it.

Mr. Brooks described what he has found to be inadequate human interaction skills, but attributed students diminishing skills to the times in which we live in where being intellectual is not always favored, but having the latest technology is. He stated,

So, I guess it kind of boils down to, we live in this time of anti-intellectualism, where it’s just not a cool thing anymore. If you think about it and who these kids idolize and they idolize tech users. They’re using it in a wrong way, well maybe not the wrong way, but not in a productive way. It worries me because eventually they are going to be paying for my life when I’m in a nursing home or something. But these are people that I’m entrusting the nation to, our world to. I want to make sure they are using technology the right way, it’s hard and scary I guess.

Lastly, Mr. Brooks discussed what he perceived to be underdeveloped social skills when students’ are communicating face-to-face. He notices that students appear to be more comfortable typing their opinions in their devices then they are having an actual human
interaction. He mentioned that it is somewhat commonplace for a student to talk to you with their head down, as if they are texting someone. He added,

I find it disturbing that they have a hard time talking to me face-to-face. So if I have a student or a few students stay after class for this thing or the other, they have a hard time forming sentences sometimes, because they don’t know how to say it out loud. I feel like sometimes they’re afraid of their own voice and we live in a society where we want to enhance the voice that young people have. When I say voice, I mean their ability to change modern culture. They’re afraid to speak on what they believe. It’s so much easier to type and to say to one person and actually hear yourself say it. That’s like an act of courage now. In the past it was just you being you. That’s one of the changes, when it comes to that device, their comfort level with human interaction.

Finally, each participant’s perception of technology and student interaction elicits a consequential meaning to what has occurred due to students’ frequent interaction with their always-on and connected devices. Rather it be a one-on-one conversation, or some form of intelligent conversation, student capabilities within this area are lacking outside of what their technology can support.

**Research and writing behaviors.**

The research behaviors theme derived from the teachers’ frequent reflections on student habits gained while doing classroom activities via their always-on and connected devices in the classroom during learning activities. As noted in the literature above, always-on and connected technology gives students access to a broad portal of
information from the internet that may not always be accurate. Consequently, students’ interconnectedness and desires to gain answers immediately, induces behaviors of academic dishonesty, lackluster problem solving skills, and limited writing skills that teachers are either having to un-teach or constantly monitor. The teachers in this study were descriptive in discussing the manner in which students may retrieve and report information gathered from internet search engines. The most utilized search engine that students and teachers use in class is Google, which ironically serves as the backbone technology powering their school-issued Chromebooks and other personal always-on and connected devices.

In our discussion related to the middle school generation, and teacher feelings surrounding dependency on technology and the internet, Mr. Brooks expressed his frustrations with student problem solving skills. He described what students would perceive to be problem solving, by depending on Google to answer everything. Ultimately this causes his students to provide answers that are well beyond their knowledge level, or they will just plagiarize an entire passage from the internet. To address this, Mr. Brooks will ask them “where did Google get it from?” In this manner, he is getting them to understand that a quick answer found via your device isn’t problem solving. A further was,

It’s mostly problem solving skills. Right now, in their mind, to solve a problem, they have to Google it. Well, that’s not always going to be true. It kind of stifles creativity and the whole thing about this STEM school and the idea of education is to create creative innovators that will be able to literally change the world as we
perceive it. If we can’t create those types of students, we won’t have anything changed. Nothing’s going to change if we don’t create little changers and little critical thinkers and problem solvers. If we create people who can Google and get an answer then you live in a stagnant culture where no one is pressing the boundaries. If you say let’s think about it first and let’s form our own answers, that’s what you need. You need students that are going to be forming their own answers and own opinions on things and not just taking the black and white from Google or Bing or whatever.

On the other hand, Ms. Long’s frustration is caused by students’ inability to spell and write properly. She stated, “My biggest thing is with spelling and handwriting. I think that the biggest problem that I have seen is they do not know how to spell. If they don’t have spell check, they are completely lost.” Since most devices, internet search engines, and word processing applications are affixed with spell check, students’ don’t have to take the time to spell things properly or form an idea. Consequently, when they are not on their devices their writing and spelling skills aren’t as strong as they should be at the middle school level. When asked if her students usage of always-on and connected technology engenders behaviors of always wanting fast, but not always accurate information, Ms. Long replied,

Yes, it also leads to plagiarism, which is one of the biggest things I’m working on right now before they do their research paper. They think that because they find it on a website, then it’s right. They don’t know how to, like when I was in high
school the teachers were like “don’t use Wikipedia”. That’s not, anyone can change it. Now it’s almost an acceptable site to use.

To combat this behavior, Ms. Long typically presents good and bad examples of researched content so that students can gain a better perspective, but this is sometimes met with difficulty. She stated, “The hardest part is getting them to read the entirety of the website.” Sometimes students will only read a few sentences and go with the answer. Likewise, Mrs. Macy described some of the same behaviors from her students when engaging in research via their always-on and connected technology. She stated,

It’s harder for the students to decipher that, if you’re using the internet source rather than a textbook, it’s harder for them to decipher the correct information against what may not be correct. For example, the Wikipedia, although they know to stay away from that site, sometimes it’s the quickest and first link that comes up. They always want to go there first and not go further.

Similarly, Mr. Smith has experienced this with his students and discussed students conditioned behavior of frequently using their technology to take shortcuts. He stated,

Time is money to them. The less time that they are doing schoolwork, the more time that they are having fun. They are always going to take the shorter route.

Then you have access to this stuff, it’s just going to be 10 times faster than going into a library, encyclopedia, or any kind of resource that’s not electronic. It’s just going to take longer.

Further, Mrs. Patton articulated that it’s a challenge getting students to understand that there is a process that they must go through to obtain accurate information. They
have been taught how to obtain information correctly, but still seek the fastest route to completion and the answer isn’t always immediate. The amount of information they can access via their connected technology puts them in a rush and they don’t follow a process that gets them to accurate results. Mrs. Patton described a recent challenge assignment that was conducted in her class, stating,

They have the skills, but it goes back to is this right? The first person that got done with the challenge had to re-do it four times, because it was, here, I’m done. Ok, did you look at it, did you do what it said, no. And that piece of paper went back and forth four times until if finally got there.

When asked if dependency on connected technology attributes to this behavior she stated,

I think it’s how they sooth themselves and I don’t know that that is good or bad. But I do know that there are other things that are lacking because of it. But who’s to say that that won’t be a more useful skill in the future. We can’t predict that.

In brief, the participants revealed various behaviors demonstrated by students when completing class assignments. The teachers discussed students’ reliance on their connected technologies and the internet to support research and writing activities, but desires for immediate answers often resulted in inaccurate responses.

**Minimal capabilities for self-directed learning.**

The theme of minimal self-directed learning capabilities was captured from participants’ responses related to middle school students’ cognitive abilities to guide their own learning and development. Four out of the five teacher participants did not elicit an attitude that would suggest their middle school students were capable of guiding their
own learning in an efficient and productive manner without support. The discussion surrounded the idea of middle school students acting as free-agent learners with the support of their always-on and connected technology and the vast amounts of online resources that they can access. As mentioned in the literature review above, the free agent learners seek out their own learning opportunities that satisfy their needs and what they feel is important to their development. This activity is self-guided with minimal to no support from a facilitator and students will leverage personal technology, online videos, websites, and e-course content to reinforce their knowledge.

When describing her thoughts on middle school students’ abilities to construct their own learning experiences and be free-agent learners, Ms. Macy felt that at this age level most students are still developing these characteristics and haven’t really found that subject that they are fully passionate about. She stated,

> At this age level I would say that it is developing. It’s not impossible, but it’s certainly not at a mastery level for them to be self-guided completely at this young age were their adolescents is. Hormonally I think there are way too many distractions to be completely self-guided. That’s just my personal opinion as seeing children of this age. At this point of life, some of them, I can’t speak for all of them, they don’t have the drive of, I want to learn about this subject, I want to excel. It’s kind of like, alright I want to make it to eighth grade. A lot of them really don’t have a certain passion quite yet. They aren’t at that passion level where they would love to learn about this subject. So it would be hard for them to put their heart into self-motivating.
Moreover, Mrs. Long’s attitude toward middle school students’ abilities to be self-directed learners supports this statement, as she only believes that a small percentage of students in this school could actually achieve a certain level of self-direction. She added, “I think about 10% of middle school students could actually accomplish that effectively.” Although students’ technologies are capable of supporting them by making content accessible anyplace and anytime, at this age they are still developing constructive ideas about right and wrong information. As such, Ms. Long shared,

The biggest problem with that is if they find wrong information, they don’t know that it’s wrong if it’s only self-directed. And also, as far as teaching there are certain standards that you have to hit. So I might say you need to research the main idea or something like that. They may think in their head that the main idea is something different. Or half listen to the directions and go and try to learn it themselves and they don’t know what’s going on.

Ms. Long added that her students often skim through prompts or have low reading levels, which causes them to misinterpret learning goals. For this reason, there should be checkpoints when doing things independently online to assure they are staying on track. Although, she did express, “if they are staying on track, the less check points they need”.

Comparatively, Mr. Smith also suggests that students should be directed by someone to keep him on the right track. He suggested, “There should be someone that they are following that knows more, at least someone to tell then when they are wrong”. There is the possibility that students at this level may become distracted by their connected devices.
Ms. Macy argues that the presence of an adult keeps students aligned to what they are supposed to be doing. She stated, “I think at this point yes, it should be facilitated by a teacher. Only because of the distractions that the internet provides on cell phones and that their device provides. There has to be some kind of monitoring”.

Moreover, Mrs. Patton, who has spent more than 9 years teaching in this school district, feels that middle school students’ are still forming core ideas and all will not have gained the skills for self-directed learning yet. When gaining insight from her on her attitude surrounding students’ abilities to be free-agent learners she stated,

I don’t think they have the skillset yet. If you want your kid to be an online learner I think that’s good for some students. I have three children and for one of my children it would have been the most phenomenal learning environment ever. For my other two children it would have made them so narrow minded and so focused and it wouldn’t have given them the skillsets to know how to go beyond their own learning. Like, you can be really into one topic and learn all you want to know about that topic, but at the same time, in middle school especially, we’re still forming core ideas. Third and fourth grade your realizing you have a voice. You get to fourth, fifth, and sixth grade and suddenly, your mom and dad’s opinion is not the only opinion in the world, right?

On the other hand, while Mrs. Patton doesn’t feel that all middle school students have the ability to direct their own learning due to underdeveloped skillsets, she does accept the reality of what they can access via their always-on and connect technology and knows all information isn’t controlled by the teacher anymore. Therefore, she argued, “If you think
you have all the information then you’ve got a very rude awakening coming. I think it’s more of how you teach your students to navigate the information”. Mrs. Patton believes that although students’ can access an abundance of information on their own, there still needs to be teacher guidance. Even for short periods of free exploration in class. She asserted,

I think there’s still a place that’s needed for a teacher at some point during the day. I would not put a child on a computer all day long and just have them investigate one topic all the way through. Unless there was something to help balance it other places.

Nevertheless, while the majority of teacher participants believed that middle school students’ have minimal to no capabilities for being free-agent learners, there was one participant that had more of an optimistic attitude toward this activity. During our discussion on this topic, Mr. Brooks stated,

Yes, children, students, they have the ability. They’ll surprise you every time, but you have to take great care to scaffold that type of understanding. If you just throw it at them, you are going to be running into a brick wall.

He discussed his intentions to engage his students in this type of learning experience and declared,

That’s actually something I am gearing myself to do, working towards that free-agent learning and letting them pick up their own trails. I want them to find the things that their interested in, I just need to find the correct pedagogical tools to let them do that properly.
However, the student still will not be able to totally elude the support of the teacher to embrace the full role of a free-agent learner. While Mr. Brooks is open to this idea, he realizes that he is still going to have to have a hand in planning this activity for his students. As such, he later added,

I will say that when it comes to things like that, it comes with a lot of planning. To do something like that right, where everyone’s doing their own thing, following their own trails that interest them, but yet somehow they are all somewhat connected with technology and the content, that’s a lot of things to factor in.
Chapter 5: Discussion and Recommendations

Analysis of Teacher Experiences in the Connected STEM Middle School

The participants in this environment revealed experiences that were from personal use and advocacy for technology use, as well as engaging strategies for students who use always-on and connected technology in the middle school setting. As individual users in this digital-age, teachers spoke of normal tendencies to use their personal smartphones, laptops, and tablets for communication and social networking activities, which are similar behaviors of today’s youth and their use of technology. The participants’ ages varied from early twenties to fifties, but the all shared a similar liking to using always-on and connected technology for personal purposes. Their skills were beneficial to the classroom as they transition to model digital-age learning experiences.

Discussion surrounding how the teachers are using and managing student use of always-on and connected technology first revealed the method for which they are staying abreast of best practices through peer collaboration. This advances as the alternative, but effective means for learning how to use online cloud-based applications such as Google Classroom student content integration and Google Docs for collaboration and instant assignment uploading. This experience, which is widely articulated from all of the teacher participants, enables students to access and upload content from home and receive real-time feedback. The cooperation of peers to work together and share their best practices for the good of the staff has proven to be a substantial benefit for both development and teaching purposes. Google, which powers the student Chromebook
technology, as well as several of the cloud-based applications teachers used, is a prominent support tool in the middle school environment and widely mentioned.

As the teachers reflected upon the reality that students not only have ubiquitous technology, but are also constantly connected to a school supplied internet source, positions a fact of what society has transitioned to as a normal occurrence. For instance, it is now a normal occurrence for students to carry a cell phone or mobile device wherever they go, so this middle school classroom just becomes an extension to this open world that welcomes their always-on and connected technology. This activity is a reflection of a technological determinism theory, which advances that human habits will begin to form under material conditions in which the society lives (Brette, 2003). A technological determinist view could potentially be used to understand the intersection of learning, student use of technology and connectedness, and teachers’ management of what has become normal to this middle school setting. For instance, technological determinism theory attributes advances in technology to institutional changes and conforming behaviors of society. The technology becomes a driving force, influences change, and alters the dynamics of an institution (Brette, 2013; Popitiu, 2011; Ray, 2013). In the case of this middle school, both teachers and students have come to depend on the technology for educational activities, as well as personal communication and entertainment.

The teachers shared similar experiences of managing students’ that tend to exude uneasiness when they don’t have access to technology and information. Since the technology supports much of what the student does educationally and personally, the acceptance has shifted the internal landscape of the middle school to a point of no return.
Therefore, the always-on and connect technology stands as a critical component for class activities and a supportive tool for both the teacher and student. Even the soft technological determinist would contend that the social structure of this institution has been changed (Smith, 1994).

Complexities of Overlapping Technology Plans

Updated technology plan and policy.

In chapter 4, a descriptive overview of the middle school environment was given from the researcher’s observations, administrative interviews, and analysis of district and school documentation. Chapter 4 also described the recent transition of the schools technology plan from a standalone BYOD facility to a one-to-one (1:1) Chromebook technology plan. While the old BYOD plan leveraged student personal technology brought to the school, the new 1:1 Chromebook plan provides school-issued laptops to the middle school’s 630 students. The students are expected to keep and use the Chromebook during their entire time at the middle school and use it as a first option when accessing learning content in class, as mentioned by the teachers in the results above. This reflects similar initiatives seen in the literature, that were advanced by school districts across the country and abroad, who have put 1:1 technology plans in place to support teaching and learning (Blackley & Walker, 2015; Broussard et al., 2014).

In conjunction with the middle school’s new 1:1 plan is the inclusion of a technology acceptable use policy that enables students’ to bring in personal technology to use and connect to the schools WIFI network. Since the Chromebook is noted as the more viable option for the schools learning goals, it is the student’s primary classroom tool, but
it also becomes another personal always-on and connected technology used by the student. Since this plan was updated during the time of data collection the always-on and connected student technology discussed in this research, was expanded to include the 1:1 Chromebook, which are primary devices that the students now use every day. During the teacher interviews, the Chromebook was mentioned along with other mobile devices such as smartphones, tablets, or iPods, as always-on and connected student technology. For instance, Ms. Macy describes the Chromebook as a primary device, but also mentions student phones as secondary. She stated, “The phones are a secondary in my room and I think most teachers, this year especially have used it as a secondary. If Chromebooks go down, then we’ll move to phones”. However, this strategy isn’t embraced by all, as Mr. Jefferson, one of the school’s administrators reflected upon a recent conversation he had with a teacher regarding their feelings on students using alternative devices. He added, 

There is one teacher who has flat out said, students’ have a device, there is no reason for them to have cell phones. So if I see a cell phone out I am going to put it in a bag and I’m going to duct tape the bag and give it to them at the end of the period. Some of the kids didn’t like that at first, but it’s like, hold on a minute, he has a point. You have your Chromebook right there. You can use it when you need it.

Consequently, the teacher, as well as Mr. Jefferson perceives the new 1:1 plan as a viable means to disregard student phones, which in reality are still permitted under the technology acceptable use policy The updated technology acceptable use policy still enables students to bring in their own mobile devices as alternative tools for learning and
permits connection to the WIFI network, similar to strategies used in other connected schools (http://www.reyn.org/TechnologyRules.aspx; Veen & Cole, 2012). As such, the middle school environment remains an always-on and connected setting.

Consequently, a crossing of the 1:1 plan and the technology acceptable use policy means that teachers are now managing student use of both a school-issued Chromebook and alternative personal technology brought from home. If all of these ubiquitous technologies would be used all the time by every student in class the environment it could be distracting. Therefore, the teachers gave frequent mention of setting boundaries with their students when attempting to use technology for class activities. Especially since they are already have to monitor the abundance of activities a student is capable of doing with the 1:1 Chromebook. For instance, Mrs. Macy stated,

I always say Chromebook first, cell phone second. That’s my policy, so I shouldn’t see your cell phone. I shouldn’t see you using your cell phone unless your Chromebook goes down and you’ve let me know that your Chromebook is down, “can I please use my cell phone”. Just because I really do think at this age, especially, the social media is a huge distraction. So that’s one I do use. I think cell phones can be great, but at this age and especially with me being a new teacher I really have to monitor that really close. In addition, they do have a way to get around the games in the school building and they do use their computers inappropriately sometimes, so they get one warning and the second time the Chromebook is closed.
The manner in which a student can connect and access content from the internet on a mobile smartphone or tablet is similar in nature to what can be pulled up from a laptop or Chromebook, but on a smaller screen ("Most People use Smartphones", 2012). This could lead to activity such as social media use and other peer-to-peer communication via their device, which is highly engaging and typical to adolescents (Palfrey & Gasser, 2008; Tulgan, 2013). This could pose as a distraction to the environment. Mrs. Macy asserted, “I actually see that when we have them with their own devices, specifically cell phones, I think they are a little more distracted.” To this end, teachers set barriers to which devices can be used at what time, which negates some distraction, but not all. Mr. Brooks asserted, “It’s hard to notice and it’s hard to track down.” The complexities of a connected environment will always present some form of distraction that can’t be monitored or something that will turn student attention to something else other than the class content. However, that is society has put in place and what teachers will have to work with. To this end, Mr. Brooks argued,

To be honest, I constantly feel like I’m not doing the content justice in this type of world. I constantly find myself pushing and being disappointed with my lesson because it just wasn’t good enough. It wasn’t integrated enough, it wasn’t hands-on enough. It wasn’t there. I find myself trying to catch up with everything they (the students) have. And that’s common, I feel like in a society that’s constantly advancing. We advance faster and faster each day right? That’s kind of the idea. We have to work harder and harder.
Overall, it appears that the teachers’ embraced both the updated 1:1 plan and the technology acceptable use policy that allow students to use always-on and connected devices, but contend that management of all is essential.

**Administration support of technology use.**

Aside from teacher responses, the administrative participants were adamant about the affordances of a connected setting and benefits gained from allowing always-on and connected student technology. Some of which include a paperless environment; rich simultaneous student-teacher interactions; teacher access to numerous online applications; real-time feedback; and extended learning beyond the walls of the school. These capabilities not only enhance the methods for which teachers are relaying STEM principles to students, but they also reinforce students’ skills and methods for using technology. As such, the administration fully supports technology and curriculum integration, but not overuse. Mr. Jefferson stated,

> Now we have our kids with the 1:1 Chromebooks, so that they have them at their disposal. A trick is to make sure that the teachers are not overusing it, so that it’s not just screen-time all day long where the kids are just staring at a screen. But instead intentionally implemented into the instruction so that they still have their direct instruction and that they still have their group work, and discussion.

Now in year 4, this middle school has experienced many changes in the way technology is used and a full balance is still in the making. Mrs. Ryans, who is the lead administrator at the school expressed her support of the 1:1 Chromebook technology plan, but doesn’t recommend planning instruction around the former BYOD model,
stating “We don’t advocate the use of teacher planning instructional design around
BYOD”. She believes that while student devices can be useful for some instructional
activity, it’s not feasible enough to fully support teaching and learning. The overlapping
technology acceptable use plan permits students to bring optional devices to the school,
but she doesn’t recommend leveraging them as primary tools. However, Mrs. Ryans does
support the 1:1 technology plan and recognizes the benefits gained from always-on and
connected tools, stating,

In a sense they are allowed to have their cell phones, but we do not use them for
instructional design because we found that it was not feasible. Yes, students are
allowed to bring their devices and we do have a small group of them that do bring
their own device in lieu of the Chromebook, but just a couple because they prefer
their own device. Then, every child in the building has a phone, which are used
sometimes. We did a geocaching experience and obviously Chromebooks don’t
do geocaching, so they did use their cell phone with that.

As it currently stands, both administrators’ championed the 1:1 technology
initiative and the potential gained through leveraging at the connected school. Mrs. Ryan
even gave mention to some of the complexities that may arise from having the always-on
and connected Chromebook devices, stating,

Figuring out how to keep the kid with the device has been an interesting process.
Figuring out how to charge them, how to have charging stations at night time,
how to have the kid come back and get it from there and end up in first period.
She has recognized that while there is great potential with the 1:1 plan, device logistics is something that is going to be somewhat of a challenge, but this is typical during plan infancy. For example, Derringer (2010) recounted one school district’s technology director’s experience with 1:1 implementation as a logistical nightmare, citing problems with batteries and operating systems, laptop damage, and infrastructure maintenance. These are potential challenges that the school will have to overcome over time and both Mrs. Ryans and Mr. Jefferson recognize the benefits students gain from always-on and connected technology.

**Analysis of Teachers Understanding of Student Capabilities and Technology**

**Influence**

Middle school grade levels are foundational pathways for student development and critical to subsequent stages of education (Maryland Middle School Steering Committee, 2008; National Middle School Association, 2010). As such, the pedagogies used by teachers to educate students at this level and in this research setting are constructed to strengthen critical thinking skills, learn from rich and varied resources, as well as develop social abilities (National Middle School Association, 2010). This assertion was affirmed from several of the teacher participants as they expressed their feelings related to students’ capabilities in the connected middle school and how the intersection of technology and education effect and influence behaviors. Not only are the students’ learning from a non-traditional STEM model, but they are also immersed with always-on and connected technology of which both parents and the school provides them. For example, students at this grade level have never known a world disconnected from a
24/7 internet connection, peer-to-peer communication via mobile technology, and online social media (JWT, 2012; Palfrey & Gasser, 2008; Rideout, 2012). Also, as mentioned in the literature, they are not restricted to a stationary home or school desktop computer, because their technology is carried around in their pocket, always-on and connected, and capable of accessing a diverse selection of content through the internet (Brotheim, 2014; Madden et al., 2013).

**Teacher concerns for underdeveloped skills.**

While a utopian state of teaching and learning remains ahead of us, a noticeable concern dwells within the present that ties to connected technology dependencies. From several participant expressions, it was revealed that frequent use of always-on and connected devices such as laptops, smartphones, and tablets have negatively influenced some students social, problem solving, and writing skills. All competencies that if not addressed properly, could likely disrupt future development. For example, Bauerlein (2009) was adamant about adolescents’ skill deficits and abilities for being productive informed citizens. He even attributed some deficits to youths’ frequent immersion in mobile device screen-time by asserting that long hours of multi-tasking with text, visuals, and other digital media on a mobile device doesn’t transfer well to their off-screen interaction (Bauerlein, 2009). Greenfield (2015) also highlighted some of the characteristics related to digital technology use, such as screen addiction and how the mind changes over time as a result of digital interaction. In a similar manner, Carr (2011) contended that continuous internet use conditions the brain to always want to connect to this medium and makes it difficult to concentrate on outside things, thus altering the
attention span. Computing devices and the internet puts information at your fingertips, which is beneficial in many instances, but seems to have presented challenges in the classroom for some teachers in this middle school setting.

Even know the research participants were advocates of technology integration in teaching and learning, their consciousness to skill deficits gained from frequent texting, social network interaction, and internet dependency is awakened every day through student conversations and assignment submission. Sensitivities to human interaction and skill deficiencies do not go unnoticed. They become repeated lessons that teachers’ have to patiently lead students through to assure they have competencies beyond their personal connected technologies. For example, during our interview Mrs. Patton shared, “I am having to teach social skills. To be in sixth grade and not be able to have an intelligent conversation with somebody is a skill that is totally not in their skillset anymore.” It was apparently frustrating for her to experience this with students at this level. Especially when noticing students engaging more on their devices, than with individuals. Teachers experienced several instances of student inability to convey their thoughts properly or even have an intelligent face-to-face conversation beyond the always-on and connected technology. Though, they are very active when communicating with a friend via a Chromebook instant message, iPod chat, or text on a smartphone. This happens frequently rather at home or, in this instance, the WIFI connected school that enables usage of personal technology and also supplies it.

Generally and somewhat through policy, the school reserves interaction with always-on and connected technology for education purposes only, but as the teachers
discussed, monitoring student activity 100% of the time has it’s difficulties. Especially since the students’ in this middle school have come through the ranks from birth to present being natives to screen technology. Therefore, interaction with a connected device will happen. The normal habits and digital tools used by this school-aged generation have been accepted. As a result, human interaction, whenever possible, is secondary because it’s not as engaging as what can be done on a device (Bauerlein, 2009).

**Deficiencies influenced from technology.**

A discussion of researching, writing, and problem solving becomes a matter of fact, but not always accurate response from students, which for the teacher becomes another re-teachable moment, attributed to always-on and connected technology. Since the internet generates an abyss of information that may not always be accurate and students’ have access to devices that will give them this information right now, plagiarism, misspelling, and deficient thinking is prevalent at times in class. Mrs. Patton expressed her frustrations, asserting,

I just sat and graded last night and how many kids turned in, basically garbage to me. Not capitalized, not periods. This is a second grade scale, I’m not re-teaching it to you. You know how to do this. Use your skills you have. I think that’s the piece that is the struggle for them.

As such, it was mentioned that the always-on and connected technology often serves as a crutch, conditioning students’ to the information immediacy from the device in their hands, or in front of them on their desk. In reference to this, Ms. Long argued,
I think it is amazing that students can get questions answered and research anything they want in only a few seconds. However, I have noticed this is hindering students' commonsense, and creates a mentality to immediately want to know how to do something without understanding how or why it works.

Also, while these tools have potential to support learning, the teachers do not want students to rely on the technology to be the problem solver. Mr. Brooks asserted this by stating, “You need students that are going to be forming their own answers and own opinions on things and not just taking the black and white from Google or Bing”. To combat this, the teachers revisit routine exercises of digging deeper beyond what is found on a random web page or video, in an attempt to build critical thinking skills and a broader knowledge base. Then helping students understand the right way to form sentences, sound out words, or solve problems without plagiarizing or over-usage of Google. It becomes a game of leveling the playing field and not allowing the technology be the leader, but more of a vessel from which the right information can be found and analyzed for credibility.

Concerns regarding a ‘free agent’ learning path.

The attitudes related to the students capabilities for being free agent, or self-directed learners by means of their always-on and connected technology was considered to be more of a utopian idea at this level of education by the teachers. The majority of teacher participants felt that at this particular age only a small percentage of their middle school students would be able to do this successfully with no assistance from an adult or facilitator. For instance, Ms. Long expressed her feeling as, “I think about 10% of middle
school students could actually accomplish that effectively. They are self-motivated. They have a hunger and passion to learn. They want to figure out everything”. Others voiced concerns about the students’ current skill sets. Mrs. Patton noted,

I don’t think they have the skillset yet. If you want your kid to be an online learner I think that’s good for some students. I have three children and for one of my children it would have been the most phenomenal learning environment ever. For my other two children it would have made them so narrow minded and so focused and it wouldn’t have given them the skillsets to know how to go beyond their own learning.

Mrs. Macy mirrored this contention as she stated, “At this age level I would say that it is developing. It’s not impossible, but it’s certainly not at a mastery level for them to be self-guided completely at this young age were their adolescents is.” Consequently the teachers have reservations when it comes to their students’ abilities to take the free agent route.

As the literature review pointed out, the free-agent learner takes a self-directed approach in developing their knowledge by means of their technology and a broad array of accessible online content (Project Tomorrow, 2010). For instance, interactive media sites such as YouTube, Khan Academy, and Twitter (Saxena, 2013). In this manner the students decide what they want to learn, how, and when. However, the participants reflected upon how easy their students may become distracted by their device at this age. Particularly, since these activities frequently have to be monitored in class during lectures and activities. Mrs. Macy assertion of, “Hormonally I think there are way too many
distractions to be completely self-guided. That’s just my personal opinion as seeing
children of this age.” This implies that students’ aren’t mature enough to handle what
would be required of free-agent learning. She also reflected upon the distracting nature of
the internet and cell phone technology stating, “I think at this point yes, it should be
facilitated by a teacher. Only because of the distractions that the internet provides on cell
phones and that their device provides. There has to be some kind of monitoring”. As such
the idea of teacher facilitation or monitoring arouse through discussion, which somewhat
dismisses the purpose or intent of the free-agent learner. However, other teachers
mirrored this same idea of monitoring. Mr. Smith, a technology teacher argues that,
“There should be someone that they are following that knows more, At least someone to
tell then when they are wrong”. Similarly, Ms. Long asserted, “I think there should be
checkpoints just to make sure that they are staying on track. Uh, and obviously if they are
staying on track, the less check points they need”. There arguments reinforce the
contention that their middle school students’ skills and maturity are still developing and
maybe only a small percentage of them are ready for free agent learning. At this age, core
ideas are still being formed by students that will lead to further knowledge and
understanding of learning components, but guidance on how to navigate through
information is still needed. Even the voice that trusts their middle school students’
abilities find their own learning paths, concede that preliminary planning must take place
for successful and productive self-direction. For instance, Mr. Brooks stated,

Yes, children, students, they have the ability. They’ll surprise you every time. But
you have to take great care to scaffold that type of understanding. If you just
throw it at them, you are going to be running into a brick wall. But if you carefully guide them, they definitely can pick up on those things.

Through his argument, there is an optimistic feeling that students at the middle school level can handle a free agent path to learning, but he still concedes and recognizes that planning and direction from a teacher is necessary. This particular school-aged generation have a common comfort level with technology and have been exposed to it their entire life (McCrindle’s, 2013), but using it properly for research and collaboration will require teacher assistance.

**Summary**

Always-on and connected technology affords an immeasurable benefit to this middle school learning environment when implemented properly. The teachers in this school are advocates of technology use and have experienced the successes and challenges resulting from the open-networked environment and student frequent use of connected technologies. While frequent, non-restricted use of technology can lead to distractions in the class and potential skill deficiencies, setting barriers for student use and collaborating with peers on best practices could yield successful learning opportunities.

There are minimal things that a teacher can do with student devices that have functionality of onboard spellcheck, or the internet with information well beyond what can be taught in a lifetime. Nonetheless, without complaints, the teachers make the effort to adjust to what has become normal to the digital-age middle schooler and push to re-align social skills and always-on and connected problem solving habits. The name
Google was mentioned several times from each interviewee, so it is no question that teachers are aware of what they are up against. However, they remain determined to level the technology playing field, as well as continue their pursuit to teach the right competencies to their students. Mrs. Patton added,

I feel it is important that students become aware that they must live in the "here and now" even though they are "always-on." Technology is a tool we use to live, not life itself-although for many of my students that line can blur. I try to help instill the idea that face to face contact still has value in this on-line world, as face-to-face makes you a better communicator in the on-line world.

The administrators are also on board to support teacher success and enable some flexibility in how they use technology in the class. Mr. Jefferson, who is one of the administrators stated, “We’re not going to say you have to stick to this policy just as it is stated. Their classroom has to be their domain and they have to feel like they have control over what’s going on in there”. Mr. Jefferson is also an advocate for technology use, but still wants to make sure teachers and students are using it the right way. His views of technology in the always-on and connected environment can be summed up as, “being a STEM school, we want to integrate technology, but we just want to be responsible” and “The main thing I would say is just to make the teachers understand, it’s there to supplement the instruction, but not to be the instruction”.

**Implications for Future Research**

The study explored the lived experiences of teachers’ educating students in an always-on and connected middle school setting, as well as the approach to managing the
environment when students have access to always on and connected personal technology. The researcher also explored their attitudes surrounding the middle school’s technology policies. Future research could widen the views into the comparisons between 1:1 technology plans and BYOD initiatives in middle schools. Since the findings related to student frequent use of always-on and connected technology revealed negative influences to social skills and learning behaviors, it would be beneficial to broaden the research to include several cases through multi-site research to explore similarities of behaviors when students are permitted to use always-on and connected technology throughout the day. This could be explored qualitatively and inclusive of more teacher participants.
References

A lesson in staying ahead of the curve: How a Wilmington, Delaware high school leveraged BYOD in arming its students for the future. (2014). *Inc.*, 2, 70.


Ash, K. (2013). Stem schools put high priority on digital skills. Programs build partnerships to provide the kinds of high-tech skills students need for college and careers. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/2013/05/22/32el-stemprep.h32.html


*Literacy Learning: the Middle Years, 21*(3), 49-60.


http://www.nap.edu/catalog.php?record_id=11463


Northeastern News. (2014). *Generation z is entrepreneurial, wants to chart its own future*. Northeastern University research study. Retrieved from:  


http://www.pcmag.com/encyclopedia/term/54444/wi-fi


http://www.edtecmagazine.com/k12/article/2013/06/more-school-districts-end-ban-cell-phones-and-embrace-byod

http://gettingsmart.com/2012/12/meet-generation-z/

http://www.educause.edu/forum/ffpiu01w.asp


Terrell, J. (2015). Class around the clock: a 24/7 learning model that's personalized and partly controlled by students will become more entrenched. *District Administration, (1)*, 56.


Appendix A. Preliminary Survey

1. What student grade level do you currently teach within the middle school environment?
   ○ 5
   ○ 6
   ○ 7
   ○ 8
   ○ Multiple Grade Levels within the facility

2. How many years have you been teaching in a K-12 middle school environment?
   ○ 1-2 years
   ○ 4-7
   ○ 8-11
   ○ 12-15
   ○ 16-19
   ○ 20-23
   ○ 24-27
   ○ 28 or more years

3. What content area do you teach in? (match, science, language arts, social studies, etc.)

4. Have you attended professional development opportunities in the school to learn how to use technology for teaching and learning?
   ○ Yes
   ○ No
5. During class, I allow my students to use their own personal mobile technology to

<table>
<thead>
<tr>
<th>Activity</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research topics related to the class activity</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Collaborate with other students on assignments</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Listen to music and play games during class</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Download and use educational applications</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Complete personal assignments</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Contact outside experts in the field being studied</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Write in blogs</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
6. I leverage the capabilities of student personal mobile technology and the BYOD environment to

<table>
<thead>
<tr>
<th>Activity</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage students in lab and other classroom activities</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Encourage student interaction</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Create digital learning experiences</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Entertain students</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

7. I am comfortable with integrating mobile technologies such as smartphones, tablets, and iPods into my middle school classroom activities.
○ Strongly Disagree
○ Disagree
○ Neither Agree nor Disagree
○ Agree
○ Strongly Agree

8. I support the schools BYOD policy and students' use of personal mobile technologies in the middle school classroom.
○ Strongly Disagree
○ Disagree
○ Neither Agree nor Disagree
○ Agree
○ Strongly Agree

9. What are some of the big differences, if any, that you have noticed when teaching in a BYOD environment versus teaching in a school that restricts students from bringing in and using their own personal mobile technology such as a cell phone, Tablet, iPods, etc...? Please describe.
10. What percentage of students in your class would you say bring and use their own personal mobile technology to class?

11. What are your feelings related to managing student use of personal mobile technology in a middle school classroom? Please share your thoughts.

12. Due to the always-on and connected nature of personal mobile technology, is there ever a concern for lack of teacher control when trying to get all students to focus without the potential interruption of technology? What concerns do you have if any?

13. What acceptable technology use rules do you employ in your classroom that goes beyond the school's BYOD policy?

14. Do you feel that the additional restrictions that you impose on students, changes the dynamics of how they engage with your course activities? Explain why.

15. What software or tools on the devices do you most often use or have students use in the BYOD classroom for instruction?

16. What are your feelings regarding middle school students frequent use of personal always-on and connected mobile technology, either in a formal education or informal context?

17. Do you feel that a student’s frequent use of always-on and connected mobile technology hinders or contributes to their overall development? Please explain your thoughts from either perspective.

18. Are middle school students capable of being self-directed learners with the support of their personal mobile technology and the internet? Briefly explain you thoughts.

19. If you are willing to participate in an interview, please put your name and email address in the box below:

20. If you wish to receive a copy of the outcomes of this survey, please put your email in the box below: (Your name will not be shown in the results output).
**Appendix B. Semi-Structured Teacher Interview Questions**

**Teacher Use of Technology/General Demographic Information**

**Demographics:**

1. How many years have you been teaching within a K-12 classroom?
2. How many years have you been teaching within this particular school district?
3. What subject or subjects are you currently teaching?
4. What student grade-level do you currently teach?
5. Is this your only experience teaching within a BYOD setting?

**Personal use of mobile technology:**

1. Do you typically bring and use a personal mobile device to your classroom?
2. What type of classroom activities do you leverage student personal mobile technology for?
3. How are your own personal mobile devices used during the day?
4. What mobile applications, if any do you use on a normal basis?
5. Have you attended any professional development sessions that assists your planning with personal mobile technology? If so, which types of activities did you engage in? How useful was it for the development of class content and self?
6. What types of classroom activities do you leverage student personal mobile technology for?
7. What are the technical tools and applications that you currently use on a daily basis for class activities?
### Lived Experiences of Teachers’ in a Connected ‘bring your own device’ (BYOD) middle school environment?

1. What are some of the big differences, if any, that you have noticed in teaching in an open technology BYOD environment versus a school that restricts students bringing and using personal technology?

2. What percentage of students in your class would you say bring and use their own personal mobile technology to class? What are your feelings related to managing their use of always-on and connected activity?

3. How would you describe the learning environment when all students are using their devices at once? Do you consider it to be a distraction to the learning environment? What are your thought about this?

4. Can you describe your teaching style and/or strategy used within an environment like this one where students have a constant access to always-on and connected personal technology?

5. How do you manage the classroom environment, knowing that students have access to personal internet-enabled technology?

6. What is your approach to confronting differing opinions as it relates to your lecture content and the real-time web information that a student may access from their personal device?
7. How do you control academic dishonesty with students that have personal connected technology in your class?

8. Describe the complexities exist in an open BYOD environment with always-on and connected student technology.

9. What personal student acceptable technology use rules do you employ in the classroom that goes beyond what is stated in the schools BYOD policy? Do you feel that the additional restrictions that you impose on students, changes the dynamics of how they engage with your course activities? Explain why.

10. Due to the always connected nature of personal mobile technology, is there ever a concern for lack of teacher control when trying to get all students to focus without the potential interruption of technology? What concerns exist if any?

11. What strategies do you use in the class to direct students’ attention from their personal mobile technology and toward your instruction? Do teacher and student roles ever change when student technology is present?

12. What are your overall feelings regarding the usefulness and necessity of a facility wide BYOD policy in a middle school environment?

What are teachers’ attitude regarding middle school students’ capabilities for being self-directed, Free Agent Learners’ by means of their personal connected mobile technology?

Personal mobile technology and intellectual abilities:
1. What are your feelings regarding middle school students’ frequent use of personal always-on and connected mobile technology, either in a formal education or informal context?

2. How do you believe the current BYOD environment in which you work contributes to students’ intellectual capabilities? Do you feel students’ personal mobile technologies are a critical component in developing these capabilities? Explain your thoughts.

3. Do you believe that using personal connected devices for research conditions students to seeking fast, but not always accurate information? What approach do you use to assuring that students use the most accurate information researched from the web? What type of response do you get from the students?

4. Do you believe that the modern school-aged generation are too dependent upon their personal technology and the internet? Can you expound further in regards to this?

5. Several studies have revealed that youth often have a sense of uneasiness when they don’t have their mobile devices, or if they are restricted from using them at certain times. How do you feel this could affect students’ of a middle school age?

6. There have been arguments that once someone becomes acclimated to the multi-tasking nature of a screen device, this becomes the preferred method for interacting with content. What are some of the behaviors that you have noticed from students when interacting with personal technology in the class? Do students prefer digital content vs. print? Please explain what you have experienced.

7. It is argued that modern school-aged students want to be self-directed ‘free agent’ learners, where they find topics of interest as well as self-assessments and learning activities online to develop themselves. What are your thoughts on middle school age students’ ability to engage in this type of ‘free agent’ learner activity? What are your
thoughts regarding students’ cognitive ability to construct their own learning at this age level?

8. Do you believe that this type of activity should always be facilitated by a teacher or adult? What are your thoughts on the teacher’s role when students’ are free to explore knowledge on their own?

9. How do you think students’ should use personal mobile technology in school?

10. How does the current administration in which you are under collaborate on mobile learning ideas with teachers prior to implementation? Are you just expected to conform to whatever is handed down? How does this make you feel as an educator?
## Administrator Interview Questions

### Administrator technology beliefs

<table>
<thead>
<tr>
<th>Demographics:</th>
</tr>
</thead>
</table>
| 1. What is your typical strategy for managing the digital connected environment?  
2. What are some of the technologies that you use within the school on a daily basis and what is your strategy for promoting technology use in teaching and learning?  
3. What are some of the benefits related to enabling students to bring personal mobile devices to the school setting?  
4. What would you say the biggest challenges are when teacher-led classroom instruction intersects with personal student technology use?  
5. How do the teachers within this environment perceive student use of personal technology?  
6. What types of technology development programs are offered for teachers and have you experience any resistance to technology use?  
7. Can you describe the safety filters that are put in place to prevent students from visiting certain internet sites? How do the students respond to this? What about the parents?  
8. How receptive are students’ parents to the connected nature of this environment? For example, students bringing in mobile devices and connecting to the web?  
9. What are some of the behaviors that you notice when students are interacting |
10. What are some of the common behaviors that you notice when teachers and students are interacting with personal devices in the classroom?

11. Are there any challenges related to the technology infrastructure that causes inconveniences to learning?

12. What are the collaboration opportunities that exist between teachers and administrators? For example, are you receptive to teachers’ ideas? Do teachers have any control in adjusting technology acceptable use policies for their classes?
Follow-up Teacher Survey

1. What influences, if any, has the "always-on and connected" learning environment in which you teach had on your philosophy of the future students and middle school education? Briefly explain your thought.

2. When reflecting upon your daily teaching experiences, what, if any, are the primary benefits gained by the teacher when students use always-on an connected mobile technologies such as laptops, smartphones, and tablets? Briefly explain your thoughts.

3. How has this affected your approach to giving quizzes or standardized exams? Briefly explain.

4. How would your teaching strategy change if the students in your class did not have access to always-on and connected technology, such as laptops, smartphones, and tablets? Briefly explain your thoughts.

5. If you could change one thing about the always-on and connected environment in which you teach, what would it be? Briefly explain your thoughts.

6. Please add your first and last initials here. This will only be seen by the researcher and used as an identifier. Thanks.
Appendix E. Interview Consent

Ohio University Adult Consent Form with Signature

Title of Research: The New Normal: Lived Experiences of Teachers’ Educating Students in an Always-on and Connected Middle School Environment
Researcher: Alexander Murray

You are being asked to participate in research. For you to be able to decide whether you want to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to sign it. This will allow your participation in this study. You should receive a copy of this document to take with you.

Explanation of Study

This study is advanced to explore the lived experiences of teachers’ who are educating students’ that are permitted to use personal mobile technology within the context of a bring your own device (BYOD) middle school environment. Many schools across the country have incorporated BYOD and 1:1 technology programs in teaching and learning. As a result students are permitted to bring and use personal mobile technology to class. Personal mobile technologies such as smartphones, tablets, and iPods continue to exist in the lives of youth as normal tools that are carried and used everywhere to access content from the internet for both learning and entertainment. The researcher intends to gain an understanding from the teacher’s knowledge and their experiences of engaging with students in the classroom who sometimes bring and use personal mobile devices to the middle school setting.

If you agree to participate, you will be asked to complete an individual interview that may help the researcher understand teachers’ feelings toward personal mobile technology use in the middle school environment; the potential influence on student development; and attitudes related to BYOD policy. Anonymity will be a high priority during the individual interview, but the researcher does intend to reinforce data collection with an audio recording of the interview.

The interview is completely voluntary and will last one hour. The participant will not be required to provide a name identifier and the researcher will use pseudonyms to identify the data.

Risks and Discomforts
No risks or discomforts are anticipated
**Benefits**

It is anticipated that this research will add to the literature surrounding teachers’ experiences and perceptions of student personal technology use in connected BYOD K-12 schools, as well as the attitudes and feelings associated with BYOD policies and technology reform in middle schools. It is also hoped that the findings will inform the K-12 education community of the benefits and challenges associated incorporating personal student technology in teaching and learning and the perceived influence on student development.

**Confidentiality and Records**

Your study information will be used for research purposes. Audio recordings will be kept confidential by the researcher and will be password protect on an external hard drive. Some direct quotes may be used, but the names of the participants will not be shared. The recorded data and interview notes will be destroyed by November, 2017.

Additionally, while every effort will be made to keep your study-related information confidential, there may be circumstances where this information must be shared with:

* Federal agencies, for example the Office of Human Research Protections, whose responsibility is to protect human subjects in research;
* Representatives of Ohio University (OU), including the Institutional Review Board, a committee that oversees the research at OU;

**Contact Information**

If you have any questions regarding this study, please contact Alexander Murray am598006@ohio.edu.

If you have any questions regarding your rights as a research participant, please contact Dr. Chris Hayhow, Director of Research Compliance, Ohio University, (740)593-0664 or hayhow@ohio.edu. By signing below, you are agreeing that:

you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions and have them answered;
you have been informed of potential risks and they have been explained to your satisfaction;
you understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study;
you are 18 years of age or older;
your participation in this research is completely voluntary;
you may leave the study at any time; if you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.
Signature________________________ Date____________________

Printed Name__________________________________________
Appendix F. Transcription Sample

Teacher Use of Technology/General Demographic Information: Mrs. Macy

Demographics:

1. How many years have you been teaching within a K-12 classroom? 1
2. How many years have you been teaching within this particular school district? 1
3. What subject or subjects are you currently teaching? Humanities-Social Studies
4. What student grade-level do you currently teach? 7th
5. Is this your only experience teaching within a BYOD setting? Yes.

Personal use of mobile technology:

8. Do you typically bring and use a personal mobile device to your classroom?
   Yes, I have my Macbook and cell phone everyday.

9. How are your own personal mobile devices used during the day?
   I don’t use mine in the room, because it can be a distraction. But if one of the kid’s individual Chromebooks go down, I’ll let them use my computer. And if they don’t have a phone, because some of them don’t use smartphones.

10. What mobile applications, if any do you use on a normal basis?
    For my personal use, I use the social media sites and a lot of banking. Education wise I use Google Docs and Google Classroom.

   So, what do you do with Google Classroom?
   I actually use Google Classroom as my class site. So because we are the technology school, we are influenced to not use as many prints. We actually have a print limit, which is 1500 and I have 150 kids, so if I wanted to do a worksheet I can really only do that 10 times during the entire semester. So it really limits me for that. So instead
what I’ll do is create a Google Doc and put it on Google Classroom. The kids have their own Google classroom, so each of my periods have their own webpage. I’ll post it on their and they can open it from their Chromebooks, type it into their Chromebook and then submit it into that file in Google Classroom. So, it’s all electronic and it goes into a nice file instead of emailing 150 papers to me. It’s pretty nice when you get to use it.

11. Have you attended any professional development sessions that assists your planning with personal mobile technology? If so, which types of activities did you engage in? How useful was it for the development of class content and self?

Yeah, we actually haven’t had too many opportunities. One new one to me is the Engrade system and that is used here. We can create assessments and link them to our standards and right away get immediate feedback. It kind of places the students, based on the standard in a green, yellow area. So it gives immediate feedback of the kid is red all across the board and they’re not getting any of what I am saying. Or it lets me know that in this particular question that I created, 90% of the class got it wrong and either I did something wrong and its not really the kids. So it’s actually a really good site that we did learn about in my district training. So I got it from Reynoldsburg and it’s a Reynoldsburg program, it seems like.

Teacher/Student Tech Interaction

1. What type of classroom activities do you leverage student personal mobile technology for?

Chromebooks are used daily in my room. We do daily writing, so they are writing in a Google Doc based on a language art standard with social studies content. So they are
addressing context clues. Right now we are doing, using commas correctly in a sentence, but its based on social studies content. So I’m integrating ancient Greece in comma work, so they have to fill in the blank with a social studies vocab word, as well as put in commas. So that’s the daily writing and they are using Google Docs for that and then they submit it to me every two weeks. Google Classroom is used quite frequently the way I described. They can do any type of assignment on there. I post announcements, I post homework and then they use it for a lot of research based programs as well. The kids use their Google Drive for everything. It’s kind of like their own version of a Windows folder. But a lot of research based, because we are focused on inquiry. So, them finding the answers on their own instead of me showing them a Powerpoint and giving them the answers. Its me asking them the questions and them researching them. 

Phones to. For me the phones are a positive, but the phones are a secondary in my room. And I think most teachers, this year especially have used it as a secondary. If Chromebooks go down, then we’ll move to phones.

2. What are the technical tools and applications that you currently use on a daily basis for class activities? Mentioned above

Lived Experiences of Teachers’ in a Connected ‘bring your own device’ (BYOD) middle school environment?

13. What are some of the big differences, if any, that you have noticed in teaching in an open technology environment versus a school that restricts students bringing and using personal technology?
I actually see that when we have them with their own devices, specifically cell phones, I think they are a little more distracted with cell phones. Because I think in previous years they’ve been a little more available because the Chromebooks are still new to them and my understanding is that they just got them last year. So they don’t know that they can go to their Chromebook first for the answers. They want to use their phones, which I think they did a couple years ago before the Chromebooks. So when they use the phones, it’s hard for me to monitor thirty kids in one room to make sure they are on Google and researching rather than Instagram and Twitter. A one to thirty ratio does not work well with social media.

So I would say with phones, there is more distractions. But as far as the Chromebooks, the amount of learning that can take place in a room, as compared to a setting that does not allow personal devices. Its enormous what they can do with these Chromebooks. I can create inquiry based lessons where I’m not showing them a Powerpoint because they have the accessibility to find the answers on their own and be driven to find the answers. And I think that’s something that a lot of people don’t get to experience, a lot of teachers because they’re use to, not necessarily lecturing, but providing them the material and them learning it rather than them finding it their self. And learning it on their own.

14. What percentage of students in your class would you say bring and use their own personal mobile technology to class? What are your feelings related to managing their use of always-on and connected activity?

With the Chromebooks, 95% because 5% have lost them already. I’ve had 5 to 7 students that have lost it in the first week. And they don’t go home with them, so they
have lost them in the school. Yes.

What about cell phones?

I would say at least 70-80% between tablets and phones. There are a few kids that have told me, I don’t have phones. But it couldn’t be more than 10% per class.

15. How would you describe the learning environment when all students are using their devices at once? Do you consider it to be a distraction to the learning environment? What are your thought about this?

It was a distraction when they were first getting used to their authority figure I think. It was almost a transition period, moving from summer and a new teacher, into what my expectations were. The games were very frequent at first and Google image search. Things they weren’t supposed to be doing. It’s very rare now that I would tell them to use their Chromebooks for an assignment and I see a game. Because they know the expectation and they know the repercussions of that. So I would say the environment now if very different than it would have been week 2 or 3. So it’s very productive now that they are aware of the expectations. It’s really productive.

16. Can you describe your teaching style and/or strategy used within an environment like this one where students have a constant access to always-on and connected personal technology?

I have done a complete 180 in my teaching style. I have never been in an environment with so much access to technology, inquiry-based thinking, and standards-based grading. This environment is completely new to most educators, I would say and even veteran teachers. So it’s completely changed my philosophy of education. I have
learned more, probably in the past six weeks than I have learned in my entire four years of being educated on education. I just think the opportunities they have to learn this inquiry-based, they will have more opportunities in the long run, then reading from a textbook. While sometimes I do wish I had the textbook, but with the computers, and with them doing the research on their own and coming up with things that maybe I probably would not have thought to teach them. So it's really changed the way I think.

So how do you manage that, to make sure they are on tasks?

So, most adults have this perception that a teacher just sits at their desk and hands out a piece of paper. No, I'm constantly walking around the room, making sure they are on a Google Doc and that they are in Google Classroom. Things like that. I'm lucky to have par-a-pro for one of my periods, there is two of us with a 2 to 30 ratio instead. In addition, especially for Google Classroom I can pull it up on my smartboard here and it tells me 2 of 30 are done and they have turned it in. Then it actually updates as they submit it and I can say, ok I am waiting on X, Y, and Z to turn in this project. What are you doing that you shouldn’t be doing?

So the Google Classroom gives you that interaction?

Yes, you can do it with discussion posts. You can do it with things they are turning in. As we did a discussion post question the other day they had a topic and they had to free-write on it for 2-3 minutes. We went through everybody’s and you could see it as they were submitting them. You could scroll through them and it had their name to it. So there are a lot of features and different applications that we use to make sure they’re on top of it.

17. How do you manage the classroom environment, knowing that students have access to personal internet-enabled technology?
**Expanded in above question.**

18. What is your approach to confronting differing opinions as it relates to your lecture content and the real-time web information that a student may access from their personal device?

I haven’t run into any parent conflict or anything like that. With the new teachers here, we are very much about technology. If anything it is a conflict with myself to change my mindset. I grew up in a school where it was paper, pencil, and textbook. I went to a college where it was like that. Even getting hired in I wasn’t aware of the full expectation and it just completely changed the way I think. So if there’s any conflict it’s in changing my pedagogy completely.

Have you ever run into any differing opinions from the students?

Yes, I have gotten that and we have had to steer them away from Wikipedia and things like that so they are really focused on primary and secondary sources and what's valuable and determining valuable information and what correct. I’ve actually not run into many situations where they said, you told me this but I found this. They have found more information than I have sometimes, so they’re saying look what I learned rather than what you just taught me. So they are actually coming with more, but I haven’t had any situation where they say you told me this and this says this. Luckily for me.

19. How do you control academic dishonesty with students that have personal connected technology in your class?
We have run into that. What students are doing in some cases is copying and pasting from the internet and saying that was their journal. We have had to address, essentially one morning in an assignment, when I could tell you didn’t write this because I never taught you that and those are facts I couldn’t have even pulled out from social studies. I mean it was exact birth dates and death dates of insignificant characters from social studies. I said I don’t even know that. There’s no way that you learned that from me. So we’ve have to address what is appropriate, how do you paraphrase, how do you reword into your own thoughts, and not pulling a direct definition. We even did that with one of our Google Classrooms, it was the definition of philosophy and what a philosopher does. Kids were copying and pasting and I said “no”, tell me what that means? They couldn’t tell me what it meant because they copied and pasted from Google. So we had to talk about, “well, its not really an authentic answer coming from your brain”. You can get an idea from that, but then you need to tell me in your own words and that’s the way you know you learned, when you can explain something yourself. I will say with that, there is a higher chance of academic dishonesty with the technology. Just doing it with pen and paper, you don’t have much to glance off of.

20. Describe the complexities that exist in an open BYOD environment with always-on and connected student technology.

21. What personal student acceptable technology use rules do you employ in the classroom that goes beyond what is stated in the schools BYOD policy? Do you feel that the additional restrictions that you impose on students, changes the dynamics of how they engage with your course activities? Explain why.
I always say Chromebook first, cell phone second. That’s my policy, so I shouldn’t see your cell phone. I shouldn’t see you using your cell phone unless your Chromebook goes down and you’ve let me know that your Chromebook is down, “can I please use my cell phone”. Just because I really do think at this age, especially, the social media is a huge distraction. So that’s one I do use. I think cell phones can be great, but at this age and especially with me being a new teacher I really have to monitor that really close. In addition, they do have a way to get around the games in the school building and they do use their computers inappropriately sometimes, so they get one warning and the second time the Chromebook is closed and you move on to paper and pencil. And that is like devastating to the children to have to use paper and pencil. So those are my two rules. Basically you get one warning.

Do you think any of those restrictions or rules you put in place change the dynamics of how they engage with your course activities?

I think with those rules in place they actually have some accountability for their own actions. So, I have only taken away one phone so far this year. They really do get it on that first warning. It really does show then, “Oh I really don’t want to use pen and paper”, so I better not do this again.

22. Due to the always connected nature of personal mobile technology, is there ever a concern for lack of teacher control when trying to get all students to focus without the potential interruption of technology? What concerns exist if any?

Yes, I would definitely say at the beginning of the year when getting use to the adult in charge, getting use to the rules and expectations. I think even the expectations may be
different in other rooms. There are always more strict teachers than others. I think that causes a concern for chaos or teacher control at the beginning, but once they have learned those rules, I don’t ever feel like the computer is a hindrance to my control. The computer or phone, I don’t feel like, at this point. Maybe at the beginning.

**So other teachers may have policies that are a little looser?**

Some maybe, whom have been in this building before me, would maybe say, “yes phones are allowed as a first resource”. Whereas in my room, they are a second resource.

23. What strategies do you use in the class to direct students’ attention from their personal mobile technology and toward your instruction? Do teacher and student roles ever change when student technology is present?

I use my 3-2-1. It’s my classroom management. So on 3 you heard me, 2, now you’re not talking, 1, now you’re listening. It’s my number one. Then I do, clap if you can hear my voice because that gets them physically involved. If you can hear my voice clap one time. If you can hear my voice clap two times. That one seems to really work lately, but I try not to clap because this wall isn’t sound proof, so it gets difficult for us to do anything because the kids next door will be distracted. But they generally are so use to it at this point for how long they have been doing the Chromebook and the bring your own device. They really just come right out of it. Also, I do have them close their Chromebook, when they are done with that activity so I know that they are not on the internet at all. They do have daily writing in the morning and it should take 5 minutes max to get them in and settled. The Chromebook goes down immediately as soon as you’re done writing so that I know that you’re done. I will say, I know your done writing when your Chromebook is closed. I know that we can move on to the next
activity when your computer is closed.

24. What are your overall feelings regarding the usefulness and necessity of a facility wide BYOD policy in a middle school environment?

I think it has enhanced learning, allowing them to have their own Chromebooks at all times. The only downfall I see is that there almost seems to be no accountability to that device. Parents weren’t really made to sign a waiver. At my student teaching school, the kids had an iPod from a grant, but the parents were to buy insurance and sign a waiver, or just sign the waiver. And so it the iPad was lost or stolen, the parent was responsible. At this school there doesn’t seem to be a waiver in place, which would be my suggestion for next year.

But I can’t explain what a benefit it is to not have to have them get out a piece of paper every 5 minutes and have to make copies of everything. It can just be in one nice neat area and the kids can access it faster than half the teachers in this building because they just know how to work these applications and they know exactly where to go before I even tell then. Because they know exactly where things would be in there brain.

So you do see the necessity of a BYOD policy?

Yes, I do after being in this type of environment.

**End of sample.**