Dissertations   **Theses & Dissertations**

8-4-2022

Effects of Excessive Student Technology Usage On Student Cognitive Engagement

Kristina Leah Loveland

Effects of Excessive Student Technology Usage

On Student Cognitive Engagement

by

Kristina Leah Loveland

August 4, 2022

A Dissertation submitted to the Education Faculty of Lindenwood University in

partial fulfillment of the requirements for the degree of
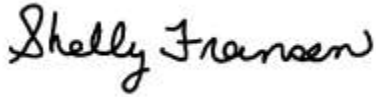
Doctor of Education

School of Education

Effects of Excessive Student Technology Usage

On Student Cognitive Engagement

by

Kristina Leah Loveland

This Dissertation has been approved as partial fulfillment

of the requirements for the degree of

Doctor of Education

Lindenwood University, School of Education

_____   8/04/2022_____
Dr. Shelly Fransen, Dissertation Chair   Date

_____   8/04/2022_____
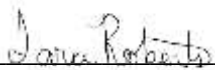Dr. Sherry DeVore, Committee Member   Date

_____   8/04/2022_____
Dr. Tara Roberts, Committee Member   Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

Full Legal Name: Your Full Name as it Appears in University Records

Signature: _____*Kristina Leah Loveland*_____ Date: _08-04-2022____

Abstract

Technology in the classroom has educators asking the question of whether technology engages students on a deep cognitive level or whether technology is holding students back. Educational technology has the potential to increase student engagement (Norris & Coutas, 2014). Wexler (2019) found technology is holding students back because they prefer the virtual setting to a real-world setting. The purpose of this mixed-methods research study was to determine if there is a connection between student cognitive engagement and excessive technology use. Developed by Antonetti and Stice (2018), the four components of Powerful Task Design were identified as the conceptual framework that guided this study. A target population of seventh and eighth-grade certified core teachers and seventh and eighth-grade students were selected from a middle school in southwest Missouri. The Pearson Product-Moment Correlation Coefficient (PPMC) analysis of students showed a correlation between excessive technology usage for middle school students and classroom engagement. Perceptions of seven certified core teachers showed excessive technology use does negatively impact student cognitive engagement and relationships with peers; however, educational technologies provide valuable ways to organize information, assess student work, and provide a way for students to stay connected to learning during absences. Implications of this study include completing an educational technology curriculum audit, introducing preventative measures for excessive technology usage, engaging students in extracurriculars, and implementing educational technology effectively and strategically within the classroom.

Table of Contents

List of Tables

List of Figures

Chapter One: Introduction

Computers have the potential to drastically improve productivity in education (Bond & Bedenlier, 2019; Patterson & Patterson, 2017; Raja & Nagasubramani, 2018). Patterson and Patterson (2017) and Raja and Nagasubramani (2018) reported computers enable students to engage with educational software, take better notes, complete tasks more quickly, stay more organized, and instantly access a broad range of learning resources. However, as the number of internet and computer-based distractions increases, so do concerns about student cyber-slacking and non-productive technology use (Patterson & Patterson, 2017; Raja & Nagasubramani, 2018; Wexler, 2019).

Chapter One includes the background of the study and the conceptual framework. Also included in Chapter One are the statement of the problem, the purpose of the study, and the research questions. The significance of the study and definitions of key terms are provided. Finally, the delimitations, limitations, and assumptions of the study are detailed.

Background of the Study

Norris and Coutas (2014) suggested the potential of education technology to improve student engagement has long been recognized; however, it is not merely a case of technology plus students equals engagement (Bond et al., 2020). Wexler (2019) determined classroom technology is holding students back in the United States. Firth et al. (2019) indicated students who are "disengaging from the real world in favor of virtual settings" may experience cognitive decline, and the internet may alter cognitive processes (p. 119).

According to Morris and Hobbs (2019), when their district became a one-to-one technology district, paper, pencils, and textbooks disappeared from classrooms; teaching apps and digital courses took the place of flashcards and notebooks; and despite the investment, academic results slipped. Wexler (2019) stated the "test score gap between students who use technology frequently and those who don't is largest among students from low-income families" (p. 4). The Organization for Economic Cooperation and Development (OECD) (2015) emphasized, "Technology is of little help in bridging the skills divide between advantaged and disadvantaged students" (p. 3).

According to Wexler (2019), "One suburban Baltimore County began abandoning textbooks and paper five years ago, with the goal of attaining a one-to-one ratio of devices to students" (p. 9). Wexler (2019) added, "Test scores have slipped, and parents are skeptical that the move to screens is helping kids learn" (p. 10). Horowitz-Kraus and Hutton (2018) discovered that for children aged eight to 12 years, more screen time and less reading time were associated with decreased brain connectivity between regions controlling word recognition and both language and cognitive control. These brain connections are considered important for reading comprehension, and researchers have suggested a negative impact of screen time on the developing brain (Small et al., 2020). Hutton et al. (2020) found increased screen time is directly related to the decreased integrity of white-matter pathways necessary for reading and language.

Firth et al. (2019) stated, "Education providers are beginning to perceive detrimental effects of the internet on children's attention, with over 85% of teachers endorsing the statement that today's digital technologies are creating an easily distracted generation" (p. 120). Bohle et al. (2019) examined neural and behavioral markers of

motor-cognitive dual-task performance in young and old adults and revealed the persistent multitasking characteristic of most technology users impairs cognitive performance. Ultimately, Gökbulut (2019) determined, "Improving students' sense of belonging to school can contribute to the reduction of feelings of rejection, as well as the prevention of technology addiction" (p. 294). According to Zhang et al. (2018), a positive sense of belonging to the school reduces stress on students and positively affects academic achievement (Adelabu, 2007; Anderson, 2001).

Conceptual Framework

The four components of Powerful Task Design, cognitive demand, connected learning, academic strategies, and engaging qualities, developed by Antonetti and Stice (2018) was the conceptual framework which guided this study. D'Angelo (2018) suggested that to strengthen student engagement and academic success, educators need to utilize technology within classroom curricula. Buckingham (2003) acknowledged technology shifts the learning environment to being more student-centered by giving students more autonomy and control over their learning and encourages the development of cognitive competencies and understanding. Furthermore, D'Angelo (2018) emphasized technology has led to significant increases in student learning and engagement and allows students the opportunity to keep up with ever-changing technology demands.

Sun et al. (2016) maintained when incorporating technology, educators must consider whether the features of technology are suited to meet task outcomes. When students realize technology can be engaging and beneficial to their learning, they are likely to apply that technology and use it to enhance their understanding of course content (Sun et al., 2016). According to Schindler et al. (2017), students believe technology can

facilitate a greater understanding of course content, which directly relates to academic achievement, learning outcomes, and better prepares them for technology in the workplace. Antonetti and Stice (2018) recognized when students have access to technology, educators must have a hands-on and minds-on approach, meaning there needs to be a clear purpose for the technology, and no distractions. If students' hands and eyes are physically engaged, their minds will be moving across the rigor divide into wondering, questions, discovering patterns, predicting, and more (Antonetti & Stice, 2018).

Specific educational technology examples shown to boost student engagement include social networking sites, web-conferencing software, blogs, wikis, digital games, TV game show-like templates, Socrative, Poll Everywhere, Kahoot, and Google Forms (D'Angelo, 2018; Schindler et al., 2017). Integrating the use of several technological applications allows students to participate in higher-order thinking, strengthen communication, engage in collaborative problem-solving activities and discussions, critically reflect on content, and expand digital competencies (Antonetti & Stice, 2018; Schindler et al., 2017).

Sun et al. (2016) shared some barriers to technology implementation within the classroom, such as the technical ability of students and teachers, lack of funding, feelings of isolation when learning, difficulty connecting with peers, distraction with other applications, and difficulty setting boundaries between class and personal life. With knowledgeable pedagogical strategies and accepting that cognitive engagement is when the learner makes meaning, instructors can overcome barriers, and use technology to enhance student engagement, success, and intellectual involvement (Antonetti & Stice,

2018; D'Angelo, 2018). The four concepts of Powerful Task Design guided development of the research questions by providing a connection between excessive technology usage and classroom engagement.

Statement of the Problem

The OECD (2015) determined the reality in schools lags considerably behind the promise of technology and where computers are used in the classroom; their impact on student performance is mixed at best. Wexler (2019) shared,

> A study of millions of high school students in the 36 member countries of the
> Organisation for Economic Co-operation and Development year found that those
> who used computers heavily at school do a lot worse in most learning outcomes,
> even after accounting for social background and student demographics. (p. 3)

Boninger et al. (2019) explained personalized learning programs are proliferating in schools across the United States; however, promoting the implementation of digital instructional materials does little to provide for oversight or accountability. According to Boninger et al. (2019), "Questionable educational assumptions embedded in influential programs, self-interested advocacy by the technology industry, serious threats to student privacy, and a lack of research support" are all challenges that come with digital instructional materials (p. 3).

The American Public Media (2019) published an audio podcast interview with Daniel T. Willingham, a University of Virginia professor of cognitive psychology. In the interview, Willingham suggested human touch was underestimated when technological solutions to learning were evaluated (American Public Media, 2019). Educational technologies have always been meant to support rather than replace human teachers

(Xiao, 2021). Willingham explained that educators are of the belief that if students are sitting in front of a screen, all they are doing is absorbing information (American Public Media, 2019). Dennen (2020) stated that as educators, the focus should always be to find out what people need first; second, to present content; and third, to use technology as support.

Relationships with teachers and peers make students care more about what others think, and in turn put forth more effort than just working in front of a computer (American Public Media, 2019). The OECD (2015) suggested, "Technology can amplify great teaching, but great technology cannot replace poor teaching" (p. 4). Wexler (2019) explained if technology is simply used as a delivery system, it zaps student motivation and drains the classroom community.

Purpose of the Study

The purpose of this study was to determine if there is a connection between excessive technology use and student cognitive engagement. Patterson and Patterson (2017) determined laptop use in the collegiate classroom hinders learning and results in poorer academic outcomes. However, Raja and Nagasubramani (2018) were inconclusive on the impact and stated, "Technology has a positive impact on education and at the same time may also pose negative effects" (p. S35). Gökbulut (2019) asserted, "Rapid increase in the use of technology and technological devices resulted in negative effects such as technology addiction as well as the excessive use of technology" (p. 282).

Technology addiction has numerous adverse effects, including negatively impacting the educational process (Gökbulut, 2019). The OECD (2015) stated excessive use of the internet by students can harm their academic achievement, health, and school-

based socialization. The use of technology in the classroom has transformed teaching and learning (Amin & Mirza, 2020).

Raymundo (2020) proposed technology has also changed the way students and teachers think, perform, interact, and process information. Churches (2010) updated Bloom's Taxonomy to include a digital taxonomy map with verbs that facilitate higher order thinking and learning. Antonetti and Stice (2018) suggested that to make a more powerful design for learning, educators must consider three elements of each task: engaging qualities, strategies, and cognition. This research may allow administrators and educators to review their current technology pedagogies and curriculum and identify areas of technology improvement to increase cognitive engagement for students both in and out of the classroom. For the purpose of this study, a certified core teacher refers to a teacher certified by the Missouri Department of Elementary and Secondary Education (MODESE) in one or more of the following subject areas, English language arts, math, science, or social studies.

Research Questions and Hypotheses

The following research questions and hypotheses guided the study:

1. What is the correlation between excessive technology usage for middle school students and classroom engagement?

H1$_o$: There is no correlation between excessive technology usage for middle school students and classroom engagement.

H1$_a$: There is a correlation between excessive technology usage for middle school students and classroom engagement.

2. What is the perception of middle school certified core teachers regarding the impact of excessive information and communication technology usage on student relationships with peers?

3. What are the perceptions of middle school certified core teachers regarding excessive use of information and communication technologies and how it affects student cognitive engagement?

Significance of the Study

This study is significant because the findings and conclusions may provide valuable insight to school district leaders as they seek to get the full value from technology tools available to classrooms. For school leaders to implement technology at a cognitively engaging level, they must dissect their curricular scope and sequence to include cognitively engaging and rigorous tasks that effectively incorporate technology (Antonetti & Stice, 2018). Bond and Bedenlier (2019) suggested:

> The more students are engaged and empowered within their learning community, the more likely it is that engagement will lead to a range of outcomes, and the more likely it is that this energy, effort and engagement will then feed back into activities and learning environment. (p. 7)

This research has practical application because the results may show students are spending excessive amounts of time on technology during and beyond the school day, which may not benefit student health or cognitive engagement in learning. Patterson and Patterson (2017) and Wexler (2019) determined computer use in the classroom hinders learning and results in poorer academic outcomes. According to Ravizza et al. (2017), students reported they engaged in texting, looked at Facebook, and browsed the internet

in class because they were bored. Raja and Nagasubramani (2018) noted a decline in student writing skills, an increase in the number of incidents of cheating, and a lack of student focus and concentration in both academics and extracurricular activities.

There appear to be inconsistencies in current research regarding the impact technology is having on students (Raja & Nagasubramani, 2018; Wexler, 2019). This study is important, because it may allow educators to determine if there is a connection between excessive technology use and student cognitive engagement. In addition, this study will provide current research on how excessive technology usage impacts cognitive engagement and relationships with peers. After reviewing the outcomes of this study, educators may improve their pedagogies to design a curriculum that is more cogitatively engaging due to decreased technology usage in the classroom.

Definition of Key Terms

For the purposes of this study, the following terms are defined:

Cognitive Engagement

According to Antonetti and Stice (2018), cognitive engagement is when the learner makes meaning, as opposed to engagement, which refers to when the work has meaning to the learner. Furthermore, cognitively engaged learners are able to explain tasks as they experience them (Antonetti & Stice, 2018).

Excessive Technology Usage

For the purpose of this study, excessive technology usage will be defined as more than two hours of recreational screen time a day. The American Heart Association (2018) recommended children and teens get no more than one to two hours of daily recreational

screen time, including TV, computer, or video games, this is far below the 11-hour average among teenagers today.

Information and Communication Technologies

Information and Communication Technologies (ICT) refers to the infrastructure and components that enable modern computing (Rouse et al., 2019).

Delimitations, Limitations, and Assumptions

The scope of the study was bounded by the following delimitations:

Time Frame

The collection of data occurred during the spring of 2022.

Location of the Study

The student survey location was during first-hour class and was proctored by the first-hour action class teacher. The teacher survey was web-based, while the teacher interviews were conducted via video conference.

Sample

Participants included a seventh or eighth-grade teacher or a seventh or eighth-grade student at the selected southwest Missouri school district. For the purpose of this study, a certified core teacher refers to an individual who is certified by the state of Missouri to teach seventh or eighth-grade math, science, social studies, or English language arts.

Criteria

Participants must have been either a seventh or eighth-grade certified core teacher or a seventh or eighth-grade student at the selected southwest Missouri school district.

The following limitations were identified in this study:

Sample Demographics

The student sample was a limitation because the study was focused on one selected school in a southwest Missouri school district.

Instrument

The researcher designed the Likert-type statements and the interview questions for this study. Validity was limited as a result.

The following assumptions were accepted:

1. The responses of the participants were offered honestly and willingly.

2. The sample was representative of the general population of educators who held teaching certificates from MODESE.

Summary

Chapter One included the background of the study. The four components of Powerful Task Design, cognitive demand, connected learning, academic strategies, and engaging qualities, developed by Antonetti and Stice (2018), were identified as the conceptual framework which guided the study. The statement of the problem was provided, and the purpose of the study and the research questions were specified. The significance of the study was included, and the definition of key terms was detailed. Finally, the delimitations, limitations, and assumptions were defined.

Chapter Two includes a thorough review of the conceptual framework through which the study was viewed. The review of current research includes the topics of classroom engagement, technology usage in the classroom, and student relationships with peers. Other topics include how technology usage affects student cognitive engagement and how the pandemic played a part in student technology usage.

Chapter Two: Review of Literature

The purpose of this study was to determine if there is a connection between excessive technology use and cognitive student engagement. The perception is technology strengthens learning outcomes; however, new technologies can be a distraction and can require a large learning curve for teachers and students, significant time, and cost to implement (Hamilton & Hattie, 2021). Wexler (2019) reported technology is frequently unhelpful for learning, because students have fewer interpersonal interactions, absorb less information, are more distracted, and are less motivated. Bedenlier et al. (2020) suggested technological difficulties, lack of technology skills, blended learning environments, lack of feedback, lack of one-on-one interaction with the teacher, and lack of useful home technologies can cause frustration and a decline in engagement. In addition, technology will not transform learning unless teaching methods change (Hamilton & Hattie, 2021).

Chapter Two includes a summary of the conceptual framework of this study. The review of literature includes topics related to the history of technology in the classroom, classroom engagement, how technology affects students' relationships with their peers, and cyberbullying. Additionally, an analysis of literature related to how excessive technology usage affects cognitive engagement and how the COVID-19 pandemic affected technology usage is detailed.

Conceptual Framework

The conceptual framework of this study was the four components of Powerful Task Design, cognitive demand, connected learning, academic strategies, and engaging qualities, developed by Antonetti and Stice (2018). Peters et al. (2018) explained the

more control students have over their learning, the more engaged students are within the

classroom environment. Developing a culture of student success, high expectations, and

technology investments allow schools to promote positive student engagement

(Almarghani & Mijatovic, 2017; Peters et al., 2018). Student choice in the classroom

about what technologies are used (Martin & Bolliger, 2018) can increase technology

confidence (Northey et al., 2017). Northey et al. (2017) explained using technology in

out-of-class activities can improve student engagement and buy-in. According to

Antonetti and Stice (2018), "A rigorous task is not a powerful task if the learners do not

want to do it" (p. 69).

      As shown in Figure 1, technology can lead to enhanced student engagement as

well as short- and long-term social and academic outcomes (Bond & Bedenlier, 2019).

Figure 1

Short- and Long-Term Academic and Social Outcomes
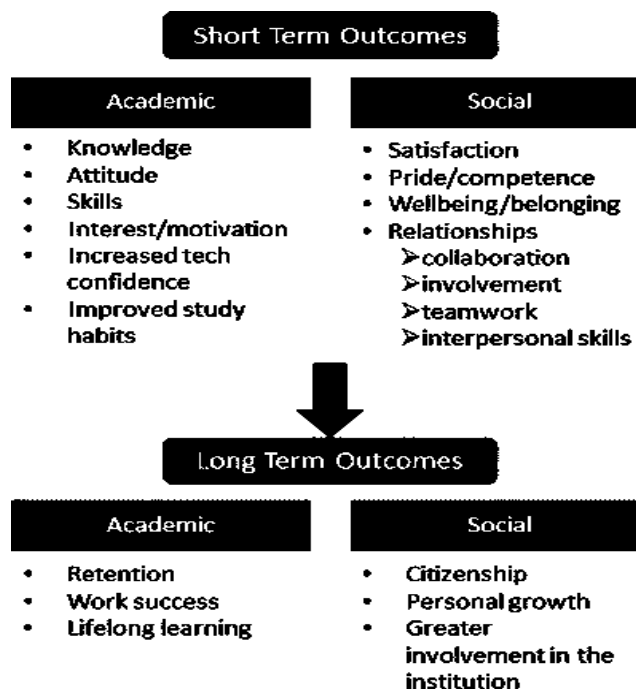
Note. This model shows the outcomes through using technology that boosts student engagement. From "Facilitating student engagement through educational technology: Towards a conceptual framework," by Bond, M., & Bedenlier, S. (2019). *Journal of Interactive Media in Education*, *2019*(1), p. 7. https://doi.org/10.5334/jime.528. Reprinted with permission.

Creating long-term outcomes results in creating life-long learners (Karabulut-Ilgu et al., 2017). Antonetti and Stice (2018) stated, "A quality task designer does not look at engagement in isolation; rather, she looks at all components of the task (engaging qualities, strategies, and cognition), because together they make a more powerful design for learning" (p. 71). Bond and Bedenlier (2019) suggested:

The more students are engaged and empowered within their learning community,

the more likely it is that engagement will lead to a range of outcomes, and the

more likely it is that this energy, effort and engagement will then feed back into

the activities and learning environment. (p. 7)

Martin and Bollinger (2018) stated when a student is engaged in the classroom, in-person or online, their satisfaction, motivation to learn, and performance increases and reduces their feeling of isolation. Technology can bring engaging qualities to a task through visual, physical, social, and cognitive interactions (Antonetti & Stice, 2018). A study by Calderon and Carlson (2019) showed elementary and secondary students say educational technologies are fun, help guide learning on their own, let them learn at their own pace, and make school and learning more interesting. Antonetti and Stice (2018) suggested "online content can provide a richness in visual experiences through websites, browsers, and search engine images" (p. 66). According to a review of educational technologies by Schindler et al. (2017), technology had a positive influence on multiple student engagement criteria, which in turn can increase learning outcomes. When students are physically engaged with a technology device through physical motions and activities, it can positively assist in the learning process (Antonetti & Stice, 2019).

Through a study on student engagement and educational technology, Bond et al. (2020) found the use of text-based tools, technologies with multiple modes of communicating, and knowledge sharing are the most effective tools to enhance student engagement. Antonetti and Stice (2019) stated, "Connected learners gain knowledge from multiple perspectives, and experience presentations through a variety of modalities, all of which require cognitive engagement to solve problems and interact with content" (p.66).

Digital technologies have encouraged learners and educators to increase self-dependence, self-direction, and to become goal-driven to improve performance (Bond & Bedenlier, 2019; Castañeda & Selwyn, 2018). Cognitive engagement occurs when learners control their depth of understanding; thrive in a technologically connected world through the complexity of a variety of modalities; and when they cross the rigor divide into deeper-level thinking, applying, analyzing, inferring, evaluating, arguing, defending, proving, or justifying their thinking (Antonetti & Stice, 2019; Bond & Bedenlier, 2019; Fisher et al., 2020).

History of Technology in the Classroom

Educational technology began in the 1970s with the integration of a range of audio-visual devices and teacher professional development training for the new technological age (Bond et al., 2018; Zawacki-Richter & Latchem, 2018). While educators and researchers expressed that educational technology through the 1970s had not made a significant impact on student learning, Bond et al. (2018) found that throughout the 1980s and the introduction of the microcomputer, teachers were able to enhance student and production outcomes, due to the launch of word processing and multimedia workstations, thus improving instructional design. According to Johnson et al. (2016), teacher attitudes and philosophies of how students learn directly influence and impact how technology is implemented in the classroom. During the 1990s, software, courseware, and the potential of interactive multimedia within schools began to advance (Bond et al., 2018; Zawacki-Richter & Latchem, 2018).

Johnson et al. (2016) indicated that for teachers to have classroom technology buy-in, they must redesign curriculum to include technology they are knowledgeable and

comfortable with, and that will enhance instruction. During the 1990s, educators began recognizing that interactive multimedia cannot take the place of teachers and should be implemented alongside strong, effective pedagogy that would cognitively engage students in order for deeper learning to occur (Antonetti & Stice, 2018; Bennett et al., 2016; Bond et al., 2018). According to Fisher et al. (2020), the goal for educators is to "help students move from participating or 'doing' to investing and driving their own learning." (p. 104)

There was significant and exponential growth in Information and Communication Technologies from 2000–2009 with the introduction of online and blended learning, ePortfolios, online assessments, and school computer labs, through substantial government funding (Baydas et al., 2015; Bond et al., 2018; Karabulut-Ilgu et al., 2017; Marín et al., 2018; Persico et al., 2018). Wongyai and Patphol (2019) proposed encouraging students to think through their own learning goals, learning processes to help achieve those goals, and self-evaluations, which transforms the instructional approach from preparing learning for students to encouraging learners to think for themselves and guide their own learning. As instructional design continued to develop and improve in the early 2000s, new Information and Communication Technology tools were explored and implemented to assist students even with learning difficulties, online environments were recognized as their own element, which moved instructional design to be more student-centered and project or activity based, creating more learner-centered classroom environments (Bond et al., 2018; Marín et al., 2018; Michos et al., 2018, Persico et al., 2018).

As the 21st century has progressed, technology has enhanced and become more sophisticated with the introduction of mobile learning, advanced collaborative tools, social media, messaging apps, technology games, and STEM (science, technology, engineering, and math) classes (Bond et al., 2018; Charitonos et al., 2012; Herodotou, 2018; Junco et al., 2013; Marín et al., 2018; Sun et al., 2018, Williams et al., 2000). Antonetti and Stice (2018) suggested, "The Web 2.0 movement is all about moving users of the Web from being passive consumers of media to contributors using digital tools to create and share their knowledge with others" (p. 65). When introducing Web 2.0 tools and personal learning environments, Torres Kompen et al. (2019) found students can often feel a sense of chaos, confusion, and overload with so many tools at their disposal and no way to structure or organize those tools, all making big picture activities overwhelming and confusing. Traditional technologies, such as discussion boards, chats, blogs, and peer assessments, have proven effective for online interaction, but the Web 2.0 movement recommends the use of web-based applications, such as Google applications, audio or video technology like Skype and YouTube, as well as Twitter feeds to improve online engagement (Banna et al., 2015; Martin & Bolliger, 2018; Revere & Kovach, 2011). According to Torres Kompen et al. (2019), Web 2.0 tools and personal learning environments challenge students to decipher between an online academic environment and using seemingly fun Web 2.0 tools.

Fisher et al. (2021) stated, "By shifting the attention from the tools (which are cool and seemingly infinite) to the functions, we can hone what we need to accomplish in order to build students' capacity in face-to-face and distance learning" (p. 105). The incorporation of technology into educational pedagogies is seen as essential and vital to

bring more meaning to learners and to equip them with 21st century skills (Halim &

Hashim, 2019).

Educators have identified off-task use of technology in the classroom as a huge

obstacle, because it not only distracts other students, but also reveals the students' lack of

self-control, self-discipline, and self-regulation (Neiterman & Zaza, 2019). To ease the

burden on educators, institutions, and students, extensive technology professional

development opportunities need to be available for proper integration into curriculum

(Bond et al., 2018; Laurillard et al., 2018). Alfallaj (2020) determined, "If ICT cannot be

successfully modified to cater to the curricular needs, it is more a distraction and danger

to education than a useful tool" (p. 101). According to Antonetti and Stice (2018), if

students are crossing the Rigor Divide (see Appendix A), they are hitting a level of

cognitive engagement that has deep meaning and will yield higher achievement goals.

Classroom Engagement

Gestures, postures, and facial expressions are some visual clues that assist in

classroom engagement detection (Dewan et al., 2019).

Bond et al. (2020) determined:

Student engagement is the energy and effort that students employ within their

learning community, observable via any number of behavioral, cognitive or

affective indicators across a continuum. It is shaped by a range of structural and

internal influences, including the complex interplay of relationships, learning

activities and the learning environment. The more students are engaged and

empowered within their learning community, the more likely they are to channel

that energy back into their learning, leading to a range of short and long term

outcomes, that can likewise further fuel engagement. (p. 3)

Koydemir and Ozcan (2018) suggested a wearable device, such as a smartwatch to collect

biometric information could be a valuable form of engagement tracing. To implement

appropriate interventions to improve learning outcomes, biometrics can help educators

evaluate students' level of attentiveness (Villa et al., 2020).

Antonetti and Stice (2018) believed the first step to engagement is to attract

attention which leads to participation, which then leads to students making meaningful

connections. Giving students choice and a voice on which technologies they use can lead

to greater technology confidence, improve engagement, and student buy-in. (Bond &

Bedenlier, 2019; Martin & Bolliger, 2018; Northey et al., 2018). Fisher et al. (2020)

found designing classroom tasks using the following principles can increase engagement:

1. Encouraging students to consider more than one perspective

2. Moving from information to understanding

3. Allowing students to try ideas to see what works and what does not work, and

4. Creating a way for students to move from procedure to problem-solving.

Torres Kompen et al. (2019) found Web 2.0 tools allow a collaborative approach to

learning, ease of sharing information with peers, assistance to struggling peers, the ability

to access resources and information students did not know about, and the opportunity to

network and develop social interactions to gain inspiration and knowledge that impacts

the learning process. As was shown in Figure 1, the outcomes of students being engaged

in the classroom ranged from improved collaboration and higher order thinking skills to

personal development and feeling connected to the community of which promotes lifelong learning.

Using technology in the classroom does not improve learning; rather, teachers must balance using technology with meaningful classroom tasks and collaborative activities (Bedenlier et al., 2020, Johnson et al., 2016). Antonetti and Stice (2018) stated that while technology brings engaging qualities to a task, learners must interact with the content to make it meaningful. How a teacher decides to implement instructional strategies, how curriculum is designed, and how classroom management techniques are used allow a teacher to keep students interested in learning (Marzano et al., 2009). Fisher et al. (2021) described students who are cognitively engaged as learners who make an intentional effort to master content goals, people who seek challenges, can self-regulate, who plan and monitor their own progress, set goals, and solve problems. According to Antonetti and Stice (2018), when technology is infused into classrooms, students interact visually (seeking information), physically (physical engagement), socially (participating with people), and cognitively (learners make meaning).

To cultivate engaged learners, educators need to carefully critique pedagogies and curriculum to determine if they include the right combination of strategies that will promote decision-making, self-questioning, problem-solving, and reflection (Antonetti & Stice, 2018; Fisher et al., 2021). Seeing the need for student engagement and interaction has propelled the development of guidelines for designing powerful online courses (Martin & Bolliger, 2018; Roblyer & Ekhaml, 2000; Roblyer & Wiencke, 2019). Learning Management Systems, or LMS platforms, can assist teachers in providing an online environment, or a virtual classroom, to house curriculum, tools, and resources and

to perform major teaching functions (Fisher et al. 2021). Antonetti and Stice (2018) refer to teachers as task designers, and educators need to look at all components of individual tasks, such as strategies introduced, engaging qualities, and how students will comprehend the material. Martin and Bolliger (2018) stress the importance of rapport and collaboration between instructors and students in an online, interactive environment, as key to student online participation.

Web 2.0 technologies allow the opportunity for teachers to create authentic 21st century experiences through unlimited access to information and videos, bringing the world into the classroom, social use of the web, and offering and encouraging collaborative learning opportunities, which develop essential life skills needed for global competition, workforce competencies, and technology changes (Bedenlier et al., 2020; Halim & Hashim, 2019; Tucker, 2014). The implementation of STEM programs in education allows teachers to design learning that is high quality and fun that benefits students through problem-based learning, project-based learning, and to create knowledge that directly relates to daily life problems (Widya et al., 2019). Torres Kompen et al. (2019) shared several advantages of Web 2.0 tools and personal learning environments, such as students being actively involved and leading their learning process, increasing motivation, and offering numerous options for communicating and starting dialogues with others, all of which can directly increase participation.

How Technology Affects Student Relationships with Peers

Neiterman and Zaza (2019) discovered from a student's perspective, technology devices are not bothersome, a classroom with no technology is unrealistic, and students are more comfortable with handwritten note-taking versus electronic note-taking. As

stated by Alfallaj (2020), "Previous studies claim that technology can be a great distraction for the learners if it is not properly handled by the teacher" (p. 99). However, Neiterman and Zaza (2019) suggested being off task with technology is not a problem unless it distracts others from learning.

Sanchez (2021) reported most students have a cell phone, regardless of income, and because the internet and social media are so easily accessible, technology can negatively affect self-image. According to Romero et al. (2018), "Technology, especially smartphone technology and the growing popularity of social media, has shifted the ways in which we interact with one another" (p. 8). Kelly et al. (2018) reported social media has become the primary communication tool for adolescents, can contribute to poor mental health, due to online harassment experiences that increase anxiety, and can damage relationships and reputations.

According to Sanchez (2021), due to the lack of face-to-face interactions, empathy is on a steady decline, and decreased social interaction can increase stress. Furthermore, Sanchez (2021) asserted, "Social skills enable students to initiate and maintain positive social relationships, achieve peer acceptance, improve the probability of being able to cope effectively within society and the development of social skills improves all aspects of educational performance" (p. 32). Twenge (2019) reported students who are heavily engaged in technology have more difficulty making friends. Primack et al. (2017) argued students who use social media for two or more hours a day

double their odds of social isolation. Face-to-face communication is directly related to increased well-being (Twenge et al., 2019).

Bedenlier et al. (2020) found students who do not contribute to group discussions, collaborative work, and the use of chat/e-mail casually become frustrated and disengaged. Other frustrations that can cause disengagement can vary from technical issues with hardware or internet instability to fellow students changing computer settings, such as backgrounds, font colors, and online group spaces (Bedenlier et al. 2020; Torres Kompen et al., 2019). Romero et al. (2018) suggested technology has dramatically shifted the ways people interact and react to one another, and when a student has a lack of technology accessibility it can cause feelings of frustration and alienation which leads to disengagement and unfavorable classroom behaviors.

Gökbulut (2019) found there is a direct correlation between school achievement and sense of belonging, and as technology addiction increases, students' sense of rejection increases. To reduce stress on students, they must have a positive sense of belonging to the classroom, teacher, and school (Zhang et al., 2018). Bedenlier et al. (2020) found some students who do not have available access to technology or the internet, and are not given the option of handwriting the work, can feel disadvantaged, which in turn makes them feel they are being penalized and causes higher levels of anxiety.

Excessive technology usage affects students' social and academic lives and studies show, as digital media use increases, in-person social interaction declines (Anderson, 2001; Anderson & Jiang, 2018; Twenge et al., 2018; Twenge et al., 2019). Hunt et al. (2018) found students who limit social media usage report less loneliness.

Shifting away from in-person social interaction and more time on digital media can have significant psychological implications (Twenge & Campbell, 2018; Twenge et al., 2018). Ouyang and Chang (2018) established socially active students versus inactive students make more knowledge inquiry and knowledge construction, thus showing that participating socially is a critical indicator of their level of cognitive engagement.

Cyber Bullying

Fege (2020) suggested, "Schools are not just places where young people learn; they are also places of community and connection, physical and emotional safety, shelter, and food, democracy and deliberation" (p. 7). According to Torres Kompen (2019), students reported "the social element has had a large impact in my learning process, helped me to create stronger links with classmates, friends and teacher because you interact more and put your opinions forward" (p. 202). According to UK based regulator of communication services, Ofcom (2021), "Just over half of 12–15s [year olds] have had some form of negative online experience" (p. 2). Lenhart (2015) reported 92% of teens go online daily, while Anderson and Jiang (2018) reported 45% of teens are online on a near-constant basis and social media usage has led to an increase in bullying and rumor spreading (para. 2).

Meter and Bauman (2016) reported cyberbullies have fewer restrictions placed on their personal devices than adolescents who do not bully. Sathyanarayan Rao et al. (2018) identified cyberbullying as:

Bullying through text messages, phone calls, e-mails, instant messengers, social media platforms, or in chat rooms, varying from posting hurtful words, derogatory

comments, posting fake information on public forums or blogs, hacking accounts

for personal vendetta to rape or death threats. (para. 3)

A significant challenge with cyberbullying is difficulty in identifying the bully and the

victim, due to potential anonymity, which in turn leads to higher rates of depression,

anxiety, and refusal to attend school (Sathyanarayan Rao et al., 2018). Meter and

Bauman (2016) reported fewer than half of the children in their sample said parents

monitor their internet usage, online activity, and social networking site practices.

In 2011–2012, adolescent mental health issues surged, in 2012 about half of

Americans were using a smartphone, and by 2015, 92% of young adults and teens owned

a smartphone (Smith, 2017, para. 4; Twenge et al., 2018, p. 765). Pew Research Center

(2021) reported 97% of Americans now own some sort of cellphone, 85% own a

smartphone, and young adults are dependent on a smartphone for online access (para.2).

The amount of time adolescents spend on social networking, what they share and how

they engage and interact online directly relates to their mental health, reputations,

relationships, and sleep cycle (Agostini et al., 2019; Kelly et al., 2018). Information and

Communications Technology (ICT) has cultivated a new type of violence, termed

cyberbullying, and has transformed traditional harassment into more aggressive behaviors

that cause numerous problems in the mental health of adolescents (López-Meneses et al.,

2020). Kelly et al. (2018) stated "sleep quality and quantity could also be affected by

levels of anxiety and worry resulting from experiences of online harassment" (p. 60).

Wang et al. (2021) discovered positive student-student relationship can protect

from adolescent cyberbullying and prevention and intervention programs aimed at

cyberbullying is needed in a school setting. López-Meneses et al. (2020) stated, "school

violence has been nourished by ICTs to develop new violent dynamics, including cyberbullying" (p. 2). Information and Communications Technology has revolutionized and transformed how people communicate, and because of the internet's scope in reaching adolescents, the aggressive act of cyberbullying has increased and provided bullies with anonymity (Festl et al., 2014; Kircaburun et al., 2019; López-Meneses et al., 2020). Communication and relationships have transformed, due to the technological revolution and cyberspace is where teenagers are mainly interacting and communicating outside of school with other people (Tanrikulu & Erdur-Baker, 2019).

The crime of cyberbullying mainly happens on social networks and in other digital environments (Divecha & Brackett, 2019; Jones & Rutland, 2019). According to Kowalski et al. (2019) and Agatston et al. (2007) forms of cyberbullying can be, but are not limited to, recording physical assaults and posting it on social networks, chats and private e-mails, offensive messaging on social media, broadcasting or sharing of offensive messages or photos on social media, repeatedly sending threats, or identify theft. The results of the meta-analysis by Gaffney et al. (2019) showed cyberbullying intervention programs can reduce cyberbullying perpetration by approximately 10% to 15% and victimization by approximately 14%, and show there is a significant gap in cyberbullying literature and prevention programs (p. 22). Since technology is an open channel, bullying is not limited to the school day any longer, because cyberbullying and harassment can happen at any time and on any old or new technological platforms (Altundağ & Ayas, 2020; Broll, 2014; Kaufman et al., 2020). Cyberbullying has a psychological and social impact on victims which increases symptoms of depression and

problematic use of social networks and the internet, as a whole (Baraldsnes, 2015; Barlett & Kowalewski, 2019).

How Excessive Technology Usage Affects Cognitive Engagement

An increase in technology usage is directly related to the ability to maintain focus (Kelly et al., 2018; Sanchez, 2021). More time spent on digital media lowers psychological well-being (Shakya & Christakis, 2017; Twenge, 2019), increases psychological problems and stress (Rosen et al., 2014), decreases happiness (Twenge et al., 2018), increases symptoms of depression (Boers et al., 2019; Lin et al., 2016), leads to more social isolation and feelings of loneliness (Boers et al., 2019; Primack et al., 2017), and increases anxiety and depression (Twenge & Campbell, 2018). Twenge (2019) reported:

> Associations between hours of screen time and lower well-being, including less curiosity, lower self-control, more distractibility, more difficulty making friends, less emotional stability, and more inability to finish tasks, with heavy users of screens often twice as likely to be low in well-being as light users. (p. 374)

Twenge and Campbell (2018) stated heavy technology users are twice as likely to be diagnosed with anxiety or depression. Researchers have suggested adolescents with elevated levels of social media use are internalizing problems, which leads to symptoms of anxiety and depression (Riehm et al., 2019; Zink et al., 2019). According to Zink et al. (2019) students with anxiety and depression often select sedentary behaviors that are screen-based (television viewing and computer/video game use) over physical or social activities. Turner et al. (2021) stated digital addiction comes from the fascination with the online world, used to escape real world problems, and "people do not realize they are

digitally addicted because having a digital device on you at all times has become the social norm" (p. 1).

Excessive screen time is negatively impacting the developing brain by decreasing language development (Horowitz-Kraus & Hutton, 2018), increasing behavioral troubles (McDonald et al., 2018), weakening brain connectivity between the regions controlling word recognition, language, and cognitive control (Horowitz-Kraus & Hutton, 2018), and decreasing the integrity of white-matter pathways in the brain needed for language and reading development (Hutton et al., 2020). Screen exposure disrupts rest by causing problems with sleep onset, sleep quality, and sleep duration (Small et al., 2020). Amorim et al. (2018) found poor sleep quality is directly related to the reduction of functional brain connectivity, decreased gray-matter volume, and a higher risk for age-associated cognitive impairment, such as Alzheimer disease. Riehm et al. (2019) stated increased levels of technology use contribute to poor sleep quality, which can cause adolescents to internalize problems. Kelly et. al (2018) found young people sleep in close proximity to their cell phones, and since sleep is associated with metal health, the overuse of social media can impact duration and disruptions in sleep, thus impacting melatonin production.

More and more technology is being seen as both the problem and the solution (Aboujaoude et al., 2022). According to Kuss (2021), vulnerable users need to be protected from the harmful effects of technology, parents, teachers, researchers, clinicians, technology companies, and governments, must work together to establish safe technology spaces and tools to ensure technology is being used in a beneficial and healthy way, so the risk for young people is diminished. Borrowing from definitions of addiction, the 11th revision of the International Classification of Diseases in 2018

introduced Gaming Disorder, officially recognizing addictive gaming as a mental health concern (World Health Organization, 2020). Kuss (2021) argued to reduce online risk and harm, there is a collective responsibility to make certain technology is being used in a healthy and beneficial way, because a "strategic policy framework regarding problematic technology use is currently lacking" (p. 895).

The World Health Organization (2020) shared that online and offline gaming disorder is characterized by behaviors over the internet including impaired control over gaming, prioritizing gaming over daily activities and other life interests, the continuance or escalation of gaming despite negative consequences, and the deterioration of personal, family, social, education, or other areas. Children and adolescents are developmentally vulnerable to online impulsivity behaviors, due to game makers directing subject matters and in-game purchases toward them (Zendle et al., 2019). In a report by the Royal College of Psychiatrists (2020), young people's technology use can result in the following risks: dropping extra-curricular activities and social time for technology engagement, exposure to inappropriate online content, online bullying, exploitation risks, ease of spending money, and negative impacts on physical and mental health, like sleep, weight, mood, body image, and addiction, etc.

According to Firth et al. (2019):

We found emerging support for several hypotheses regarding the pathways through which the Internet is influencing our brains and cognitive processes, particularly with regards to: a) the multifaceted stream of incoming information encouraging us to engage in attentional switching and "multi tasking", rather than sustained focus; b) the ubiquitous and rapid access to online factual information

outcompeting previous transactive systems, and potentially even internal memory

processes; c) the online social world paralleling "real world" cognitive processes,

and becoming meshed with our offline sociality, introducing the possibility for the

special properties of social media to impact on "real life" in unforeseen ways. (p.

126)

According to Aboujaoude and Gega (2021), children and adolescents are digital

natives, not knowing life before Google, and are more impacted by the issues of online

addictions, impulsivity, inattentiveness, anger, and social media follows, and do not have

the wherewithal to manage and control the fast-paced, online life. As Riley (2022)

reported, Superintendent Grenita Lathan of Springfield Public Schools in Springfield,

Missouri, is not only reviewing technology and internet filtering agents, but is exploring

other avenues to protect students from accessing age-inappropriate websites on their

school issued devices, and will be developing a change committee to redefine the role of

technology within the classroom on all grade levels.

Furthermore, Small et al. (2020) found that people who are continually using

technology do not allow sufficient time for their brain to rest in its default mode and that

continuous technology usage can adversely impact cognitive development and the

developing brain. In a study of children 8 to 12 years of age, Horowitz-Kraus and Hutton

(2018) established that

more screen and less reading time were associated with decreased brain

connectivity between regions controlling word recognition and both language and

cognitive control" and that "such connections are considered important for

reading comprehension and suggest a negative impact of screen time on the

developing brain." (para. 13)

Furthermore, Hutton et al. (2019) showed that increased screen time impacts the

decreased integrity of the brain's white-matter pathways that are essential for language

and reading. Springfield Public School's desire is to have all graduates be not only tech-

savvy and ready for the digital world, but also have the skills needed to make them

whole, productive members of society (Riley, 2022).

Technology Usage and the COVID-19 Pandemic

On March 11, 2020, the World Health Organization (2020) declared the COVID-

19 outbreak a global pandemic. Even though interruptions in education have occurred

previously (Bozkurt et al. 2020), it is "being experienced more acutely and affectively by

educators, students and parents" at a global scale for the first time (Williamson et al,

2020, p. 107). While distance education (online learning and e-learning), had been proven

valuable (Xiao, 2018), emergency remote education was necessary and essential with

children learning from home and parents suddenly learning how to become educators

(Bozkurt et al., 2020). Highlighted by Jansen (2020), "our biggest mistake would be to

treat children as cognitive machines that can simply be switched on again after the trauma

of COVID-19" (para. 10). Furthermore, Bozkurt et al. (2020) explained, due to the

COVID-19 pandemic, learners, teachers, and parents alike were going through a great

deal of anxiety, due to self-isolation, lockdowns, lack of resources, like water and proper

nutrition, increased financial responsibilities, and distress over looming health and safety

of themselves and loved ones. The urgent task in the COVID-19 pandemic was to quickly

and actively engage people (Teräs et al., 2020) and to ensure students were engaged and learning through a combination of different learning mediums (World Bank, 2020).

Conversations about the new educational normal during the COVID-19 pandemic shifted in favor of online education (Hanson, 2020; Kobb, 2020; Raveendran, 2021; Sintema, 2020; Xiao, 2021). Weitzel (2020) defined blended learning as combining "face-to-face instruction and online instruction into a single course" (para. 6). Researchers have recognized obstacles and limitations to learning remotely and suggested blended learning as an alternative (Agarwal, 2020; Mubeen, 2020; Olivier, 2020; Weitzel, 2020). While some populations were able to access emergency remote education via laptops, smartphones, hotspots, and other technologies, there were often issues with the number of devices needed to accommodate students' educational needs (Bozkurt et al., 2020). Adam (2020) stated there is a misconception that if devices along with internet access are equally available to all students and educators, remote teaching and learning solutions will be effective, because educators are under the assumption that students understand digital and internet literacy and possess the self-directed learning skills needed to benefit from online remote learning.

Quilter-Pinner and Ambrose (2020) discovered there are still one million students without access to the internet, which can hinder online learning or blended classroom learning. Lack of an internet connection not only hinders learning, but also makes it hard to have one-on-one conversations and connections with students, because they are unable to be engaged (Morin, 2020). Due to the pandemic, the significant inequalities in technology access and infrastructure have surfaced that can severely hinder online education (Adam, 2020; Bates, 2020; Bozkurt et al., 2020; Fege, 2020; Fowler, 2020).

Dennen (2020) stated the pandemic caused worry and challenges in the areas of health, finances, and social distancing. As demonstrated through Maslow's (1943) hierarchy of needs, it is difficult for people to focus on tasks, such as learning if their safety and physiological needs are not being met.

Xiao (2021) argued online technologies are becoming normalized and warned educators to use technology in the classroom at "a right time for a right purpose through a right means by right people" (p. 150). Hanson (2020) advised, "There is no one-size-fits-all option that will work best for all workers and learners… [and] most consumers believe that online and hybrid are the modes through with they learn best" (para. 9). Morin (2020) cautioned online students need more structure and support, since online learning forces students to be more independent and responsible.

Regarding online learning, educators need to realize engagement looks different; to keep learners engaged, tasks need to be meaningful, motivating, and relatable (Morin, 2020; Schlechty, 2011). There is a misconception that young people are well connected and digitally savvy (Williamson et al., 2020). Online learning can be a disadvantage in the following ways: high distraction, complicated technology issues, connectivity problems, navigating through online applications, demanding or time-consuming online classes, sense of isolation due to the absence of social interaction, lack of teacher training, proper management of screen time, and lack of taking physical and mental breaks (Bijeesh, 2021; Gautam, 2020; Nolasco, 2022). Riley (2022) reported at the beginning of the 2021-2022 school year, Springfield Public Schools, located in

Southwest Missouri, incorporated a technology integration course as part of back-to-school training, to ensure technology in the classroom supported instruction.

According to Fisher et al. (2020) educators who are teaching online need to design a considerate schedule by replicating the face-to-face instruction schedule and to be sympathetic to the burden placed on families through lack of internet access and technology availability, while also providing a student- and family-friendly schedule. Turner et al. (2021) suggested the effectiveness of taking a digital detox is unlikely due to blended classrooms, online classrooms, students being encouraged to engage regularly online, the use of social media applications for personal and educational use, and ways for students to stay connected with fellow students and to stay updated on extracurricular activities.

According to Westwick and Morreale (2020), "the rapid transition to remote learning brought attention to a wide array of vexing concerns related to pedagogy, student learning, student access, instructor communication variables, technology, and the research methods we use to examine these critical issues" (para. 3). According to Riley (2022), now that students are learning full-time in person again, Springfield Public Schools will be reassessing the role technology will play in the teaching and learning process, how devices are used during the school day and at home, what role devices should play in academic achievement and instruction, and that students in preschool through fifth grade will not be allowed to take their technology devices home daily.

Summary

Chapter Two included a review of literature related to the conceptual framework of this research. The review of literature included the topics of the history of technology

in the classroom, classroom engagement, how technology affects students' relationships with peers, and cyberbullying. In addition, literature was reviewed related to how excessive technology use affects cognitive engagement and how educational technology was used through the COVID-19 pandemic.

Examined in Chapter Three is the methodology used to guide this study. This includes a review of the problem and purpose, research design, and the population and sample. The instrumentation, data collection, and data analysis are also detailed. Ethical considerations and a summary of the study's methodology conclude Chapter Three.

Chapter Three: Methodology

Chapter Three included an overview of the methodology used to obtain and analyze data regarding the effects of excessive student technology usage on student cognitive engagement. The problem and purpose overview provided background on why this study is important. The research design and the population and sample of the study are discussed. Furthermore, the instrumentation, data collection, and data analysis were detailed. Finally, the ethical considerations and a summary of the study's methodology were reviewed.

Problem and Purpose Overview

Computers have the potential to drastically improve productivity in education (Bond & Bedenlier, 2019; Patterson & Patterson, 2017; Raja & Nagasubramani, 2018). Patterson and Patterson (2017) and Raja and Nagasubramani (2018) reported computers enable students to engage with educational software, take better notes, complete tasks more quickly, stay more organized, and instantly access a broad range of learning resources. However, as the number of internet and computer-based distractions increase, so do concerns about student cyber-slacking and non-productive technology use (Patterson & Patterson, 2017; Raja & Nagasubramani, 2018; Wexler, 2019).

Bond and Bedenlier (2019) suggested:

The more students are engaged and empowered within their learning community, the more likely it is that engagement will lead to a range of outcomes, and the more likely it is that this energy, effort and engagement will then feed back into activities and learning environment. (p. 7)

However, Patterson and Patterson (2017) and Wexler (2019) determined computer use in the classroom hinders learning and results in poorer academic outcomes. According to Ravizza et al. (2017), students reported they engaged in texting, looked at Facebook, and browsed the internet because they were bored. Raja and Nagasubramani (2018) noted a decline in student writing skills, an increase in the number of incidents in cheating, and a lack of student focus and concentration in both academics and extracurricular activities.

There appear to be inconsistencies in current research regarding what type of impact technology is having on students (Raja & Nagasubramani, 2018; Wexler, 2019). This study may allow educators to determine if there is a connection between excessive technology use and cognitive student engagement and what that connection is. In addition, this study will provide current research on how excessive technology usage impacts cognitive engagement and the impact it has on students' relationships with their peers. By reviewing the outcomes of this study, educators could improve their pedagogies to design curriculum that is more cogitatively engaging while decreasing technology usage in the classroom.

Research Questions and Hypotheses

The following research questions and hypotheses will guide the study:

1. What is the correlation between excessive technology usage for middle school students and classroom engagement?

$H1_o$: There is no correlation between excessive technology usage for middle school students and classroom engagement.

$H1_a$: There is a correlation between excessive technology usage for middle school students and classroom engagement.

2. What is the perception of middle school certified core teachers regarding the impact of excessive information and communication technology usage on student relationships with peers?

3. What are the perceptions of middle school certified core teachers regarding excessive use of information and communication technologies and how it affects student cognitive engagement?

Research Design

A mixed-methods research study was chosen to evaluate the effects of excessive technology usage on student cognitive engagement because of the benefits of using both quantitative and qualitative research (Creswell & Creswell, 2018; Mertens, 2020). Fetters and Molina-Azorin (2017) suggested a mixed-methods design combines comprehensive qualitative interview data with quantitative survey data, which can highlight the practical implications of a study. This approach allows researchers to triangulate the quantitative and qualitative data with the review of literature (Creswell & Creswell, 2018).

Population and Sample

For this research, a target population of seventh and eighth-grade certified core teachers and seventh and eighth-grade students from a middle school in southwest Missouri was selected. The building counselor was asked to provide a list of seventh and eighth-grade student cohorts. The two cohorts for the research were randomly selected using the Excel random number generator. One seventh-grade cohort and one eighth-grade cohort were selected. According to Fraenkel et al. (2019), a simple random sample is one in which each and every member of the population has an equal and independent chance of being selected. Once the cohorts were randomly selected, the counselor

provided the names of the certified core teachers for the selected cohorts. Student names were not gathered, as participating teachers were responsible for handing out and collecting the informed consent forms and distributing the surveys. Table 1 displays the student and certified core teacher population for each seventh and eighth-grade cohort.

Table 1

Population of Seventh and Eighth-Grade Cohorts

	Seventh Grade	Eighth Grade
Total Students	402	414
Total Certified Core Teachers	4	4
Total Number of Cohorts	3	3
Cohort #1 – Total Students	136	n/a
Cohort #2 – Total Students	125	n/a
Cohort #3 – Total Students	130	n/a
Cohort #4 – Total Students	n/a	122
Cohort #5 – Total Students	n/a	143
Cohort #6 – Total Students	n/a	138

Note. One seventh-grade cohort and one eighth-grade cohort will be randomly selected to participate in the student survey.

A participation email (see Appendix B) was sent to the eight certified core teachers from the two randomly selected cohorts explaining the study and requesting the certified core teachers monitor the student survey and participate in a one-on-one interview. The email included a copy of the informed consent form (see Appendix C) and a copy of the interview questions (see Appendix D). Once the certified core teachers

agreed to participate, the survey participation letter (see Appendix E) and the adult consent form on behalf of a minor (see Appendix F) were sent home with participating seventh and eighth-grade grade cohort students for parents to review and sign consenting for their students to participate. Participating teachers were asked to collect all signed adult consent forms on behalf of the minor students from parents.

The day of the survey, participating teachers with a homeroom class were provided a script (see Appendix G) to introduce the survey to all students. Homeroom teachers provided participating students with a copy of the minor assent form (see Appendix H). After students signed the form, participating homeroom teachers collected the forms and provided students with the survey (see Appendix I) link. Any students in the sample cohorts who did not return the signed consent forms from their parents or who did not wish to participate in the survey were removed from the class while the survey was administered.

Instrumentation

Quantitative

For the quantitative portion of the study, an online survey was created to collect student data. The instrument included 8 Likert-type scale statements to be administered to students at two different grade levels. The survey was designed to measure student technology usage in and out of the classroom and perception of engagement.

The student survey was developed to assist in answering research question one. The conceptual framework and the review of literature guided the creation of the student survey. Survey statements one and two were designed to collect data regarding learning management systems (Antonetti & Stice, 2018; D'Angelo, 2018; Schindler et al., 2017).

Survey statements three and four were designed to gather student perceptions of educational technologies (D'Angelo, 2018; Schindler et al., 2017). Survey statements five and six were designed to determine if education technologies assist students with assessment of their learning (Johnson et al., 2016; Northey et al., 2017; Schindler et al., 2017). Finally, survey statements seven and eight were designed to gather information about personal technology usage (Meter & Bauman, 2016; Sun et al., 2016).

Qualitative

The teacher interview protocol was developed to assist in answering research questions two and three. The literature review guided the creation of the interview questions. Interview questions one through four were designed to collect perceptions of technology usage and its effect on student relationships with peers (Kelly et al., 2018; Primack et al., 2017; Romero at al., 2018; Sanchez, 2021; Twenge, 2019; Twenge et al., 2019). Interview questions five through seven were designed to gather teacher perceptions regarding how technology usage affects student cognitive engagement when implementing learning management systems and educational technologies, as well as how these technologies help assess learning (Antonetti & Stice, 2018; Bond & Bedenlier, 2019; Bond et al., 2020; Johnson et al., 2016; Northey et al., 2017; Schindler et al., 2017; Small et al., 2020).

Reliability

According to Creswell and Creswell (2018), reliability refers to the ability of an instrument's measures to be consistent and repeatable. Fraenkel et al. (2019) suggested piloting instruments to ensure survey questions meet reliability standards. The student survey phase will be field-tested by the eight certified core teachers participating in the

study. Field testing identifies any problems students might experience and will ensure the soundness of the survey questions. The test-retest method was utilized by requesting the eight certified core teachers take the survey twice, one week apart (Fink, 2016). The test-retest measures the consistency of the survey results when administered to the certified educators not chosen to participate in the survey (Johnson & Christensen, 2020).

Reliability was established through the use of recording devices for the qualitative data. Each recording was transcribed and then coded. Triangulation of the quantitative data, qualitative data, and the literature review also strengthened reliability (Burkholder et al., 2020; Creswell & Creswell, 2018; Johnson & Christensen, 2020; Mertens, 2020).

Validity

In a mixed-methods study, validity must be established in both quantitative and qualitative research instruments (Creswell & Creswell, 2018). Survey statements and interview questions were analyzed by certified core teachers not participating in the study. The teachers were asked to analyze each survey statement and interview question using the Validation Rubric for Expert Panel (VREP) to ensure validity. To certify validity of interview responses, the member-checking process was utilized. Interview participants were asked to review their transcripts for accuracy and were able to ask for a follow-up interview to clarify their answers (Burkholder et al., 2020; Creswell & Creswell, 2018; Johnson & Christensen, 2020; Mertens, 2020).

Data Collection

Quantitative

The data collection process took place during the spring of 2022 after permission to conduct research from the southwest Missouri school district had been granted (see

Appendix J) by the district superintendent and after the Lindenwood University

Institutional Review Board (IRB) approved the study. The building counselor was asked

to provide a list of seventh and eighth-grade cohorts. One cohort from each grade level

was randomly selected using the Excel random number generator.

After the two cohorts were selected, the eight certified core teachers from the two

cohorts were emailed the participation letter, a copy of the informed consent, and a copy

of the interview questions. After selected teachers agreed to participate in the study, they

were provided with copies of the student participation letter for parents and with the adult

consent form on behalf of a minor. The participating teachers were asked to send the

information home with students and to collect the signed consent forms from parents.

Any students not returning the consent form were not allowed to participate in the study.

After the forms were collected, the participating teachers provided the students

with a copy of the student assent form and the survey link. Any student choosing not to

participate was removed from class during the survey. The first page of the survey

included the informed consent form; by completing the survey, the students consented to

participate in the study. The quantitative data retrieved from the student survey responses

regarding technology usage and level of classroom engagement was gathered through the

web-based survey tool, Qualtrics. To establish ethical methods, each participant was

assured of anonymity, transparency, confidentiality, and security of data. Certified core

teachers were given a script to follow when administering the student survey. The total

number of student survey participants was 34.

Qualitative

Seven certified core teachers from the two participating cohorts were interviewed. Participants were sent a participation letter, a copy of the informed consent, and the interview questions prior to scheduling the interviews. Prior to conducting the interviews, the research study consent form was reviewed, and verbal consent was recorded. Interviews were audio and/or video recorded. After interviews were conducted, the interviews were transcribed, the response were interpreted and analyzed for common themes.

Data Analysis

Quantitative

Creswell and Creswell (2018) stated quantitative and qualitative data need to be analyzed separately for a mixed-methods design. Once the student survey was completed, the quantitative data were analyzed using the Pearson Product-Moment Correlation Coefficient (PPMC). The PPMC "measures the degree of relationship between two continuous variables" (Coolidge, 2021, p. 189). For this study, the two variables were student technology usage and student engagement in class. Once the data were analyzed, tables and figures were used to illustrate the findings.

Qualitative

Interview participants were provided a copy of their transcript to review to ensure accuracy, known as member checking. Open and axial coding was used to analyze transcripts and develop main themes. Burkholder et al. (2020) stated that open coding "is the process of identifying, labeling, examining, and comparing your codes and categorizing them into larger, conceptual categories encompassing a variety of similarly

themed codes" (p. 236). During this phase of analysis, each transcript was analyzed and compared with the other transcripts to identify main concepts. After the main concepts were identified, axial coding was used to identify the major themes.

Johnson and Christensen (2020) indicated:

During axial coding, the researcher develops the concepts into categories (i.e., slightly more abstract concepts) and organizes the categories. The researcher then looks to see what kinds of things the participants mentioned many times (i.e., what themes appeared across the interviews). (p. 436)

The results were interpreted to determine if any themes or patterns were present (Creswell & Creswell, 2018).

Ethical Considerations

Quantitative

A southwest Missouri school district granted permission to survey students, and various safeguards were implemented to ensure the protection, anonymity, and confidentiality of student participants. Approval from the Lindenwood IRB was obtained before data collection. All parents of student participants were emailed the Lindenwood approved study and survey consent forms. Informed consent was acknowledged with the completion of the survey. All electronic files, including survey response data, were secured within a password-protected personal file and will be kept for three years following the conclusion of the study (Fraenkel et al., 2019).

Qualitative

Certified educators who participated in one-on-one interviews were provided with a consent form that was read aloud before the start of each interview. The Lindenwood-

approved consent form includes information about the study's purpose, any risks to participants, and procedures to opt out of the study at any point. To ensure the anonymity of interview subjects and cohorts, alphanumeric codes were used for participant names, school district name, and interview locations (Creswell & Creswell, 2018). Digital interview recordings and paper transcripts were kept in a password-protected file and locked cabinets, respectively (Fraenkel et al., 2019). All participants' identifying information from the survey and the interviews will be saved in a secure location for three years and then destroyed (Fraenkel et al., 2019).

Summary

Chapter Three included a review of the methodology of the research study. Descriptions of the problem, purpose, and research questions were provided. An introduction to the mixed-methods research design was also shared. The population and sample of the study were reviewed. Analysis of the instrumentation tools was presented. Details of the data collection and analysis were discussed. Lastly, ethical considerations were presented to offer evidence of how participants were protected during research.

Provided in Chapter Four is an overview of the demographics of the participants. The results of the data collection of the study are revealed. Data are presented within tables and graphics to display the perceptions of participants.

Chapter Four: Analysis of Data

Even though technology has transformed learning and teaching (Amin & Mirza, 2020), the side effects of technology addiction are numerous and can negatively impact the education process (Gökbulut, 2019). Technology has changed the ways students and teachers think, perform, interact, and process information (Raymundo, 2020). To make a more powerful design for learning, the following three elements for task design need to be considered by educators: engaging qualities, strategies, and cognition (Antonetti & Stice, 2018).

Chapter Four includes the presentation of data. The quantitative data are presented using percentages and figures. A PPMC calculation is provided using survey data. The qualitative data are presented as a synthesis of responses along with direct quotations from participants.

Quantitative Data

The survey was designed to gather student perceptions regarding daily technology usage and student engagement. Four statements were written to gain student perspectives on the amount of time they spent on technology, both at school and at home. Four other Likert-type Scale statements were written to gain student perspectives on whether the technology used in the classroom and at home made them feel more engaged in the classroom. The data gathered is presented using percentages and figures to illustrate the findings for each statement.

Survey Statement 1

Student participants were asked to respond to the statement, *The PERCENTAGE OF TIME in my core classes I use educational LMS technologies such as Canvas, Gmail,*

Google Drive, etc. is: The five options were; 0%–20%, 41%–60%, 61%–80%, and 81%–

100%. As shown in Figure 2, 5.88% of students responded they only used LMS

technologies 21%–40% of the time. However, 35.29% responded they used LMS

technologies 41%–60% of the time, 38.24% responded 61%–80%, and 20.59%

responded 81%–100% of the time.

Figure 2

The Percentage of Time in Core Classes Students Used Educational LMS Technologies

Such as Canvas, Gmail, Google Drive, etc.

Survey Statement 2

    This Likert-type Scale statement asked participants to respond to how they

believed Canvas, Gmail, Google Drive, etc. helped them engage and understand their

learning targets, how they were reaching their learning targets, and where they were

going next in their learning targets. Survey response data (see Figure 3) indicated 58.83%

of students agreed or strongly agreed that Canvas, Gmail, Google Drive, etc., helped

them engage and understand their learning targets, how they were reaching their learning

targets, and where they were going next in their learning targets. Of the 58.83% who

agreed or strongly agreed, only 5.88% disagreed or strongly disagreed that Canvas,

Gmail, Google Drive, etc. helped them engage and understand their learning targets, how

they were reaching their learning targets, and where they were going next in their

learning targets, while 35.29% of students surveyed were neutral.

Figure 3

Percent of Student Who Believed Canvas, Gmail, Google Drive, etc. Helped Them

Engage and Understand Learning Targets, How to Reach Learning Targets, and Where

They Were Going Next in Their Learning Targets
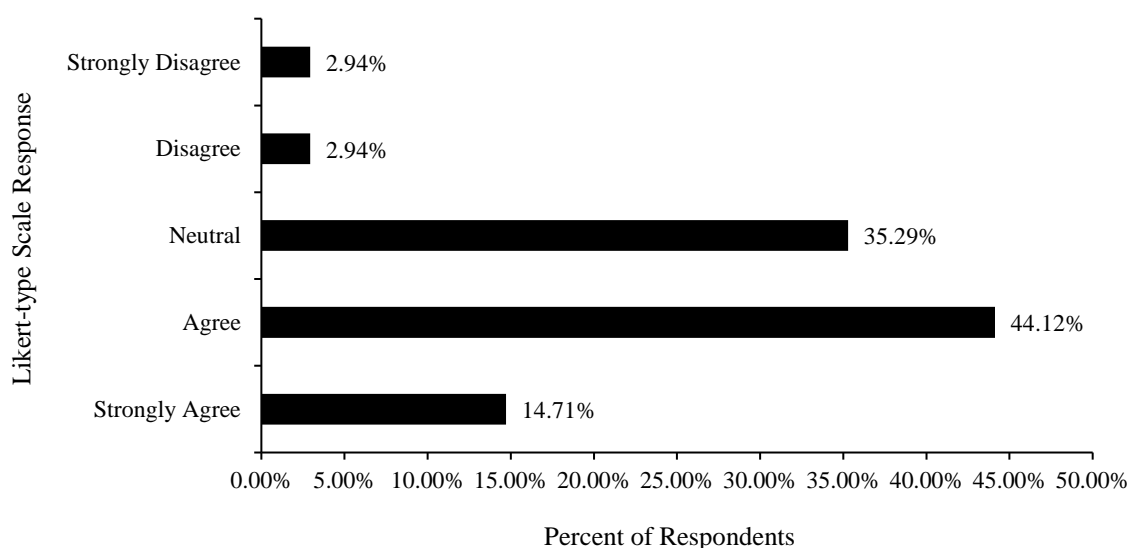
Survey Statement 3

Student participants were asked to respond the statement, *The PERCENTAGE OF*

TIME in my core classes I use educational technologies, such as Kahoot, Quizlet, Google

Slides, Interactive Notebooks, Video embedded with questions, Simulations, and/or

Polling to help me reach my learning goals is: The five options were; 0%–20%, 41%–

60%, 61%–80%, and 81%–100%. As shown in Figure 4, 9% of students responded they

only used educational technologies 0%–20% of the time. However, 26.47% responded

they used educational technologies 21%–40% as well as 41%–60% of the time, and

2.94% responded 81%–100% of the time.

Figure 4

The Percentage of Time in Core Classes Students Used Educational Technologies Such

as Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video Embedded with

Questions, Simulations, and/or Polling to Help Them Reach Their Learning Targets.
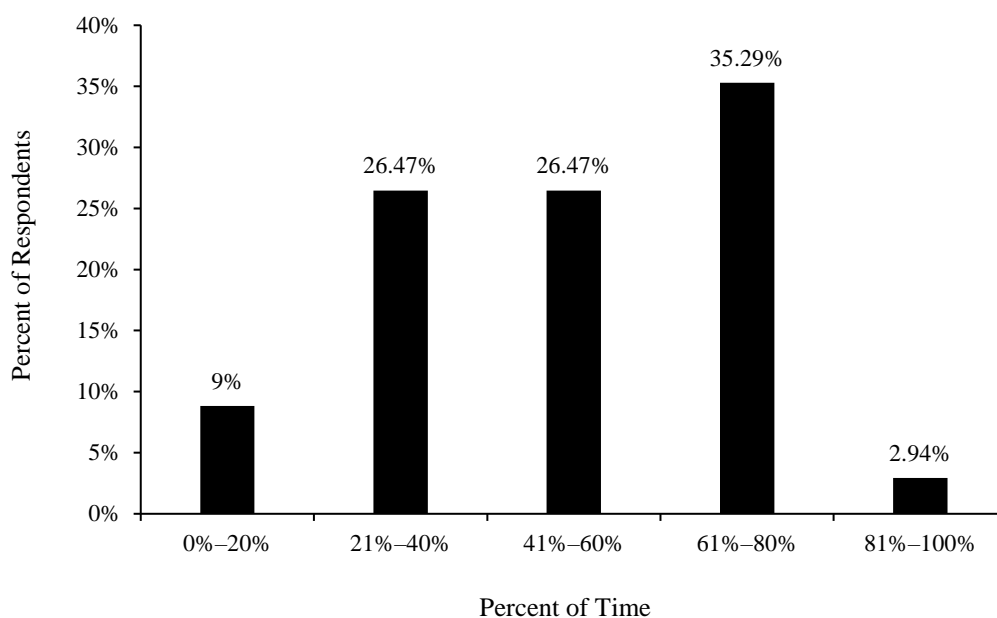
Survey Statement 4

This Likert-type Scale statement asked participants to respond to how they

believed Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video Embedded with

Questions, Simulations, and/or Polling helped them engage and understand their learning

targets, how they were reaching their learning targets, and where they were going next in

their learning targets. Survey response data in Figure 5 indicated 70.59% of students

agreed or strongly agreed that Kahoot, Quizlet, Google Slides, Interactive Notebooks,

Video Embedded with Questions, Simulations, and/or Polling helped them engage and understand their learning targets, how they were reaching their learning targets, and where they were going next in their learning targets. Additionally, 26.47% were neutral, 2.94% disagreed, and 0% strongly disagreed.

Figure 5

Percent of Student Who Believed Educational Technologies Such as Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video Embedded with Questions, Simulations, and/or Polling Help Them Engage and Understand Learning Targets, How to Reach Learning Targets, and Where They Were Going Next in Their Learning Targets.
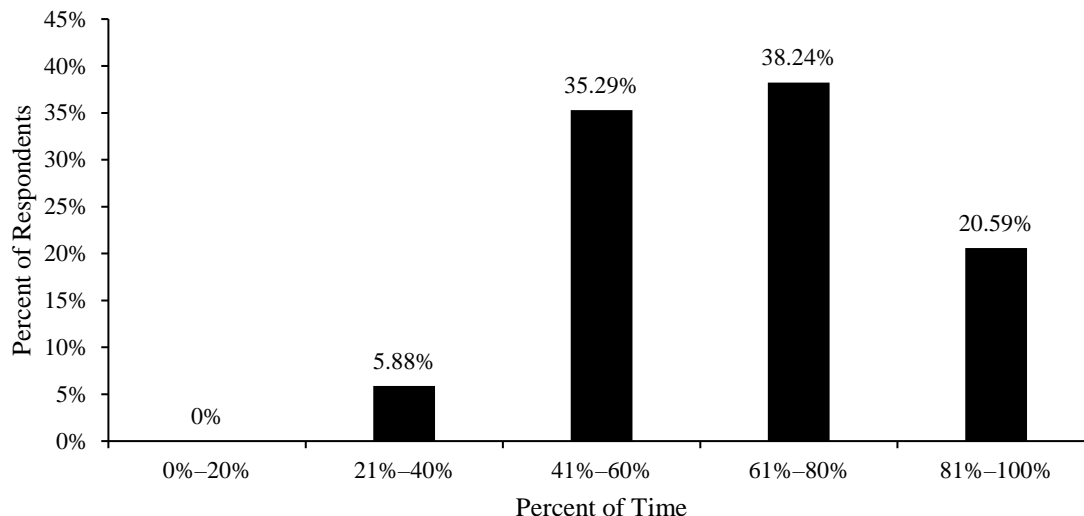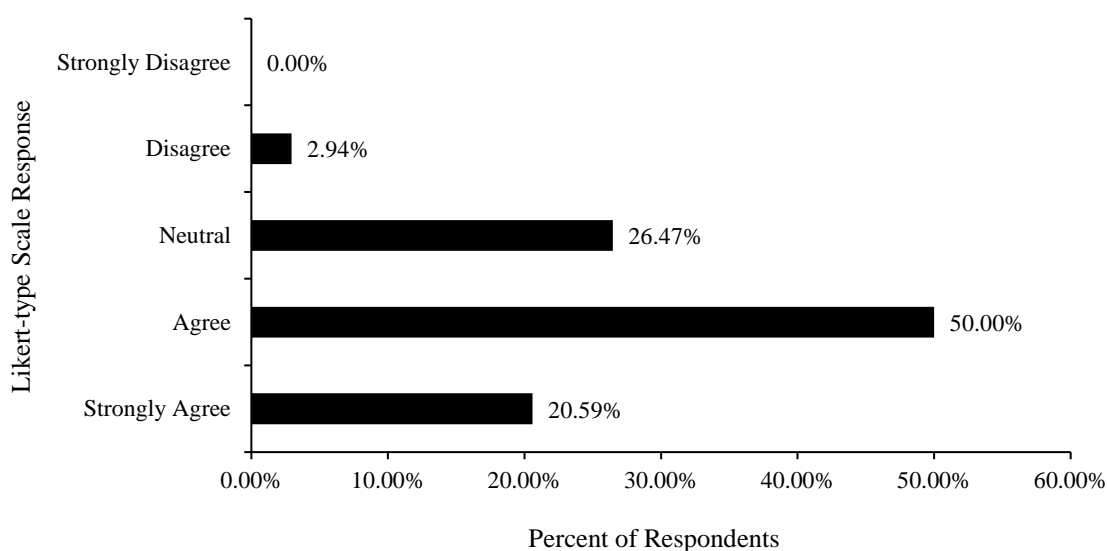

Survey Statement 5

Student participants were asked to respond to the statement, *The PERCENTAGE OF TIME in my core classes I use educational technologies, such as Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. to help me assess my learning is:* The five options were; 0%–20%, 41%–60%, 61%–80%, and 81%–100%. As shown in Figure 6, 26% of students responded they only used educational technologies to assess their

learning 0%–20% of the time. As shown in Figure 6, 11.76% of students responded they use educational technologies to assess their learning 61%–80% as well as 81%–100% of the time. However, 14.71% of students reported they used educational technologies to assess their learning 41%–60% of the time, 35.29% responded 21%–40% of the time, and 26% of students responded 0%–20% of the time.

Figure 6

The Percentage of Time in Core Classes Students Used Educational Technologies Such as Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. to Help Them Assess Their Learning.
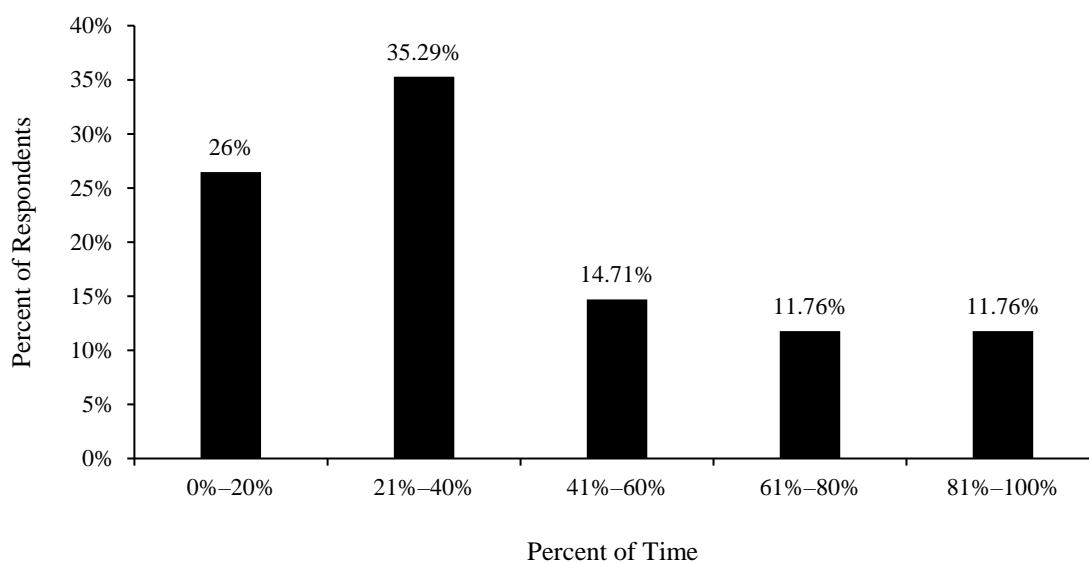
Survey Statement 6

Participants were asked to respond to a Likert-type Scale statement about how they believed Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. helped them engage and understand their learning targets, how they were reaching their learning targets, and where they were going next in their learning targets. Survey response data in Figure 7 indicated 38.24% of students agreed and 14.71% of students

strongly agreed Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc.

helped them engage and understand their learning targets, how they were reaching their

learning targets, and where they were going next in their learning targets. Students

reported that 29.41% were neutral, 11.76% disagreed, and 5.88% strongly disagreed.

Figure 7

Percent of Student Who Believed Educational Technologies Such as Flipgrid, Websites,

Blogs, Infographics, Canvas Tools Like Quizzes, etc. Help Them Engage and Understand

Learning Targets, How to Reach Learning Targets, and Where They Were Going Next in

Their Learning Targets.
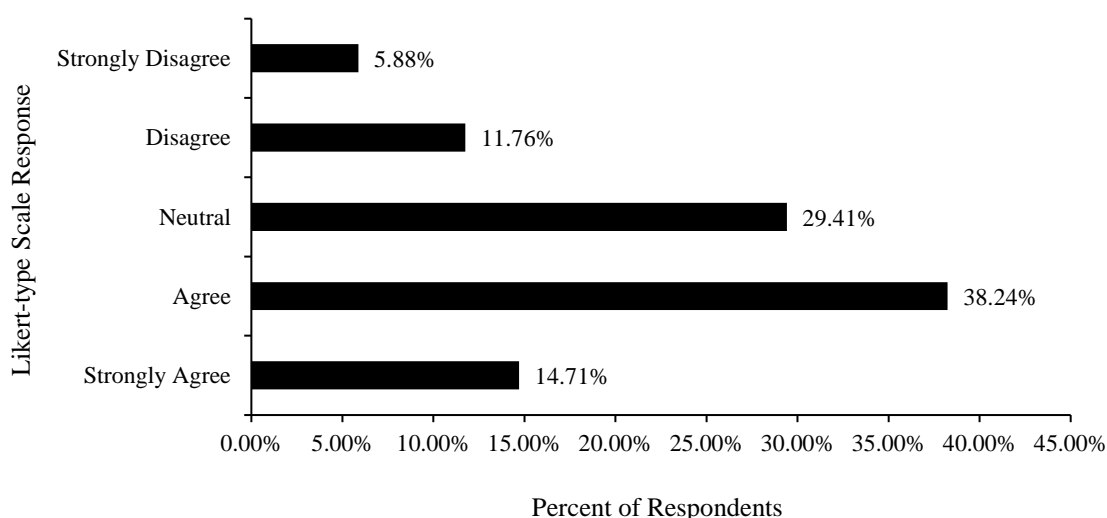
Survey Statement 7

Student participants were asked to respond the statement, *From 2:33 p.m. Until I*

Go to Sleep, This Is How Much Time I Spend on My Personal Technology Usage Outside

of School: The five options were; 0 to 30 minutes, 30 minutes to an hour, 1–2 hours, 2–4

hours, and more than 4 hours. As shown in Figure 8, 20.59% of students reported more

than 4 hours of technology usage from 2:33 p.m. until bedtime. Students who reported

using technology 2–4 hours was 41.18%, 20.59% reported 1–2 hours, 11.76% reported 30 minutes to an hour, and 5.88% reported 0 to 30 minutes.

Figure 8

From 2:33 p.m. Until I Go to Sleep, This Is How Much Time I Spend on My Personal Technology Usage Outside of School.
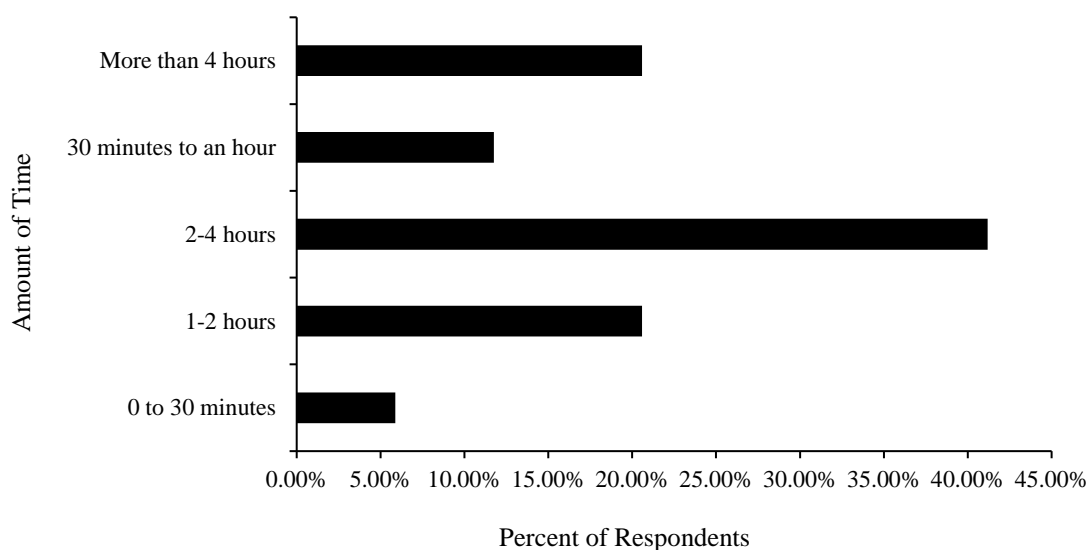
Survey Statement 8

Participants were asked to respond to how they believed this time spent on their personal technology usage helped them engage and understand their learning targets, how they were reaching their learning targets, and where they were going next in their learning targets. Figure 8 indicates 41.18% of students disagreed and 5.88% strongly disagreed that their personal technology usage outside of the school day helped them engage and understand their learning targets, how they were reaching their learning targets, and where they were going next in their learning targets. However, 23.53% of students were neutral, 11.76% agree their personal technology usages helped them engage, and 17.65% strongly agree.

Figure 9

I Believe This Time Spent on My Personal Technology Usage HELPS ME Engage and Understand My Learning Targets, How I Am Reaching My Learning Targets, And Where I'm Going Next in My Learning Targets.
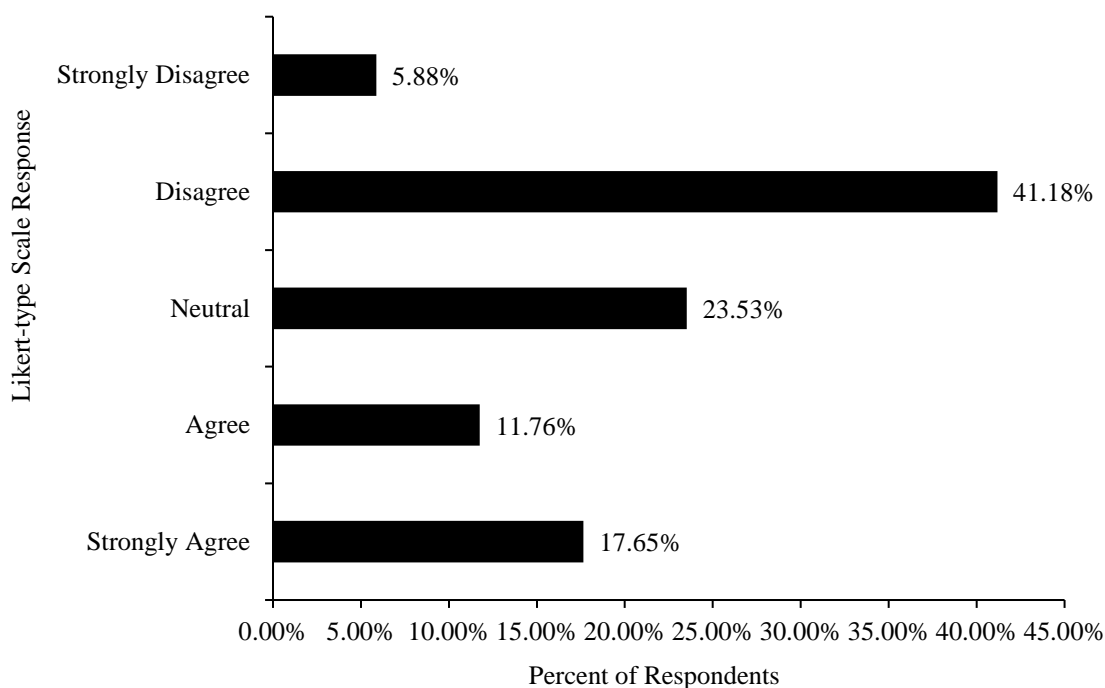
PPMC Analysis

The results of the four statements regarding the amount of time for student technology usage were averaged for each student and that average was used as the first set of data for the PPMC. A numerical value, 1–5, was given to each response so an average could be calculated. The value of 1 was given to the lowest amount of time spent and the value of 5 for to the highest amount of time spent. The results of the four Likert-type Scale statements regarding how students perceived technology usage and student engagement were also averaged and those averages were used as the second set of data for the PPMC. The value of r was -0.4404. A negative r value indicated a negative

association between variables. The *p*-value was .009214. The result is significant at $p <$ .05. The null hypothesis was rejected. There was a correlation between excessive technology usage for middle school students and classroom engagement.

Qualitative Data

The interview questions were designed to gather core teachers' perceptions of technology usage. To gain a clearer understanding of classroom technology usage and how it affects student cognitive engagement, interview questions one through four were designed to collect perceptions of technology usage and its effect on student relationships with peers. To gather teacher perceptions and further insight regarding how technology usage affects student cognitive engagement when implementing learning management systems and educational technologies, as well as how these technologies help assess learning, interview questions five through seven were designed. Participant interview transcripts were provided to the respondents to validate the data. The interview data gathered was compiled and analyzed and key findings are presented under each interview question heading.

Interview Question 1

How has the use of education technologies aided in students' collaborative learning with each other?

All interview participants agreed education technologies aided in student collaborate learning in several ways. All seven respondents noted students collaborate through discussion posts, chats through Canvas, and providing feedback on each other's work through comments aided in collaborative learning. Participant 1 stated, "in math, it's given them different avenues other than paper and pencil to collaborate, like

discussion boards and chats through Canvas." Participants 2, 6, and 7 shared educational

technologies help introverted students or students who are lacking confidence find

confidence behind the computer screen and it allows for interaction through chats and

comments, facilitating comfort to communicate thoughts and ideas when working

towards a shared goal.

Participant 8 observed,

The select few that would maybe not share in front of the class as far as any type

of discussion that's going on, they are braver to type it in some sort of discussion

setting online as opposed to in person.

Participants 4 and 5 noted technology helped through the COVID-19 pandemic by

allowing students to continue participating in class and collaborate with peers even when

they were in quarantine. Participant 6 noticed students are more likely to work in groups

if technology is part of the assignment and stated, "in the classroom, I've noticed that

they're less willing to work in small groups unless they're doing it through an online

basis." All participants agreed that educational technologies provide students with more

choices to present work and projects, increase student confidence, and allow for more

creativity.

Interview Question 2

How has the use of education technologies been a disadvantage in terms of student

relationships with peers?

All interview participants agreed middle school students do not have the

wherewithal to use technology appropriately most of the time and it has negatively

impacted student relationships with peers. Participant 4 stated, "it's like it's becoming an

addiction for them and they would rather be on their computer than talk with someone face to face." Participant 3 responded too much technology integration has students stuck behind a screen, either on their computer or phones, not getting enough face-to-face interaction. Participant 3 went on to state, "they are losing their communication skills with people." Participant 1 also agreed with the other participants and stated, "they have a hard time talking face to face."

Participants 1, 2, 5, 6, and 7 all observed students consistently choosing to use technology inappropriately to chat with one another, sabotage collaborative learning opportunities, have less patience, and are becoming more aggressive, hateful, and impatient with their peers. Participant 5 shared an example, during group projects students divide up their work, but then students change other students' work. Participant 2 had experienced a similar situation:

> Like a document where there is a group or the whole class is working, the disadvantage of all students on the same document is they delete files, get off track, type inappropriate things, delete entire presentations, fight, and kick one another off the project. Even though it's hard to pinpoint which student cause the chaos, it does eventually come out and that student or students get sent to the office.

Participant 7 has had issues with discussion posts:

> They're not always kind online like they're not always kind in person. That's one of the downfalls of discussions posts. If they're commenting on someone else's work, sometimes they are unkind in the things that they say, and it causes fights between students.

Participant 6 has observed students being less patient, more upset and irritated with peers, and if they have to wait on a peer, they get more hateful, aggressive, and impatient.

Interview Question 3

What is your perception of student conduct/student behavior when it comes to relationships with peers?

Participants 1 and 2 spoke to the lack of maturity with middle school students and have observed similar instances where technologies are not doing what they are intended to do educationally for students, because the students who lack maturity are goofing off, are off track, and are not completing their work which negatively affects relationship building and causes negativity between students. Participant 2 noticed students:

[Students] who are more mature with the tech piece are amazing, have great, deep conversations, and work to create masterpieces online. The students who goof off aren't building good relationships if their work is not getting done and they are looked at negatively by their peers.

Participants 3, 4, and 5 all agreed social media is wrecking middle school students. Participant 3 expressed:

Open access to the internet has affected their behavior because they don't understand what's acceptable and how to react. Lack of internet etiquette and what they are allowed to watch and what they are exposed to is really negatively affecting student behavior.

Participant 4 vented, "social media has destroyed middle school students. Snapchat is the worst and has been a vehicle to easily, anonymously, and purposefully destroy other students." Participant 5 similarly expressed, "social media is a huge problem. There is a

lack of respect, and they treat each other horribly. Bullying is happening online and then, somehow, they access each other's project and then cause havoc."

Participants 6 and 7 spoke to technology usage through the pandemic and noticed that technology helped students continue a relationship with their peers, even though it is less personal, they were still able to connect with their friends. They also noted that added isolation has changed the dynamic of relationships with peers negatively because how they respond to one another on social media is different than how they engage with one another in real life. Participant 7 stated, "when students are hiding behind a computer screen they are brave enough to say things they wouldn't normally say in a face to face classroom situation."

Interview Question 4

What is your perception of students using personal technology to connect with peers?

When it comes to students using personal technology all seven participants had some strong opinions and experiences. Participant 2 expressed:

> We all know social media; we all love it. It's funny and it's what's hip and what's out there and that's what's drawing people to it. Cyberbullying, arguments online, lies, and different things that aren't true that get out there. I've had students come up to me and show me great things online that they've seen, and it strikes up good conversations. For instance, a student showed me something that was on TikTok today and it was a snail laying eggs. They asked what was going on here and it struck up a whole conversation. It would be nice if there was a safer version like TikTok for education or something. I see more negative than good.

Participant 4 shared strong concern:

They can do anything under the sun with that device, and it's going to be

permanent. Everything on the internet leaves a footprint somewhere and they're

going to be things that are going to haunt them that they never intended. They

could be in some serious trouble or have serious regrets about something they did

as a child.

Participant 7 also had a very strong perception and shared:

Social media is a huge problem. Kids are too attached, say terrible things online,

take pictures in bathrooms, and having a personal cell phone creates a lot of

opportunities for bad things to happen. It's a negative thing for students at this age

to have personal technology. There is a lack of parent oversight with technology

usage which increases the probability of negative things to happen.

Participants 3 and 5 expressed free access to internet needs to be limited for students and

technology is only good at the middle school age when they use it appropriately to

connect with one another. Participant 1 stated, "those that have regular rules and

expectations established are able to use personal technology in a decent way." All

participants agreed students need more internet etiquette and cyber education.

Interview Question 5

What is the percentage of time you use education LMS technologies, such as Canvas,

Gmail, and Google Drive as organizational tools in your classroom per week?

Participants 2, 4, and 7 responded they used Canvas, Gmail, and Google Drive

100% of the time in their classrooms during the week. Participant 5 responded with 90–

95% of the time. Participant 1 responded they used these programs 80% of the time.

However, Participants 3 and 6 used these online platforms significantly less. Participant 6 responded with 30–40% of the time and Participant 3 responded only 10% of the time

Interview Questions 5a

What do you notice about how LMS technologies impact students in the classroom?

All seven participants agreed LMS technologies help students be more organized, self-directed, and responsible because education is right at their fingertips. Through the use of educational technology students are able to read daily announcements from teachers, know what assignments need completed, use email to communicate, stay on top of their own grades, and are able to lead their own learning. LMS technologies are convenient and helpful for students who are absent, on homebound services, and throughout the pandemic for learning to continue.

For students who are really disciplined, Participant 5 noted LMS technologies help them stay on track and gives them access to go above and beyond with enrichment activities. Participant 7 stated, "with the use of Canvas announcements students have become more self-directed learners, especially when they are absent from the classroom." Participant 7 went on to explain that when students are absent, they can find class work instruction on Canvas or if they missed something in class, they could revisit Canvas and see what they missed. Participant 7 explained, "in a sense, they have access to everything that they need for class in one spot."

Interview Question 5b

Do these LMS technologies help you achieve your classroom goals? How?

All participants indicated LMS technologies are a huge time saver when it comes to, grading, organizing and pushing out important information, managing resources, and

with assignment turn-in. Participant 7 explained using Canvas announcements and assignments is similar to how teachers used to write traditional lesson plans. Participant 7 described creating lesson plans through Canvas allows teachers to include links to resources, both uploaded and out on the world wide web, helps keep teachers on track when planning, and Google Drive keeps track of all shared resources between teachers. Participant 7 indicated, "Google Drive provides easy access so that we (teachers) can all work on curriculum together as we collaborate," indicated Participant 7. Participant 6 added, "having communication through Google email and Canvas makes students advocate for themselves."

Interview Question 5c

Do these LMS technologies help students achieve classroom goals? How?

LMS technologies allow teachers to set up an online classroom with all the information students need to be successful in a class. Participant 4 explained:

I mean, it puts it all in one place. That's everything we're going to do for an entire unit right there, so if there's any question of where study materials are for an upcoming assessment or where daily assignments are located, teachers can direct students back to Google Drive or Canvas. Google Drive is very, very helpful in forwarding students a wide variety of slideshows, presentations, and resources.

Participant 6 touched on classroom learning goals and shared, "students know where they can go to get help, support, information, materials, and resources if they need it." Participant 1 mentioned the ease of Canvas quizzes by sharing, "it gives them that immediate feedback. Especially in Canvas quizzes, it automatically grades so students can see immediately if they are meeting their learning targets." Participant 7 shared

Canvas and Google apps help students who have reading difficulties or some other

individualized education plan because through the use of the immersive reader, it can

read the text aloud for them and helps students stay organized.

Interview Question 6

What is the percentage of time you use different learning platforms, such as Kahoot,

Quizlet, Google Slides, Interactive Notebooks, and Video embedded with questions,

simulations, and/or polling in your classroom per week to test mastery of learning?

Participants 3 and 5 responded they used Kahoot, Quizlet, Google Slides,

Interactive Notebooks, and Video embedded with questions, simulations, and/or polling

in their classroom 90–100% of the time. Participant 5 responded with 75% of the time.

Participant 4 responded that they used Quizlet 20% of the time and Google Slides 50% of

the time. However, Participants 6 and 7 used these online platforms significantly less.

Participants 6 and 7 responded with 20% of the time.

Interview Question 6a

What do you notice about how educational technologies impact students in the

classroom?

All seven participants agreed educational technologies grab students' attention

and are very engaging. Each participant spoke about students enjoy how fun learning can

be using educational technologies and how it can reach a multitude of different learning

styles. Participant 7 explained:

> In social studies we use Quizlet occasionally and we use Kahoot a lot. I
>
> don't do traditional tests. The Quizlet and Kahoot students really like when
>
> we're working on level 2 vocabulary, learning facts, and things like that

because it's just the online flash cards and games that's helping them learn (see

Appendix K).

Participant 2 expanded further on Quizlet and its usefulness with vocabulary

repetition for those needing practice and Kahoot helps with those needing a quick review.

Participant 2 continued and explained how the option of embedding videos helps visual

and auditory learners. Participant 3 similarly expressed education technologies can assist

in reaching multiple learning styles. Participant 5 also uses Kahoot regularly and

discussed how students get excited when they see they are playing a learning game

during class. Participant 5 stated:

> They love Kahoot! They get loud and want to win by being the first one to answer
>
> the question which moves their name to the top of the winners list. They love to
>
> have bragging rights! By using Kahoot you can get kids involved who never
>
> speak in class.

Participants 3 and 6 have noticed these educational technologies are very engaging and

keep students' attention during the lesson. Participant 4 uses Google Slides regularly

because it is user friendly and easy to follow along and type or handwrite class notes on

the slides or paper copy. Participant 5 shared:

> I've read some of the most awesome answers from students on a discussion board,
>
> especially from students who never say a word in class. It's a different learning
>
> tool, but an important one because students don't have to speak in front of
>
> everybody.

Interview Question 6b

Do these educational technologies help you achieve your classroom goals? How?

All participants except Participant 3, who rarely uses technology in the classroom, agree educational technology allows them to achieve their classroom goals through formative assessments, quick knowledge checks, relaying information to students, interactive activities, differentiating instruction, and providing enrichment activities. Participants also spoke about educational technologies' ease of use. Participant 7 stated using educational technology allows for the quick sharing of information, organization of information, and opportunities for extra practice for students. Participant 4 explained the educational technology, Google Slides, is a "nice, easy way to present information to the class for them to follow along." Participant 4 also spoke about Quizlet being "very user friendly" and "I can put exactly what I want them to review on it so that they have no misconception about what they will be assessed over."

Participants 5, 6, and 7 spoke to how these educational technologies help them differentiate learning. Participant 6 shared educational technology is presented using different types of media and materials throughout the week in hopes of not only keeping students engaged but also meeting the needs of all learning types. Participant 5 explained presenting information in a mundane way does not always reach all students or provide an opportunity for participation, so differentiating instruction by using educational technologies can provide students with a learning connection, which in turn would get students more engaged within the classroom. Participant 5 commented, "differentiating lessons might just even change a student's whole week."

Participants 1 and 2 felt educational technologies allow for quick knowledge checks and formative assessments. Participant 1 spoke to the importance of "giving

information to kids in a variety of methods" and has found success using interactive activities as informal knowledge checks. Participant 2 used educational technology to:

> see where we're at as a whole class. If there is a majority of them that are getting the information, then we move on. If I notice a lot of them are not understanding, then that tells me I need to reteach. It helps me see if I'm achieving my learning goals for the day or week.

Interview Question 6c

Do these educational technologies help students achieve classroom goals? How?

All participants agreed educational technologies help students achieve classroom goals by helping them understand their learning targets, become excited and engaged in classroom activities, present research, and to stay on top of schoolwork, due to absences. Participant 2 talked in-depth about Kahoot and Quizlet being incredible resources to help students achieve learning goals. Participant 2 stated:

> When there is a question pulled up with, let's say, a vocabulary question, and the student doesn't quite get that vocab piece and they miss the question, then a percentage of how many students got it right is shown on a poll. That tells the student, and me, if there needs to be a review or reteach of that vocabulary word or whatever the topic is.

Participants 5 and 6 emphasized when information is presented in a fun way for the students to think it is a game, a higher level of engagement and learning occurs. Participant 5 found, "it gets them more engaged, especially those that aren't usually engaged." Participant 6 stated, "some students learn better through a fun game and if enrichment activities are presented in a fun way, then many times I've seen a student get

it and they have a click-on brain moment." Participant 7 found using Quizlet like flash cards for level 2 information, vocabulary, drill, and practice, is a way to engage struggling students in a fun way and since the Quizlet is linked in Canvas for students to go back to for practice, it allows student to have access at any time.

Participants 4 and 7 talked about Google Slides being a convenient way for students to follow along during class lectures, can be printed for students to take handwritten notes; and if an absence occurs, it is easy for students to read through the slides and access the missed information. Participant 4 relied heavily on Google Slides for both presenting information and for students to present research. Participant 4 shared:

Google Slides are a very easy way for students to put together their social studies research and then relay that information as they present to an audience. I do try and get them to do other things because a lot of kids are tired of seeing a Google Slideshow. I offer alternative options to students to present their research, such as creating a video, a Prezi, a website, an Infographic, or something else besides, you know, death by PowerPoint.

Interview Question 7

What is the percentage of time you use educational technologies, such as Flipgrid, Websites, Blogs, Infographic, and Canvas tools like quizzes to help you assess learning in your classroom?

Participant 5 responded using a mix of digital labs, Google Slides, Flipgrid, and Canvas 90–100% of the time for assessment. Participant 7 responded they used these programs to assess 95% of the time. For level 3 and 4 assessments they use a mix of technology and Socratic discussions. Participant 2 used these online platforms for

assessment 95% of the time, while Participant 6 responded with 30–40% of the time. Participants 1, 3, and 4 used these online platforms significantly less for assessment. Participant 1 reported using educational technologies for assessment 20% of the time, Participant 3 only 1% of the time, and Participant 4 uses Canvas exclusively for assessment 10–20% of the time.

Interview Question 7a

What do you notice about how educational technologies for assessment impact students in the classroom?

> Participant 3 emphasized:
>
> I have no experience using educational technologies for assessment. I think I just like the concept of students seeing the problem and being able to solve it and not have to rewrite the question on a piece of paper. They could mess up rewriting the question off the computer. My typical feedback on assessments is 24 hours. I'm from a small school and we weren't 1:1 technology, so I learned the traditional way in the classroom, even though I'm only 24 years old.

All other participants use educational technology for assessment and appreciate the immediate feedback it gives students. They also all agree students use the immediate feedback as a tool to know where they are at in their learning and whether they need any learning interventions.

> Participant 7 especially likes the immediate feedback it gives students and shared,

"the way we build our quiz banks, students are allowed to reassess, but not necessarily have the same questions. I really enjoy that aspect and that immediate feedback has the biggest impact on them." Participants 1 and 6 agreed with Participant 7 and like the

immediate feedback and quick response time a teacher can give on short answer or

critical thinking questions, and the variety of questions educational technologies allow

teachers to write, because it better prepares them for the variety of types of questions they

might see on standardized tests.

Participant 2 indicated:

When students are done taking an assessment, they not only see their grade

immediately, but they know which questions they missed and what the correct

answer was so they can go back and study. Their brain is already thinking about

the information so getting that immediate feedback gives them instant

gratification on what they missed and why. It also helps the student know if they

need Focus class (response to intervention class) or tutoring. Anything done

online that I have to grade, it's just a quick read and typing feedback to students.

Participant 4 found value in the control teachers have in preparing assessment from

mixing up the questions, and how the assessment questions show up, to how students

respond and the immediate feedback it provides. Participant 5 cautioned building

assessments without any deeper level thinking questions. Participant 5 has observed and

shared, "Multiple choice questions don't measure deeper level thinking. To get students

to think more critically there needs to be a mix of question types."

Interview Question 7b

Do these educational technologies help you achieve your classroom goals? How?

When it comes to teachers achieving their classroom goals, seven participants

agreed it allows them to quickly identify who needs intervention through Focus class or

tutoring. Participant 3 disclosed, "they don't help me reach my goals because [I] only use

them 1% of the time." Participant 1 shared, "I can really see their thinking with some of the online tools I use." Participants 4, 5, 6, and 7 discussed what a huge time saver educational technology for assessment has been. Participant 4 appreciated Canvas's ability to grade a large amount quickly and reported, "I can use this extra time in more constructive ways in my classroom instead of hand grading 130 quizzes and assignments." Participant 6 is fond of how quickly they can figure out who needs interventions and reassessment opportunities. Participant 7 shared:

> It's a time saver by allowing for immediate feedback but not for deeper level, critical thinking questions. The immediate feedback helps me to have meaningful conversations with students about their learning because they have already seen what they've gotten wrong, and we can talk about it quickly.

Participant 2 expressed valuable insight:

> I look at the standards for the week and that helps guide the development of my assessment questions. I create assessments in Canvas that are true/false, multiple choice, and essay. It's faster grading for me and faster feedback for students so I can intervene and implement strategies for learning. The downside is I used to spend more time with deeper discussions and feedback than I do now because I just really rely on technology to give me the feedback.

Interview Question 7c

Do these educational technologies help students achieve classroom goals? How?

Participant 3 revealed educational technologies do not help students achieve classroom goals, while the six other participants shared having the availability of a variety of different technologies increases student engagement and meeting learning

targets. One of the ways to help students stay on track is an educational technology called Hapara. Participant 1 stated, "Hapara is a big help with keeping students on track and closely monitoring them." Participant 2 appreciates how educational technologies helps students to:

> [To] make goals for themselves (whether weekly or quarterly) that is academically driven. Canvas is a tool they use to show their body of evidence, know how they are doing in the class, and where they are at on their goals. It's a great learning management tool that will hold everything for them.

Participant 7 shared students are able to cross reference their answers with the p-scale that's provided and how that helps students keep track of the learning. Participant 4 similarly agreed:

> [Educational technology] gives students an opportunity to show what they've learned throughout that learning phase. It provides teachers and students hard quantitative data, and they can match up what questions they missed with the proficiency scale it's related to and whether they met or didn't meet their learning targets. That immediate feedback that links to their p-scale is valuable. Then they know what they need to relearn and reassess on to fill in that learning gap. They know immediately if they need Focus or tutoring and they come tell me to get them signed up. I think it gives them more ownership over their learning. Before the assessments, I'm able to tell them that if you get an 8 or 9, then you've met the goal and passed that p-scale. They know right there whether they need to take extra steps to bridge the gap of what they had wrong, misconceptions, or bad info, and they know immediately what they need to learn and fix.

Participants 5, 6, and 7 agreed with other participants on the value of immediate feedback and getting students signed up quickly for an appropriate learning intervention.

Interview Question 7d

Do you believe these educational technologies are a distraction? Why or why not?

Whether it is chats, email, multiple open tabs, or gaming, all seven participants shared these are major areas of concern within the classroom. Participant 4 observed education technologies are a real issue for kids with short attention spans. Participant 4 stated, "It's almost unrealistic to think I can keep them all on the same Google tab at the same time. They like to wander from tab to tab."

Participant 4 supported a student technology monitoring system, Hapara, it has made it easier to observe what students are doing on their computers. Participant 7 identified there is a time and place to use technology and teachers should be implementing other types of resources as well into the classroom. Participant 7 expanded:

> Teachers need to implement high standards or strict standards for students in the classroom when it comes to tech. That way even though students will be tempted to play games or be off task, they know those standards are in place and that the teacher will enforce them,

 Participant 7 perceives technology offering a huge temptation for students to be off task doing non-educational activities that are not intended for the classroom.

Participant 5 shared that it all depends on how the teacher uses educational technology in the classroom. It is great for giving opportunities for choice and to show what they know. Participant 5 warned against giving students free online access because

they are easily distracted by gaming, friends, email, and other activities. Participant 5 continued, "I use Hapara every single day. If teachers are watching them [students] like a hawk they'll flip screens and be off doing something else. It takes discipline and focus which is hard for kids."

Participant 2 felt educational technologies are a distraction, especially anything Google, because they communicate with one another in a variety of ways, such as email, chat, and collaborative projects. Participant 6 shared an interesting perspective by relating that the educational technology teachers use during class is not a distraction, but the habit of automatically getting on technology is where the issue lies. Students always want their Chromebook open, whether they are using it or not. Participant 6 stated,

> They always want to be on it doing whatever they want to do. They love to play games, do other classwork, and do anything with listening to music unless you tell them it's not the time. They also love trying to do other things than what they are supposed to be doing. I use Hapara, but that only works if I'm able to monitor student screens.

Interview Question 7e

What do you notice about student engagement when you use technology versus not using it at all (discussions, paper/pencil, traditional lectures, etc.)?

All participants felt there is a lot of value in discussions, paper and pencil activities, traditional lectures, and getting students off technology during class. Participant 1 shared a teacher's perception, in that students are tired of constant technology usage. Participant 1 stated, "They are so comfortable with technology that I feel like I get more thorough answers on assessments when I use technology. However,

during a regular class period I think students are more engaged when they are not on their

Chromebooks,"

Participant 4 indicated in social studies classes there are a lot of traditional

discussions where engagement is high. Participant 4 further explained:

I believe engagement is higher in classes that are holding discussions,

Chromebooks are shut or inaccessible, and students get a chance to sit and talk

with each other and the teacher to share opinions and thoughts. Occasionally I do

go traditional lecture and notes on what I'm presenting. When I do traditional

lectures, students are given a graphic organizer to fill out or a notes page kind of

format that follows along with what I'm lecturing on and it's nice and easy for

them to fill out and follow along with.

Participant 3 hardly uses any technology in the classroom and spoke to the value of

giving students a notes page to follow along with during class instruction. Participant 3

stated, "I have it printed for students every day. When I'm lecturing, they follow along on

their notes page. I'm not experienced in trying to have them follow along on their

Chromebook." Both Participants 3 and 4 explained students enjoy getting a break from

being on a Chromebook, plus that frees up the teacher from having to look at a computer

screen also.

Participants 6 and 7 spoke to the importance of creating interesting, engaging, and

fun lessons and if what you're doing in the classroom is not appealing, no amount of

technology usage can save the lesson. Not all students are going to connect to a lesson in

the same way, so Participants 6 and 7 both believe it is important to incorporate various

methods of instruction to try and reach all students. Participant 7 explained:

If you simply use technology every day to read through Google slides students are

not going to be any more engaged than they are reading out of a textbook.

Unfortunately, technology isn't novel anymore, it has almost become expected to

use every day. If it's not new and fresh every day, students get bored and

unengaged. That's the challenge.

Participant 6 described their classroom as a mix of physical and technological.

Participant 6 expressed,

I incorporate various methods of instruction like visual and auditory for students

to see a video or listen to a book. I have Google Slides going where I can show

them, and we can practice. Discussions and handouts are great. I try and hit as

many different learning styles as possible.

Participant 5 made an interesting observation; technology has distracted students from

thinking more independently. Participant 5 voiced concerns about technology and student

engagement:

If they are on technology, they are thinking about emailing someone, playing a

game, searching Google, etc. Technology has made things too easy to where kids

don't have to think as much resulting in not being as engaged. If we threw an

encyclopedia down in front of them, would they even know what to do with it?

Interview Question 7f

The goal is for students to move from surface learning to deeper learning (Antonetti &

Stice, 2018). How do you use educational technologies to move students across that rigor

divide when you are lesson planning, creating assessments, etc.?

When moving students into a deeper level of learning, all participants agreed that it is all about teachers asking the right questions, so students make connections. Participant 1 explained:

The level and types of questions and the variety of technology available allows us to give those higher order questions to kids. One of my favorite activities is called notice and wonder. I just pop up a question or a picture as a prompt and ask students to tell me what they notice and what they wonder. They think it's not math related, but it totally is and they just don't realize it. It helps students think more critically and make connections to what we've been learning.

Participant 2 spoke to enjoying a debate unit and moves students into deeper learning by giving students a firm level 2 foundation with vocabulary followed by an analogy activity using the vocabulary in a sentence and how they have seen it used in the world. Participant 6 enjoys watching students make connections within their reading. and described taking virtual tours has helped students understand what they are reading and to make those real-life connections:

I like to give them a lot of background information so that we can have deeper conversations seeing and making connections through different experiences like virtual tours help students make a deeper connection. They have the freedom during the tour to look at the areas that interest them or they want to learn more about. Each student can find something to look more into and go deeper where it's a personal connection.

Participant 3 shared an educational technology, Open Up. Participant 3 houses basic, intermediate, and advanced lessons in Open Up, allowing students who need

enrichment the opportunity for deeper learning. Participant 5 expanded on open-ended, higher order questions:

> Open-ended questions are where students have to provide evidence and I do not present them using technology. I have found when students have to use paper/pencil, they try harder, and I get a better idea on their level of thinking. After reflecting and gathering data, they put that into their digital lab on Google Slides. This also helps me track their progress.

Participant 7 explained how technology is used more as a source of information in their classroom. Participant 7 communicated:

> I just don't use technology to move students over the rigor divide. To test their deeper learning, I do authentic discussions and projects, and maybe technology is a small piece of those things. For example, we just did a Socratic discussion where they evaluated the manifest destiny and westward expansion. To prepare they looked through an inquiry packet online to look at all the sources that helped them answer their level 2 questions. Then they build an argumentative essay outline and when that was done, they could choose to have a discussion with me to assess their learning or do something online as a presentation. Technology was a small part of helping them prep for the project, but you really get to learn about what they know through having a conversation with them. That's how I assess their deeper learning.

Participant 4 introduced students to information evaluation. Participant 4 shared that teaching students how to decipher credible sources is a deeper learning activity that she utilized:

They evaluate information within an article I provide which can lead them to all

kinds of places of reliable and unreliable information that they actually have to

think deeply about. Sometimes I give them bogus resources that I know are full of

fallacies and false information. The goal is to have students actually think

critically and research what makes a bogus website. My planning involves a lot of

technology because that's where the education system has moved.

Interview Question 7g

How has technology helped students be more cognitively engaged?

All seven participants spoke about the variety of platforms available online and

how it has aided students and teachers alike in the classroom. Technology has definitely

increased engagement, because of all these options. Participant 2 said:

Some kids like the reading piece, some like to create, some learn from audio,

some are visual learners. That's what technology opens up the world for. Blogs,

videos, images, infographics, presentation choice, websites, slideshows are just

some examples where students have to critically think through many things and

how to incorporate their content using those mediums. It's a great way for me to

know that they know the information.

Participant 5 stated technology has given students all kinds of opportunities to share

opinions, chat, and engage in activities and projects. The perception shared by Participant

6 is technology has helped students make more personal, meaningful connections. The

key is for the teacher to connect it back to the curriculum and to not forget about the

value of discussions, instruction, and to guide students to the correct places for

information online. Participant 6 shared, "Students then can move at their own pace and

take ownership over their learning," In-person collaboration and online collaboration both have value. Participant 6 stated, "technology has helped with the collaboration piece. The introverts are more engaged because they can share freely through text than talking. The extroverts are having to have the in-person conversations and has increased their confidence." In regards to finding information online, Participant 4 said:

> You cannot leave students to find information on the internet by themselves, they struggle badly. It's definitely an age thing…they don't have the wherewithal yet to understand how to research and get factual information. They don't click the actual links and read and they cite Google search as their source. To keep students engaged it's really all about teachers training students on knowing what to do online and how to evaluate websites for accuracy, copyrights, up-to-date information, and if the website shows bias. If you give them the right place to go and look, they have more success.

Participant 7 uses technology to provide enrichment activities for students stating:

> It has allowed me to differentiate instruction easier. I can offer different levels for things for students to do. I build enrichment into my Canvas announcement. It helps them work more, provides students to work through instruction at their own pace, and I notice more engagement when I provide a variety of options for students to share their knowledge and learning.

On the flip side, Participant 3 is not an avid proponent of technology in the classroom. Participant 3 does not believe technology has aided in students being more cognitively engaged. Participant 3 shared:

Technology is too distracting and hurts them more than it helps. I see students

distracted by Spotify, Google searches, chatting, emailing, and gaming. They are

on technology almost 7.5 hours a day, then go home for hours and are on school

or personal technology like their cell phone, Xbox, or other things. They need

more in-person interaction with one another without the interference of

technology.

Interview Question 7h

How has technology been a distraction in your classroom?

While participants mentioned emailing, social media, cell phones, chats, not

having charged devices, and connectivity and hardware issues as some technology

distractions; gaming is the number one distraction in the classroom according to six of the

seven participants. Participant 5 said, "They are basically hooked on gaming."

Participant 1 shared:

We have had a lot of issues this year with gaming and students chatting with one

another online. They've found ways around the internet filtering system and even

though it might look like an assignment they are working on, it's actually a chat

box of some kind with five or six students participating. Another annoying

distracting is students saying they can't do their quiz or assignment because their

Chromebook isn't working for various reasons. It's just a whole new element of

being unprepared for class and trying to get out of doing the work. Teachers

always need to be prepared with an alternate paper assignment because you never

know when a student is going to lose their technology privileges.

Participant 2 agreed teachers always need to "have a plan b, especially when students have to be pulled off of their device for not following the rules or in case of connectivity issues." Participant 6 expressed frustrations with students gaming:

> Keeping them on task and not playing games is a real struggle. That's the biggest distraction. A close second is Chromebooks not being charged and students not bringing their chargers to school. Technology has its place but I think it really comes down to intermingling it with traditional forms for variation in the classroom. We have been so tech heavy that we've forgotten the value of traditional forms. Teachers must add different modes to support lectures and discussion. We read a lot from real books in-hand in my classroom. It's almost like a brain break to read out of an actual book.

Participants 4 and 5 voiced frustrations over connectivity issues when teaching lessons, websites not working in the middle of a lesson, and how when you lose the attention of students it really affects instruction in a negative way. Participant 5 stated,

> I think technology has made us lazy and has made some things too easy. Kids wouldn't know what to do if they had to research and do work like we did in school. They complain that it's too hard. If everything technology falls apart one day, students living during this time wouldn't know what to do. Because of technology students are lacking communication and researching skills.

Participant 6 said:

> One of the biggest distractions is having kids with access to the entire world and everything we've ever known about right at their fingertips. I try and keep them on the right thing and engaged in the learning, but I lose their attention span and

they are surfing different tabs or playing games instead of doing the coursework or following along during class.

Participant 7 mentioned concerns over gaming issues in the classroom and middle school student's immaturity when handling technology. Distractions with students not having chargers, forgetting computers, and being on unapproved websites, have been exhausting for several years. Participant 7 shared:

I have strong expectations with consequences for technology violations. Follow through is so important and it's been very frustrating that I can discipline technology issues in my classroom but when those escalate to the office level, there is no accountability. There are technology expectations in the student handbook but students in our building are given too many chances, so they don't take the rules and expectations seriously.

Participant 3 has no technology distractions in the classroom, because they only use technology 1% of the time in the classroom.

Summary

Technology in schools is a double-edged sword. Participants revealed how the ease of use, accessibility, organization, connecting with other educators, and options for collaborative projects and presentations in a multitude of ways make a positive impact on learning. The distractions technology presents are strong and are a cause of great alarm. The reality about how much students are on technology and what students are accessing is a deep concern for educators. Students are being over stimulated and inundated by technology and online access, which affects their cognitive engagement.

Educators have found creative ways to move students across the rigor divide into deeper level learning activities, which keeps students excited, engaged, and learning. The bulk of the participants' frustrations come from lack of maturity, when it comes to students making decisions online. Technology has been a blessing to participants by providing a platform for educator collaboration, a way to push out assessments and feedback, and creating a huge time saver within the classroom. Technology has also allowed students who are absent from school to stay connected and to continue learning. Additionally, technology has allowed teachers to free up more time in the classroom to meet one-on-one with students for learning checks.

Chapter Five includes the findings and conclusions for this study. Implication for practice is described. Finally, recommendations for future research are presented.

Chapter Five: Conclusions and Implications

Hamilton and Hattie (2021) emphasized the importance of transforming teaching methods so technology can enhance learning. Wexler (2019) reported that when an excessive amount of technology is present in the classroom, students have fewer opportunities for social collaborations, learn less information, are increasingly unfocused, and are less interested in learning. The perception is technology improves learning outcomes; however, according to Hamilton and Hattie (2021) it can be a substantial learning interference and can present a large learning curve for students and teachers alike. Even though computers and educational technologies have the capability of significantly enriching efficiency and learning in the classroom through educational software, organizational platforms, and instant access to learning resources (Bond & Bedenlier, 2019; Patterson & Patterson, 2017; Raja & Nagasubramani, 2018), technological complications, like lack of technology skills, online and blended learning opportunities, insufficient feedback, decreased one-on-one interactions, and inadequate home technologies can hinder student engagement.

The purpose of this mixed-methods research study was to establish if there is a connection between student cognitive engagement and excessive technology use. The focus of the study was to determine educator perceptions of excessive technology use on student relationships with peers and how excessive technology use affects student cognitive engagement. Bond and Bedenlier (2019) suggested the more students are connected and encouraged within their learning community the more likely it is participation, effort, and success will develop. Additionally, the intent of this study is to provide some educational technology insight to educators so pedagogies and curriculum

can be redesigned to be more cogitatively engaging while decreasing technology usage in the classroom.

The findings based on this study's data analysis were introduced in Chapter Four and are further explained in this chapter. Additionally, conclusions guided by the findings are supported by the reviewed literature in Chapter Two. Suggestions for curriculum reform and development are offered based on educator perceptions. Future research suggestions are also provided. The final summary of the study concludes in Chapter Five.

Findings

Student and educator perceptions on daily technology usage and student engagement were obtained and analyzed. Three research questions were used to guide this study and were answered with the collection of quantitative and qualitative data. The quantitative data were analyzed to gain student perspectives on the amount of home and school technology usage. A PPMC calculation was applied for the quantitative data. The null hypothesis was rejected, and a significant correlation was found between excessive technology usage and classroom engagement of middle school students. Data from the qualitative interviews revealed educator perceptions of Learning Management Systems, student relationship with peers, student personal technology usage, how valuable educational technologies are to students and teachers, student cognitive engagement while using technology, and distractions with technology usage.

Research Question One

What is the correlation between excessive technology usage for middle school students and classroom engagement? Quantitative data from the student survey indicated 94.12% of students used LMS technologies, such as Canvas, Gmail, or Google Drive in

the classroom 41–100% of the time. When asked if students believed LMS technologies helped them to engage and understand learning targets, how to reach learning targets, and understand where they were going next in their learning targets, 58.83% responded they agreed or strongly agreed. Moreover, 5.88% of students used LMS technologies 0–40% of the time, and 5.88% of students disagreed or strongly disagreed that it helped them to engage and understand their learning targets, while 35.29% were neutral.

When asked about the percentage of time spent using educational technologies, such as Kahoot, Quizlet, Google Slides, interactive notebooks, video embedded with questions, simulations, or polling, in the classroom, 64.7% of students responded they used educational technology 41–100% of the time. Of those students that participated, 70.59% agreed or strongly agreed that educational technologies help them engage and understand learning targets, how to reach learning targets, and where they are going next in their learning targets. Additionally, 35.47% of students conveyed they used educational technologies to reach their learning targets 0–40% of the time, and 2.94% disagreed or strongly disagreed it helped them to engage and understand their learning targets, while 26.47% were neutral.

When it comes to using educational technologies for assessment, 38.23% of students responded they use Flipgrid, websites, blogs, infographics, canvas tools like quizzes, or similar products 41–100% of the time to help them assess their learning. Out of the 38.23% that use educational technology for assessment, 52.95% of students believed using educational technology to assess their knowledge helped them engage and understand learning targets, how to reach their learning targets, and where they are going next in their learning targets. Furthermore, 61.29% of students surveyed used educational

technology for assessment 0–40% of the time, and 17.64% disagreed or strongly disagreed that using educational technology for assessment helped them engage and understand learning targets, while 29.41 were neutral.

Middle school students were asked to respond to how much time outside of the school day, until they go to sleep, they spend on personal technology usage. Students reported 41.18% use personal technology for 2–4 hours a day, with 20.59% more than four hours a day. Additionally, 20.59% of students acknowledged one to two hours of personal technology usage, 11.76% reported 30 minutes to an hour, and 5.88% reported zero to 30 minutes. When students were asked if the time spent on personal technology and if they felt like that assisted them in engaging and understanding their classroom learning targets, survey responses indicated 47.06% disagreed or strongly disagreed. Survey responses showed 23.53% of students were neutral, and 29.41% of students agreed or strongly agreed.

Analysis of quantitative data revealed over 52% of students surveyed agree Learning Management Systems and educational technologies for learning and assessment helped them engage and understand learning targets, how to reach learning targets, and where they are going next in their learning targets. The PPMC analysis of quantitative data resulted in rejection of the null hypothesis. A negative association between variables was established. There was a correlation between excessive technology usage for middle school students and classroom engagement.

Research Question Two

What is the perception of middle school certified core teachers regarding the impact of excessive information and communication technology usage on student

relationships with peers? Qualitative data were gathered through interview questions of seven core teachers and their perspectives on how excessive technology usage affects student relationships with peers. Participants unanimously agreed education technologies have aided in students' collaborative learning, sharing their observations of increased confidence, creativity, student voice, and choice. Participants shared through the use of discussion boards and posts, student feedback, and collaborative projects, there is an increased level of positive student-to-student interaction and technology provides an opportunity for all students to be involved and interact at their learning levels.

Participants revealed some disadvantages of educational technologies in terms of student relationships with peers. Four out of seven participants discussed appropriate usage of technologies can damage student relationships by being off task chatting online, moving or deleting files, changing editing privileges, not displaying positive online etiquette through feedback and comments, and general off-task online behaviors. Two participants have the perception students are becoming addicted to the computer, negatively impacting interpersonal skills.

How students treat one another in and out of the classroom, face to face and online are of great concern to the participants. The perception is students are lacking internet etiquette skills which affects students' relationships with peers in a negative way. Participants shared that if students are engaged and using technology in the way it is intended, then good relationships will be built. The problem participants are experiencing, is students are not disciplined enough to use technology in a manner which promotes positive interactions with others, so the behavior introduces negativity with their peers.

Regarding middle school students' personal technology usage, participants perceive a problem with cyberbullying, inappropriate internet surfing, phone addiction, excessive gaming, the inability to look after and care for the technology itself, and the general lack of having the wherewithal to make positive choices with their personal technologies. All seven participants mentioned cell phones being a massive problem in and out of the classroom. Participants shared their perceptions of inappropriate cell phone usage, such as: taking pictures in bathrooms, social media posts and commenting, texting, and sneaking on devices during classroom learning time to name a few. Several participants believe in-person connection is important to build social skills that are applicable in real life situations and personal devices, such as cell phones hinder the forming of these skills.

Research Question Three

What are the perceptions of middle school certified core teachers regarding excessive use of information and communication technologies and how it affects student cognitive engagement? Analysis of qualitative responses indicated the majority of participants use educational technologies to enhance learning within classrooms. The LMS technologies assist in organization for both educators and students. It allows for the push out of information quickly, student participation during absences, and create self-directed learners. The LMS technologies also aid in keeping lesson plans on track through daily announcements with links and allows students a sense of accountability with turning in assignments. Participants notice students are able to achieve classroom goals easier, because everything is organized for them, they have access to the internet and links provided by the teacher, and can see grades in real-time.

Educational technologies impact students in the classroom, because they are fun and engaging. All participants mentioned Google Slides as beneficial to students, because it is user friendly, printable, and students can follow along through daily lessons. Participants also shared the excitement students have when educational technology is used for quick knowledge checks. Since educational technologies present in a game format, students are more engaged in learning level 2 facts and vocabulary. Quizlet, Kahoot, and Google Slides were the top three most popular educational technology used by participants and the ability to engage all different types of learners and push them towards their learning goals was noted. Participants shared educational technologies aid in students achieving classroom goals by allowing a greater understanding of learning targets, increase in classroom participation, quick access to information, and mastery of learning.

Pertaining to assessments, most participants find significant value in the immediate feedback educational technologies provide. It allows students to know exactly what learning targets they mastered or if they need intervention time to prepare for reassessment. Several participants mentioned the ease of use of educational technology and how it is a significant time saver when it comes to grading and allows large amounts of information to be pushed out to students quickly. Regarding grading and the time educational technology saves, participants pointed out it frees up one-on-one discussion time with students so deeper level thinking can be assessed. Participants found having the availability of different technologies for immediate use gives students the opportunity to show what they have learned through different mediums. Respondents perceive an

increase in student engagement when they are able to have voice and choice on how they present what they know.

The downfall to incorporating educational technologies daily into the classroom is it presents distractions. A few participants discussed the importance of implementing high and strict standards for students in the classroom when they are using technology and accessing educational technologies, because technology inherently offers a temptation for off-task behaviors. Several participants mentioned, since technology is no longer a novel idea, students need to be monitored closely using a software, such as Hapara. Monitoring software allows educators to watch computer screens in real-time. All participants mentioned the benefits of traditional teaching and how more paper and pencil and interpersonal activities need to be incorporated to achieve balance. All participants mentioned that during class discussions the student cognitive engagement is perceived to be very high. Several respondents mentioned the importance of creating engaging lessons and whether technology is involved or not, if the lesson is enticing, student engagement will be high.

To ensure students are moving across the rigor divide into deeper learning (Antonetti & Stice, 2018), contributors pointed out several key factors that must be incorporated into lesson planning and curriculum writing. The level of questioning, type of questioning, and making connections were top suggestions. The level of questioning can allow students to move into a deeper level of thinking critically. The types of questioning, multiple choice, true/false, or higher order open-ended questions allow educators to understand student thinking, intervene when there are misconceptions, and promote connections during learning. Several participants mentioned open-ended

questions where students are required to think critically and provide evidence,

encouraging authentic discussions, and offering stimulating projects also increase student

cognitive engagement. The variety of technology platforms available to educators and

students have also encouraged students to be more cognitively engaged. Several

participants mentioned how technology is a blessing and a curse by having access to any

piece of information they could ever need, but also open access to the internet can be an

enormous distraction. Middle school students lack self-discipline, the capability, and

willpower to reject the temptation to use technology for educational purposes only during

the school day.

Analysis of responses to how technology has been a distraction in the classroom

indicated many participants are exceedingly frustrated with the consistent and constant

redirection they have to give off-task students. All seven participants viewed gaming as

the number one temptation for student off-task behavior. Respondents also mentioned

how disappointing it is when the technology infrastructure is not working properly,

causing classroom distractions and disruptions. Several participants shared concerns

about middle school students having open access to the internet, sharing they are able to

access websites that are inappropriate and clearly not used for educational purposes.

Participants also fear social media, texting, and chats open students up for sending and

receiving disturbing material that can not only interfere with their educational work, but

can also be harmful to middle school students and their mental health.

Conclusions

For this study, quantitative and qualitative data associated with excessive

technology usage and how it affected student cognitive engagement were gathered

(Creswell & Creswell, 2018). Bond et al. (2020) established that student engagement is the effort and drive students devote to learning and can be observed in a variety of ways. The more connected students are to their learning, the more likely they are to be a more motivated learner (Bond et al., 2020). Responses for survey statement 8 identified 47.06% of students surveyed believed the time spent on personal technology does not help them engage in learning. Core teacher Participant 6 believed technology is good in small doses, but in person connection is essential to building social skills used in real life situations. Participant 1 shared the perception of students being bored with and tired of technology. Participant 5 stated when students collaborate and hand write out their own scientific procedures, they are more engaged. Participant 5 continued, "If they do the work online, I've noticed they get off task easier, sit more, and chit chat about other things. When I require them to hand write the labs, their conversations are more centered around the task."

Peters et al. (2018) suggested technology allows for students to have more control over their learning, thus increasing student cognitive engagement. However, teachers must provide a balance in the classroom using meaningful technologies to improve learning and collaborative activities (Bedenlier et al., 2020, Johnson et al., 2016). Antonetti and Stice (2018) identified the importance of learners using technology in a meaningful way, so classroom content becomes more significant. Participant 7 stated:

Whether you are using technology or not, if what you are doing is not interesting or is boring, students will be disengaged. Honestly, I feel like it's more of their level of interest in what they're doing, not necessarily whether you're on tech or not. Novelty plays a huge part in it. So, if you simply use tech every day and read

through Google sites or slides, etc. and that's all you're doing with technology,

then they're not going to be any more engaged in that than they are already

reading out of a textbook. If you're doing something novel or something you've

never done before with technology, I think you're going to get more engagement.

Same with a non-tech activity. Technology has almost become expected. If you're

not using it in a new and fresh way, and you do the same thing every day, students

get bored.

Data collected from surveys and interviews were analyzed and evaluated along

with the review of literature to develop the themes. The themes that became apparent

were how technology affects student relationships with peers and how excessive

technology usage affects cognitive engagement. These themes are included as part of the

conclusions of this study.

The Effect Technology Has on Student Relationships with Their Peers

Smartphone technology and social media has changed the way people interact

with one another (Romero et. al, 2018). Social media has become the main way teenagers

communicate with one another and can promote poor mental health through

cyberbullying, which damages relationships (Kelly et al, 2018) and adolescents who use

social media in excess of two hours per day double their odds of social seclusion

(Primack et al., 2017). Interview Participant 3 perceived lack of communication skills

between students, lack of face-to-face interaction, and the excessive use of social media

has hindered students' ability to communicate with others.

With heavy integration of technology within the classroom and in students'

personal lives, face-to-face interactions are declining; a decrease in social interactions can

cause stress and social skills are key to creating and maintaining positive social relationships, rapport, and bonds (Sanchez, 2021). Adolescents who are heavily engaged in technology struggle making friends, struggle with a sense of belonging, and struggle with school achievement (Gökbulut, 2019; Ouyang and Chang (2018); Twenge, 2019). Participant 4 shared, "Social media has destroyed middle school students. Snapchat is the worst and has been a vehicle to easily, anonymously, and purposefully destroy other students." Participant 5 similarly expressed, "Social media is a huge problem. There is a lack of respect, and they treat each other horribly. Bullying is happening online and then, somehow, they access each other's project and then cause havoc." Participant 2 added: "While we all love social media, they see more negative than good." Participant 4 went on to state, "Technology encourages negative behavior, negative treatment of one another, and how they act in class."

The Effect of Technology on Student Cognitive Engagement

Researchers have found an increase in time spent on digital media reduces psychological well-being and lessons the ability to maintain focus (Kelly et al., 2018; Sanchez, 2021; Shakya & Christakis, 2017; Twenge, 2019). Anxiety, depression, low self-control, and being more distracted are a few effects of excessive technology usage (Twenge, 2019). Participant 3 communicated the belief that technology has not aided in students becoming more cognitively engaged and stated,

> I don't believe it has. It's too distracting. Almost seven and a half hours a day at school on technology and then they go home and are on it for hours, and we expect them to be alert and engaged during class, when it's hard for teachers to sit through a half hour meeting.

Student survey results revealed 61.77% of respondents spend two or more hours a day on personal technology outside of school and of those, 47.17% believed that time spent on personal technology helps them engage and understand their learning targets, how they are reading their learning targets, and where they are going next in their learning targets.

An imbalance of screen time can impact the growing brain by decreasing language development, increasing behavioral problems, and damaging brain connectivity that links language, word recognition, and cognitive control (Horowitz-Kraus & Hutton, 2018; McDonald et al., 2018). Hutton et al. (2020) found that too much technology usage decreases the integrity of the brain's white-matter pathways needed for reading and language development. Participant 6 shared:

> When I take technology away and introduce more traditional methods of teaching, students dread it in my class. It's taken away a lot of learning how to speak and being comfortable talking with one another. Finding words to interact on a personal level has created a lack of social skills. Students aren't as nice, not as respectful, communication norms, and societal interactions are a struggle.

Since adolescents do not know life before Google, Aboujaoude and Gega (2021) suggested, they are more impacted by online addictions with heighten impulsivity, inattentiveness, distractions, and anger.

> Participant 6 stated:
>
> Ed tech that we use during class is not a distraction. But the habit of automatically getting on technology is where the issues are. Students are getting to the point where they always want their Chromebook open, whether they are using it or not. They always want to be on it doing whatever they want to do. They love to play

games, do other classwork, listen to music, etc. unless you tell them that's not the time for this.

Student survey results indicated 70.59% of respondents agree or strongly agree educational technologies help them engage and understand their learning targets, how they are reaching their learning targets, and where they are going next in their learning targets. Riley (2022) stressed the importance of high school graduates not only possessing tech-readiness, but also the skills to make them whole, productive members of society.

Implications for Practice

The findings of this mixed-methods study have significant implications for technology integration within and outside of the classroom. The first implication is school district leaders and classroom teachers should complete an educational technology audit and revamp curriculum to balance traditional learning with technology integration. The second implication is since students are spending excessive amounts of time on technology during and beyond the school day, which is a health and learning concern, more preventative measures need to be in place to assist in reducing technology availability, such as cell phone monitoring systems and more sophisticated web filtering system for web browsing. Thirdly, because excessive technology usage negatively impacts student relationships with peers, school district leaders and teachers should provide ways to engage students with social and physical extracurricular activities that involve little to no technology usage. The final implication is assisting teachers with understanding how to implement educational technologies effectively and strategically within the classroom.

Technology Audit and Revamping Curriculum

Antonetti and Stice (2018) suggested technology can bring engaging qualities to a task through a multi-media approach, however, to create a more powerful learning design, educators need to consider the elements of engaging qualities, strategies, and cognition. Technology addiction is proving to have numerous undesirable effects which can negatively impact the educational process (Gökbulut, 2019). Interview responses indicated that if the lesson design is not engaging, no level of technology implementation can engage students.

School districts in Southwest Missouri are already realizing the need for a technology audit to verify technology in the classroom is being supported by instruction (Riley, 2022). Since children and adolescents struggle with managing the fast-paced online experience (Aboujaoude & Gega, 2021), educators must improve their pedagogies and redesign curriculum to incorporate more engaging qualities, while decreasing technology usage in the classroom. School district leaders must make efforts to create learning environments and curricula that does not impair student engagement and relationships.

Preventative Measures on Reducing Technology Accessibility

Riley (2022) shared the goal of high school graduates is to be not only tech-ready but to possess the skills needed to become productive members of society. An imbalance of screen time can adversely impact the growing brain, language, and cognitive control (Horowitz-Kraus & Hutton, 2018; McDonald et al., 2018), and can also create an increase in sleep difficulties, anxiety, and depression (Twenge, 2019). Smartphone technology and easy access to the internet and social media have changed the way people

interact with one another (Romero et. al, 2018) and increase their odds of social seclusion (Primack et al., 2017). Participant 6 shared that while technology has allowed students to continue a relationship with peers, it is less personal and less respectful as face-to-face relationship building. Participant 6 said, "technology has also aided in isolation and has changed the dynamic of relationships for peers negatively, mainly because of how they respond to one another on social media."

Excessive screen time is negatively impacting the development in many areas of the brain (Horowitz-Kraus & Hutton, 2018; Hutton et al., 2020; McDonald et al., 2018), and sleep deprivation, due to nighttime screen exposure directly relates to the reduction of functional brain connectivity (Amorim, et al., 2018). Because students are vulnerable users of technology, parents, teachers, and administrators need to work together to establish a safe technology space to ensure technology is being used as a beneficial resource in the classroom (Kuss, 2021). Targeted interventions, such as firm school policies regarding personal technology usages that involve cell phones, smart watches, earbuds, and other similar devices and the implementation of sophisticated web filtering software systems to control students' web browsing need to be discussed. Participant 7 shared frustrations with lack of school accountability:

> At our school we have no accountability for inappropriate technology use. It has been a constant battle all year for me. I think that having a strong expectation and follow through with consequences is key, and I think students aren't always held accountable to the same standards in every class.

Ways to Engage Students Socially and Physically Through Extracurricular Activities

Participant 7 identified students were having trouble with the social-emotional aspect of the classroom. Participant 7 revealed:

> We have figured out with my own kids that if they're tired and they get on the screen, they act worse for some reason. I think it might be because they are over stimulated. Go to a restaurant and look around, nobody talks anymore. It's really messing up relationships and student engagement.

Raja and Nagasubramani (2018) reported a decline in student attention and motivation in both academics and extracurricular activities. Adolescents who are heavily engaged in technology have a hard time making friends, do not feel like they belong or are connected, and have lower school achievement (Gökbulut, 2019; Ouyang & Chang, 2018); Twenge, 2019). Participants 1, 6, and 7 indicated students seemed to be hiding behind computer screens as opposed to connecting with others in-person and this is of great concern.

Strong social skills empower students to start and keep positive community relationships, get peer acceptance, and manage a variety of different areas of their social and educational lives (Sanchez, 2021). Since students who are deeply engaged with technology have more problems making friends (Primack et al., 2017), there is an increasing need for a variety of extracurricular activities without a technology aspect. Primack et al (2017) also identified students double their odds of social isolation for every two or more hours of social media use. This study indicated 61.77% of students surveyed reported they used personal technology for two or more hours per day. Twenge

et al. (2019) reported increased student well-being is directly related to face-to-face communication.

Implementing Educational Technologies Effectively and Strategically Within the Classroom

Antonetti and Stice (2018) encouraged educators to scrutinize curricular scopes and sequences to determine whether technology implementation is including cognitively engaging and rigorous tasks. For educators to have classroom technology buy-in from students, a curriculum redesign is necessary that includes modest technology pieces that will enhance instruction (Johnson et al., 2016). Technology can empower students to learn more, at a deeper level, and to be more engaged (Antonetti & Stice, 2018; Bond & Bedenlier, 2019), but if technology is not integrated properly into the curriculum, it is more of a distraction and danger to education (Alfallaj, 2020).

All seven interview participants in the study shared educational technologies have assisted them in increasing student engagement, creating valuable lessons and assessments that move students across the rigor divide, as an invaluable organizational tool, and education technology saved time with grading and providing students with immediate feedback. On the flip side, all seven participants in the study believed education technology also hindered engaging learning environments through online distractions like gaming or web browsing, problems with hardware and connectivity, and students simply lacking responsibility. Participants 1, 2, 4, 5, 6, and 7 shared we are in a generation of tech-heavy learning that is boring students and we have forgotten the value of traditional forms of introducing curriculum. Antonetti and Stice (2018) shared engagement comes from first attracting the student's attention, which guides

participation, which then leads to students making meaningful connections within their learning.

Recommendations for Future Research

This mixed-methods study focused on whether there is a connection between student cognitive engagement and excessive technology usage. Data collected from the student survey and core teacher interviews indicate a significant correlation between excessive technology usage for middle school students and classroom engagement. This correlation suggests pedagogies and curriculum need to be revamped to create a more impactful learning environment. Investigating the long-term effects of excessive technology use and how it affects the brain matter could shed some light on how it is affecting students' abilities to connect to learning and build positive relationships with others. Additionally, further research is needed to understand the impact online learning has on academic success and social involvement.

Revamping Pedagogies and Curriculum

The findings of this study suggested future studies should focus on why pedagogies and curriculum should be overhauled to include more of a balance between traditional teaching and technology integration. Data collected from interview responses indicated many educators realize students are disengaged, because the classroom technology component is too heavily utilized, opening students up for off-task behaviors and technology distractions. Some participants shared they use technology heavily to just simply share out information instead of using educational technologies for learning. Investigating how teachers use technology in the classroom, best practices for using

education technologies, and ways of restructuring and modifying classroom curriculum could shed light on how to improve student cognitive engagement.

Long-term Effects of Excessive Technology and How It Affects the Brain

Future research regarding the developing brain, brain connectivity, and how the brain functions when exposed to excessive technology usage is necessary. Reviewing the literature and analyzing the data indicated excessive screen time is in fact negatively impacting the developing brain. Research revealed excessive screen exposure disrupts rest which is directly related to students' mental health and the reduction of operative brain connectivity. This study would require exploring brain connectivity among the regions in the brain that control language, word recognition, cognitive control, and the integrity of the white-matter pathways in the brain necessary for language and reading development.

Impact of Online Learning on Academic Success and Social Involvement

Researchers have established a variety of reasons why online learning can hinder student engagement, such as insufficient technology and infrastructures available, lack of adequate internet access, the absence of face-to-face socialization skills, as well as the COVID-19 pandemic and the associated challenges in areas of finance, health, and social distancing, to name a few (Adam, 2020; Bates, 2020; Bozkurt et al., 2020; Fege, 2020; Fowler, 2020; Quilter-Pinner & Ambrose, 2020). Analysis of data revealed the significant impact the aforementioned areas have on student engagement and the relevancy of pulling back on technology in favor of more traditional ways of learning and teaching. Because of the COVID-19 pandemic, schools were forced into providing sufficient technology and infrastructures to move in-person teaching to solely online. A study

investigating audits of technology infrastructure and the use of technology within curricula to ensure technology is not hindering and distracting students from being engaged in their learning would be beneficial.

Summary

The critical findings and conclusions of the research study were presented in Chapter Five. Students in a middle school from Southwest Missouri were surveyed regarding their personal and in-class technology usage to answer the study's research question number one. Educator perceptions of technology usage and how it affected student relationships and student cognitive engagement were identified to answer the study's research questions numbers two and three. Implications for practice were developed and presented based on the findings and conceptual framework of this mixed-methods study. These included a technology audit and revamping of curriculum, preventative measures on reducing technology accessibility, ways to engage students socially and physically through extracurricular activities, and implementing educational technologies effectively and strategically within the classroom. Chapter Five concluded with recommendations for future research.

References

Adelabu, D. H. (2007). Time perspective and school membership as correlates to

academic achievement among African American adolescents. *Adolescence*,

42(167), 525–538.

https://web.p.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=1a465aa7-

c014-40ec-8f7e-f31c3746c96f%40redis

Aboujaoude, E., & Gega, L. (2021). Editorial perspective: Missing the forest for the trees

– how the focus on digital addiction and gaming diverted attention away from

wider online risks. *Child and Adolescent Mental Health*, *26*(4), 369-

371. https://doi.org/10.1111/camh.12503

Aboujaoude, E., Kuss, D. J., Yao, M. Z., & Leung, L. W. (2022). *Online psychology*

beyond addiction and gaming: A global look at mental health and internet-related

technologies. Frontiers Media SA.

Adam, T. (2020, April 22). *The privilege of #pivotonline: A South African perspective*.

Zenodo. https://zenodo.org/record/3760383#.YnCBMdrMKM8

Agarwal, A. (2020, June 9). *Blended learning is the 'new normal' and here's why*.

LinkedIn. https://www.linkedin.com/pulse/blended-learning-new-normal-heres-

why-anant-agarwal/

Agatston, P. W., Kowalski, R., & Limber, S. (2007). Students' perspectives on cyber

bullying. *Journal of Adolescent Health, 41(6),* S59-S60.

https://doi.org/10.1016/j.jadohealth.2007.09.003

Agostini, A., Lushington, K., & Dorrian, J. (2019). Sleep, bullying, and physical and

mental health in adolescence. *Sleep Medicine*, *64*, S4.

https://doi.org/10.1016/j.sleep.2019.11.012

Alfallaj, F. S. (2020). Technology in Saudi EFL undergraduate classrooms: Learning

tool or weapon of distraction? *The Asian ESP Journal*, *16*(4), 97–115.

https://www.asian-esp-journal.com/volume-16-issue-4-july-2020/

Almarghani, E. M., & Mijatovic, I. (2017). Factors affecting student engagement in HEIs

– it is all about good teaching. *Teaching in Higher Education*, *22*(8), 940–

956. https://doi.org/10.1080/13562517.2017.1319808

Altundağ, Y., & Ayas, T. (2020). Effectiveness of the whole school-based program for

equipping high school counselors with strategies of coping with cyberbullying

and cyberbullying awareness. *TED EĞİTİM VE*

BİLİM. https://doi.org/10.15390/eb.2020.8350

American Academy of Pediatrics. (2019). *How to make a family media use plan.*

https://www.healthychildren.org/English/family-life/Media/Pages/How-to-Make-

a-Family-Media-Use-Plan.aspx

American Heart Association. (2018, May 15). Limit screen time and get your kids (and

the whole family) moving. https://www.heart.org/en/healthy-living/fitness/getting-

active/limit-screen-time-and-get-your-kids-and-the-whole-family-moving

American Psychological Association. (2020). *Publication manual of the American*

Psychological Association (7th ed.).

American Public Media. (2019, September 9). It's not a given that tech in the classroom

improves learning. *Marketplace Tech* [Audio podcast episode].

https://www.marketplace.org/shows/marketplace-tech/its-not-a-given-that-tech-in-the-classroom-improves-learning/

Amin, H., & Mirza, M. S. (2020). Comparative study of knowledge and use of Bloom's digital taxonomy by teachers and students in virtual and conventional universities. *Asian Association of Open Universities Journal*, *15*(2), 223–238. https://doi.org/10.1108/aaouj-01-2020-0005

Amorim, L., Magalhães, R., Coelho, A., Moreira, P. S., Portugal-Nunes, C., Castanho, T. C., Marques, P., Sousa, N., & Santos, N. C. (2018). Poor sleep quality associates with decreased functional and structural brain connectivity in normative aging: A MRI multimodal approach. *Frontiers in Aging Neuroscience*. https://doi.org/10.3389/fnagi.2018.00375

Anderson, K. J. (2001). Internet use among college students: An exploratory study. *Journal of American College Health*, *50*(1), 21–26. https://doi.org/10.1080/07448480109595707

Anderson, M., & Jiang, J. (2018). *Teens, social media & technology 2018*. Pew Research Center: Internet, Science & Tech. https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/

Antonetti, J., & Stice, T. (2018). *Powerful task design: Rigorous and engaging tasks to level up instruction*. Corwin Press.

Banna, J., Lin, M. G., Stewart, M., & Fialkowski, M. K. (2015). Interaction matters: Strategies to promote engaged learning in an online introductory nutrition

course. *Journal of Online Learning and Teaching*, *11*(2), 249-

261. https://pubmed.ncbi.nlm.nih.gov/27441032/

Baraldsnes, D. (2015). The prevalence of cyberbullying and the views of 5-12 grade

pupils and teachers on cyberbullying prevention in Lithuanian schools. *Universal*

Journal of Educational Research, *3*(12), 949-959.

https://doi.org/10.13189/ujer.2015.031201

Barlett, C. P., & Kowalewski, D. A. (2019). Learning to cyberbully: An extension of the

Barlett gentile cyberbullying model. *Psychology of Popular Media Culture*, *8*(4),

437-443. https://doi.org/10.1037/ppm0000183

Bates, T. (2020). *What is next for online learning during and after COVID-19?*

https://teachonline.ca/tools-trends/what-next-online-learning-during-and-after-

covid-19

Baydas, O., Kucuk, S., Yilmaz, R. M., Aydemir, M., & Goktas, Y. (2015). Educational

technology research trends from 2002 to 2014. *Scientometrics*, *105*(1), 709-

725. https://doi.org/10.1007/s11192-015-1693-4

Bedenlier, S., Bond, M., Buntins, K., Zawacki-Richter, O., & Kerres, M. (2020).

Facilitating student engagement through educational technology in higher

education: A systematic review in the field of arts and humanities. *Australasian*

Journal of Educational Technology, *36*(4), 126–150.

https://doi.org/10.14742/ajet.5477

Bennett, S., Dawson, P., Bearman, M., Molloy, E., & Boud, D. (2016). How technology

shapes assessment design: Findings from a study of university teachers. *British*

Journal of Educational Technology, *48*(2), 672-

682. https://doi.org/10.1111/bjet.12439

Bijeesh, N. A. (2021). *Advantages and disadvantages of distance learning!* College

Education Guide: Career Options, Planning & Information Portal.

https://www.indiaeducation.net/online-education/articles/advantages-and-

disadvantages-of-distance-learning.html

Bodily, R., Leary, H., & West, R. E. (2018). Research trends in instructional design and

technology journals. *British Journal of Educational Technology*, *50*(1), 64-

79. https://doi.org/10.1111/bjet.12712

Boers, E., Afzali, M. H., Newton, N., & Conrod, P. (2019). Association of screen time

and depression in adolescence. *JAMA Pediatrics*, *173*(9), 853.

https://doi.org/10.1001/jamapediatrics.2019.1759

Bohle, H., Rimpel, J., Schauenburg, G., Gebel, A., Stelzel, C., Heinzel, S., Rapp, M., &

Granacher, U. (2019). Behavioral and neural correlates of cognitive-motor

interference during multitasking in young and old adults. *Neural Plasticity*, *2019*,

1–19. https://doi.org/10.1155/2019/9478656

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational

technology: Towards a conceptual framework. *Journal of Interactive Media in

Education*, *2019*(1). https://doi.org/10.5334/jime.528

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020).

Mapping research in student engagement and educational technology in higher

education: A systematic evidence map. *International Journal of Educational

Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-019-

0176-8

Bond, M., Zawacki-Richter, O., & Nichols, M. (2018). Revisiting five decades of
    educational technology research: A content and authorship analysis of the British
    Journal of educational technology. *British Journal of Educational*
    Technology, *50*(1), 12-63. https://doi.org/10.1111/bjet.12730

Boninger, F., Molnar, A., & Saldaña, C. M. (2019). *Personalized learning and the digital*
    privatization of curriculum and teaching. National Education Policy
    Center. https://nepc.colorado.edu/publication/personalized-learning

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., Lambert, S. R.,
    Al-Freih, M., Pete, J., Olcott, Jr., D., Rodes, V., Aranciaga, I., Bali, M., Alvrarez,
    Jr., A. V., Roberts, J., Pazurek, A., Raffaghelli, J. E., Anagiotou, N. P., de
    Coëtlogon, P., … Paskevicius, M. (2020). A global outlook to the interruption of
    education due to COVID-19 Pandemic: Navigating in a time of uncertainty and
    crisis. *Asian Journal of Distance Education*, *15*(1), 1-
    126. https://eric.ed.gov/?id=EJ1290039

Broll, R. (2014). Collaborative responses to cyberbullying: Preventing and responding to
    cyberbullying through nodes and clusters. *Policing and Society*, *26*(7), 735-
    752. https://doi.org/10.1080/10439463.2014.989154

Buckingham, D. (2003). *Media education: Literacy, learning and contemporary culture*
    (1st ed.). Polity Press.

Burkholder, G. J., Cox, K. A., Crawford, L. M., & Hitchcock, J. H. (2020). *Research*
    design and methods: An applied guide for the scholar-practitioner. Sage
    Publications.

Calderon, V. J., & Carlson, M. (2019, September 12). *Educators agree on the value of ed tech. Gallup*. https://www.gallup.com/education/266564/educators-agree-value-tech.aspx

Castañeda, L., & Selwyn, N. (2018). More than tools? Making sense of the ongoing digitizations of higher education. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-018-0109-y

Charitonos, K., Blake, C., Scanlon, E., & Jones, A. (2012). Museum learning via social and mobile technologies: (How) can online interactions enhance the visitor experience? *British Journal of Educational Technology*, *43*(5), 802-819. https://doi.org/10.1111/j.1467-8535.2012.01360.x

Churches, A. (2010). *Blooms' digital taxonomy*. https://burtonslifelearning.pbworks.com/w/file/fetch/26327358/BloomDigitalTaxonomy2001.pdf

Coolidge, F. (2021). *Statistics: A gentle introduction* (4th ed.). SAGE Publications.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

D'Angelo, C. (2018). The impact of technology: Student engagement and success. In R. Power (Ed.), *Technology and the curriculum.* Power Learning Solutions. https://techandcurriculum.pressbooks.com/chapter/engagement-and-success/

Demographics of mobile device ownership and adoption in the United States. (2021, April 7). Pew Research Center: Internet, Science & Tech. https://www.pewresearch.org/internet/fact-sheet/mobile/

Dennen, V. (2020, March 17). *People first. Content second. Technology third. Word Press.* https://vanessadennen.com/2020/03/16/people-first-content-second-technology-third/

Dewan, M. A., Murshed, M., & Lin, F. (2019). Engagement detection in online learning: A review. *Smart Learning Environments*, *6*(1). https://doi.org/10.1186/s40561-018-0080-z

Divecha, D., & Brackett, M. (2019). Rethinking school-based bullying prevention through the lens of social and emotional learning: A Bioecological perspective. *International Journal of Bullying Prevention*, *2*(2), 93-113. https://doi.org/10.1007/s42380-019-00019-5

Fege, A. F. (2020). *Reimagining the "new normal": Equity, policy, COVID, and rural public schools*. MAEC. https://maec.org/resource/reimagining-the-new-normal/

Festl, R., Scharkow, M., & Quandt, T. (2014). The individual or the group: A multilevel analysis of cyberbullying in school classes. *Human Communication Research*, *41*(4), 535-556. https://doi.org/10.1111/hcre.12056

Fetters, M. D., & Molina-Azorin, J. F. (2017). The Journal of Mixed Methods Research starts a new decade: The mixed methods research integration trilogy and its dimensions. *Journal of Mixed Methods Research*, *11*(3), 291–307. https://doi.org/10.1177/1558689817714066

Fink, A. G. (2016). *How to conduct surveys: A step-by-step guide*. Sage Publications.

Firth, J., Torous, J., Stubbs, B., Firth, J. A., Steiner, G. Z., Smith, L., Alvarez-Jimenez, M., Gleeson, J., Vancampfort, D., Armitage, C. J., & Sarris, J. (2019). The

"online brain": How the internet may be changing our cognition. *World Psychiatry*, *18*(2), 119–129. https://doi.org/10.1002/wps.20617

Fisher, D., Frey, N., & Hattie, J. (2020). *The distance learning playbook, grades K-12: Teaching for engagement and impact in any setting*. Corwin Publishers.

Fowler, D. (2020, June 29). *We need to get all Canadian students online quickly in the face of pandemic uncertainty. CBC.* https://www.cbc.ca/news/opinion/opinion-children-students-internet-access-1.5583321

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education (10th ed.). McGraw-Hill.*

Gökbulut, B. (2019). The relationship between sense of belonging and technology addiction of high school students. *International Journal of Eurasian Education and Culture*, *4*(7), 281–297. https://doi.org/10.35826/ijoecc.46

Halim, M. S., & Hashim, H. (2019). Integrating Web 2.0 technology in ESL classroom: A review on the benefits and barriers. *Journal of Counseling and Educational Technology*, *2*(2), 57. https://doi.org/10.32698/0421

Hamilton, A., & Hattie, J. (2021). *Not all that glitters is gold: Can education technology finally deliver?* Corwin Press, Inc. https://cognitioneducationgroup.com/wp-content/uploads/2020/11/Not-All-That-Glitters-is-Gold.pdf

Hanson, A. R. (2020, December 9). *In a post-COVID world, will online learning become the new normal? Online Learning Consortium.* https://onlinelearningconsortium.org/in-a-post-covid-world-will-online-learning-become-the-new-normal/

Herodotou, C. (2018). Mobile games and science learning: A comparative study of 4 and 5 years old playing the game angry birds. *British Journal of Educational Technology*, *49*(1), 6-16. https://doi.org/10.1111/bjet.12546

Horowitz-Kraus, T., & Hutton, J. S. (2018). Brain connectivity in children is increased by the time they spend reading books and decreased by the length of exposure to screen-based media. *Acta Paediatrica*, *107*(4), 685–93. https://doi.org/10.1111/apa.14176

Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology*, *37*(10), 751-768. https://doi.org/10.1521/jscp.2018.37.10.751

Hutton, J. S., Dudley, J., Horowitz-Kraus, T., DeWitt, T., & Holland, S. K. (2020). Associations between screen-based media use and brain white matter integrity in preschool-aged children. *JAMA Pediatrics*, *174*(1). https://doi.org/10.1001/jamapediatrics.2019.3869

Jansen, J. (2020, April 9). *Let's face facts, the 2020 school year is lost. So, what to do?* Sunday Times Daily. https://select.timeslive.co.za/ideas/2020-04-09-lets-face-facts-the-2020-school-year-is-lost-so-what-to-do/

Johnson, A. M., Jacovina, M. E., Russell, D. G., & Soto, C. M. (2016). Challenges and solutions when using technologies in the classroom. In S. A. Crossley & D. S. McNamara (Eds.), *Adaptive educational technologies for literacy instruction* (pp. 13–30). Routledge. https://doi.org/10.4324/9781315647500-2

Johnson, R. B., & Christensen, L. (2020). *Educational research: Quantitative, qualitative, and mixed approaches*. Sage Publications.

Jones, S. E., & Rutland, A. (2019). Children's social appraisal of exclusion in friendship

   groups. *International Journal of Bullying Prevention*, *2*(2), 129-

   138. https://doi.org/10.1007/s42380-019-00022-w

Junco, R., Elavsky, C. M., & Heiberger, G. (2012). Putting Twitter to the test: Assessing

   outcomes for student collaboration, engagement and success. *British Journal of

   Educational Technology*, *44*(2), 273-287. https://doi.org/10.1111/j.1467-

   8535.2012.01284.x

Karabulut-Ilgu, A., Jaramillo Cherrez, N., & Jahren, C. T. (2017). A systematic review of

   research on the flipped learning method in engineering education. *British Journal

   of Educational Technology*, *49*(3), 398–411.

   https://doi.org/10.1111/bjet.12548

Kaufman, T. M., Huitsing, G., Bloemberg, R., & Veenstra, R. (2020). The systematic

   application of network diagnostics to monitor and tackle bullying and

   victimization in schools. *International Journal of Bullying Prevention*, *3*(1), 75-

   87. https://doi.org/10.1007/s42380-020-00064-5

Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2018). Social media use and

   adolescent mental health: Findings from the UK millennium cohort study.

   EClinicalMedicine, *6*, 59–68. https://doi.org/10.1016/j.eclinm.2018.12.005

Kircaburun, K., Jonason, P., Griffiths, M. D., Aslanargun, E., Emirtekin, E.,

   Tosuntaş, Ş. B., & Billieux, J. (2019). Childhood emotional abuse and

   cyberbullying perpetration: The role of dark personality traits. *Journal of

   Interpersonal Violence*, *36*(21-22), NP11877-

   NP11893. https://doi.org/10.1177/0886260519889930

Kobb, J. (2020). *The new normal higher education in post-Cv*. Zhejiang University. https://zibs.intl.zju.edu.cn/eng/wp-content/uploads/2020/04/0417-The-New-Normal-Higher-Education-in-Post-Cv1.pdf

Kowalski, R. M., Limber, S. P., & McCord, A. (2019). A developmental approach to cyberbullying: Prevalence and protective factors. *Aggression and Violent Behavior*, *45*, 20-32. https://doi.org/10.1016/j.avb.2018.02.009

Koydemir, H. C., & Ozcan, A. (2018). Wearable and implantable sensors for biomedical applications. *Annual Review of Analytical Chemistry*, *11*(1), 127–146. https://doi.org/10.1146/annurev-anchem-061417-125956

Kuss, D. J. (2021). Risk reduction and harm prevention in technology use. *Journal of Behavioral Addictions*, *9*(4), 895-897. https://doi.org/10.1556/2006.2020.00079

Lenhart, A. (2015). *Teens, social media & technology overview 2015*. Pew Research Center: Internet, Science & Tech. https://www.pewresearch.org/internet/2015/04/09/teens-social-media-technology-2015/

Lin, L. Y., Sidani, J. E., Shensa, A., Radovic, A., Miller, E., Colditz, J. B., Hoffman, B. L., Giles, L. M., & Primack, B. A. (2016). Association between social media use and depression among U.S. young adults. *Depression and Anxiety*, *33*(4), 323–331. https://doi.org/10.1002/da.22466

Laurillard, D., Kennedy, E., Charlton, P., Wild, J., & Dimakopoulos, D. (2018). Using technology to develop teachers as designers of TEL: Evaluating the learning designer. *British Journal of Educational Technology*, *49*(6), 1044-1058. https://doi.org/10.1111/bjet.12697

López-Meneses, E., Vázquez-Cano, E., González-Zamar, M., & Abad-Segura, E. (2020). Socioeconomic effects in cyberbullying: Global research trends in the educational context. *International Journal of Environmental Research and Public Health*, *17*(12), 4369. https://doi.org/10.3390/ijerph17124369

Marín, V. I., Duart, J. M., Galvis, A. H., & Zawacki-Richter, O. (2018). Thematic analysis of the International Journal of educational technology in higher education (ETHE) between 2004 and 2017. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-018-0089-y

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, *22*(1), 205-222. https://doi.org/10.24059/olj.v22i1.1092

Marzano, R. J., Marzano, J. S., & Pickering, D. J. (2009). *Classroom management that works: Research-based strategies for every teacher*. Prentice Hall.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370-396. https://doi.org/10.1037/h0054346

McDonald, S. W., Kehler, H. L., & Tough, S. C. (2018). Risk factors for delayed social-emotional development and behavior problems at age two: Results from the all our babies/families (AOB/F) cohort. *Health Science Reports*, *1*(10), e82. https://doi.org/10.1002/hsr2.82

Mertens, D. M. (2020). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Sage Publications.

Meter, D. J., & Bauman, S. (2016). Moral disengagement about cyberbullying and
parental monitoring: Effects on traditional bullying and victimization via
cyberbullying involvement. *The Journal of Early Adolescence*, *38*(3), 303–
326. https://doi.org/10.1177/0272431616670752

Michos, K., Hernández-Leo, D., & Albó, L. (2018). Teacher-led inquiry in technology-
supported school communities. *British Journal of Educational Technology*, *49*(6),
1077-1095. https://doi.org/10.1111/bjet.12696

Morin, A. (2020, July 1). *5 reasons students aren't engaging in distance learning*.
Understood. https://www.understood.org/articles/en/5-reasons-students-arent-
engaging-in-distance-learning

Morris, B., & Hobbs, T. D. (2019, September 3). *Schools pushed for tech in every
classroom. Now parents are pushing back*. The Wall Street Journal.
https://www.wsj.com/articles/in-a-school-district-where-technology-rules-grades-
fall-parents-ask-why-11567523719

Mubeen, J. (2020, July 15). *Blended learning must be part of education's 'new normal.'*
Whizz Education. https://www.whizzeducation.com/news/blended-learning-must-
be-part-of-educations-new-normal/

Neiterman, E., & Zaza, C. (2019). A mixed blessing? Students' and instructors'
perspectives about off-task technology use in the academic classroom. *The
Canadian Journal for the Scholarship of Teaching and Learning*, *10*(1).
https://doi.org/10.5206/cjsotl-rcacea.2019.1.8002

Nolasco, C. E. (2022, February 2). *Online distance learning: The new normal in education*. eLearning Industry. https://elearningindustry.com/online-distance-learning-the-new-normal-in-education

Norris, L., & Coutas, P. (2014). Cinderella's coach or just another pumpkin? Information communication technologies and the continuing marginalisation of languages in Australian schools. *Australian Review of Applied Linguistics*, *37*(1), 43–61. https://doi.org/10.1075/aral.37.1.03nor

Northey, G., Govind, R., Bucic, T., Chylinski, M., Dolan, R., & Van Esch, P. (2017). The effect of "here and now" learning on student engagement and academic achievement. *British Journal of Educational Technology*, *49*(2), 321–333. https://doi.org/10.1111/bjet.12589

Ofcom. (2021). *Children and parents: Media use and attitudes report 2020/21*. https://www.ofcom.org.uk/research-and-data/media-literacy-research/childrens/children-and-parents-media-use-and-attitudes-report-2021

Olivier, W. (2020, May 24). *Education post-COVID-19: Customised blended learning is urgently needed*. The Conversation. https://theconversation.com/education-post-covid-19-customised-blended-learning-is-urgently-needed-138647

Organization for Economic Co-operation and Development (OECD). (2015). *Students, computers and learning: Making the connection*. https://doi.org/10.1787/9789264239555-en

Ouyang, F., & Chang, Y. (2018). The relationships between social participatory roles and cognitive engagement levels in online discussions. *British Journal of Educational Technology*, *50*(3), 1396-1414. https://doi.org/10.1111/bjet.12647

Patterson, R. W., & Patterson, R. M. (2017). Computers and productivity: Evidence from laptop use in the college classroom. *Economics of Education Review*, *57*, 66–79. https://doi.org/10.1016/j.econedurev.2017.02.004

Persico, D., Pozzi, F., & Goodyear, P. (2018). Teachers as designers of TEL interventions. *British Journal of Educational Technology*, *49*(6), 975-980. https://doi.org/10.1111/bjet.12706

Peters, H., Zdravkovic, M., João Costa, M., Celenza, A., Ghias, K., Klamen, D., Mossop, L., Rieder, M., Devi Nadarajah, V., Wangsaturaka, D., Wohlin, M., & Weggemans, M. (2018). Twelve tips for enhancing student engagement. *Medical Teacher*, *41*(6), 632–637. https://doi.org/10.1080/0142159x.2018.1459530

Primack, B. A., Shensa, A., Sidani, J. E., Whaite, E. O., Lin, L. Y., Rosen, D., Colditz, J. B., Radovic, A., & Miller, E. (2017). Social media use and perceived social isolation among young adults in the U.S. *American Journal of Preventive Medicine*, *53*(1), 1–8. https://doi.org/10.1016/j.amepre.2017.01.010

Quilter-Pinner, H., & Ambrose, A. (2020). *The 'new normal': The future of education after Covid–19*. IPPR.

Raja, R., & Nagasubramani, P. C. (2018). Impact of modern technology in education. *Journal of Applied and Advanced Research*, *3*(1), S33–S35. https://pdfs.semanticscholar.org/788e/14bddd7035863fc556a4ef83441b181bed82.pdf

Raveendran, H. (2021, June 11). *Lessons learned from a year of remote education*. Samsung Business Insights. https://insights.samsung.com/2021/06/11/lessons-learned-from-a-year-of-remote-education/

Ravizza, S. M., Uitvlugt, M. G., & Fenn, K. M. (2017). Logged in and zoned out: How laptop internet use relates to classroom learning. *Psychological Science*, *28*(2), 171–180. https://doi.org/10.1177/0956797616677314

Raymundo, M. R. (2020). Fostering creativity through online creative collaborative group projects. *Asian Association of Open Universities Journal*, *15*(1), 97–113. https://doi.org/10.1108/aaouj-10-2019-0048

Revere, L., & Kovach, J. V. (2011). Online technologies for engaged learning: A meaningful synthesis for educators. *The Quarterly Review of Distance Education*, *12*(2), 113-124.

Riehm, K. E., Feder, K. A., Tormohlen, K. N., Crum, R. M., Young, A. S., Green, K. M., Pacek, L. R., La Flair, L. N., & Mojtabai, R. (2019). Associations between time spent using social media and internalizing and externalizing problems among U.S. youth. *JAMA Psychiatry*, *76*(12), 1266. https://doi.org/10.1001/jamapsychiatry.2019.2325

Roblyer, M. D., & Ekhaml, L. (2000, June 15). *How interactive are YOUR distance courses? A rubric for assessing interaction in distance learning*. University of West Georgia. https://www.westga.edu/~distance/ojdla/summer32/roblyer32.html

Roblyer, M. D., & Wiencke, W. R. (2019). Exploring the interaction equation: Validating a rubric to assess and encourage interaction in distance courses. *Online Learning*, *8*(4). https://doi.org/10.24059/olj.v8i4.1808

Romero, V. E., Robertson, R., & Warner, A. N. (2018). *Building resilience in students impacted by adverse childhood experiences: A whole-staff approach*. Corwin Press.

Rosen, L., Lim, A., Felt, J., Carrier, L., Cheever, N., Lara-Ruiz, J., Mendoza, J., &
Rokkum, J. (2014). Media and technology use predicts ill-being among children,
preteens and teenagers independent of the negative health impacts of exercise and
eating habits. *Computers in Human Behavior*, *35*, 364–375.
https://doi.org/10.1016/j.chb.2014.01.036

Rouse, M., Ferguson, K., & Pratt, M. K. (2019). *What is ICT (information and
communications technology)?* https://searchcio.techtarget.com/definition/ICT-
information-and-communications-technology-or-technologies

Royal College of Psychiatrists. (2020). *Technology use and the mental health of children
and young people.* CR225. London: Royal College of Psychiatrists

Sanchez, H. (2021). *The poverty problem: How education can promote resilience and
counter poverty's impact on brain development and functioning*. Corwin.

Sathyanarayana Rao, T., Bansal, D., & Chandran, S. (2018). Cyberbullying: A virtual
offense with real consequences. *Indian Journal of Psychiatry*, *60*(1), 3.
https://doi.org/10.4103/psychiatry.indianjpsychiatry_147_18

Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer-based
technology and student engagement: A critical review of the literature.
International Journal of Educational Technology in Higher Education, *14*(1), 1–
28. https://doi.org/10.1186/s41239-017-0063-0

Schlechty, P. C. (2011). *Engaging students: The next level of working on the work*. John
Wiley & Sons.

Shakya, H. B., & Christakis, N. A. (2017). Association of Facebook use with compromised well-being: A longitudinal study. *American Journal of Epidemiology*, *185*(3), 203–211. https://academic.oup.com/aje/article/185/3/203/2915143

Sintema, E. J. (2020). E-learning and smart revision portal for Zambian primary and secondary school learners: A digitalized virtual classroom in the COVID-19 era and beyond. *Aquademia*, *4*(2), 2. https://doi.org/10.29333/aquademia/8253

Small, G. W., Lee, J., Kaufman, A., Jalil, J., Siddarth, P., Gaddipati, H., Moody, T., & Bookheimer, S. (2020). Brain health consequences of digital technology use. *Dialogues in Clinical Neuroscience*, *22*(2), 179–187. https://doi.org/10.31887/dcns.2020.22.2/gsmall

Smith, A. (2017, January 12). *Record shares of Americans have smartphones, home broadband*. Pew Research Center. https://www.pewresearch.org/fact-tank/2017/01/12/evolution-of-technology/

Sun, S., Lee, P., Lee, A., & Law, R. (2016). Perception of attributes and readiness for educational technology: Hospitality management students' perspectives. *Journal of Hospitality & Tourism Education*, *28*(3), 142–154. https://doi.org/10.1080/10963758.2016.1189832

Sun, Z., Lin, C., Wu, M., Zhou, J., & Luo, L. (2017). A tale of two communication tools: Discussion-forum and mobile instant-messaging apps in collaborative learning. *British Journal of Educational Technology*, *49*(2), 248-261. https://doi.org/10.1111/bjet.12571

Tanrikulu, I., & Erdur-Baker, Ö. (2019). Motives behind cyberbullying perpetration: A test of uses and gratifications theory. *Journal of Interpersonal Violence*, *36*(13-14), NP6699-NP6724. https://doi.org/10.1177/0886260518819882

Teräs, M., Suoranta, J., Teräs, H., & Curcher, M. (2020). Post-covid-19 education and education technology 'solutionism': A seller's market. *Postdigital Science and Education*, *2*(3), 863-878. https://doi.org/10.1007/s42438-020-00164-x

Torres Kompen, R., Edirisingha, P., Canaleta, X., Alsina, M., & Monguet, J. M. (2019). Personal learning environments based on Web 2.0 services in higher education. *Telematics and Informatics*, *38*, 194-206. https://doi.org/10.1016/j.tele.2018.10.003

Tucker, S. Y. (2014). Transforming Pedagogies: Integrating 21st century skills and Web 2.0 technology. *Turkish Online Journal of Distance Education*, *15*(1). https://doi.org/10.17718/tojde.32300

Turner, L., Bewick, B. M., Kent, S., Khyabani, A., Bryant, L., & Summers, B. (2021). When does a lot become too much? A q methodological investigation of UK student perceptions of digital addiction. *International Journal of Environmental Research and Public Health*, *18*(21), 11149. https://doi.org/10.3390/ijerph182111149

Twenge, J. M. (2019). More time on technology, less happiness? Associations between digital-media use and psychological well-being. *Current Directions in Psychological Science*, *28*(4), 372–379. https://doi.org/10.1177/0963721419838244

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, *12*, 271–283. https://www.sciencedirect.com/science/article/pii/S2211335518301827?via%3Di hub

Twenge, J. M., Martin, G. N., & Campbell, W. K. (2018). Supplemental material for decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion, 18*(6), 765–780. https://psycnet.apa.org/doiLanding?doi=10.1037%2Femo0000403

Twenge, J. M., Spitzberg, B. H., & Campbell, W. K. (2019). Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. *Journal of Social and Personal Relationships*, *36*(6), 1892–1913. https://doi.org/10.1177/0265407519836170

Villa, M., Gofman, M., Mitra, S., Almadan, A., Krishnan, A., & Rattani, A. (2020). A survey of biometric and machine learning methods for tracking students' attention and engagement. *2020 19th IEEE International Conference on Machine Learning and Applications (ICMLA)*. https://doi.org/10.1109/icmla51294.2020.00154

Wang, P., Wang, X., & Lei, L. (2019). Gender differences between student–student relationship and cyberbullying perpetration: An evolutionary perspective. *Journal of Interpersonal Violence*, *36*(19-20), 9187-9207. https://doi.org/10.1177/0886260519865970

Weitzel, A. (2020, August 17). *Why blended learning is the new normal*. CourseKey.

    https://coursekey.com/blended-learning-is-the-new-normal/

Westwick, J. N., & Morreale, S. P. (2020). Advancing an agenda for instructional

    preparedness: Lessons learned from the transition to remote

    learning. *Communication Education*, *70*(2), 217-

    222. https://doi.org/10.1080/03634523.2020.1857416

Wexler, N. (2019). How classroom technology is holding students back. *MIT Technology*

    Review. http://ir.westcliff.edu/wp-content/uploads/2020/01/How-classroom-

    technology-is-holding-students-back.pdf

Widya, Rifandi, R., & Laila Rahmi, Y. (2019). STEM education to fulfil the 21st century

    demand: A literature review. *Journal of Physics: Conference Series*, *1317*(1),

    012208. https://doi.org/10.1088/1742-6596/1317/1/012208

Williams, D., Coles, L., Wilson, K., Richardson, A., & Tuson, J. (2000). Teachers and

    ICT: Current use and future needs. *British Journal of Educational*

    Technology, *31*(4), 307-320. https://doi.org/10.1111/1467-8535.00164

Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and

    practices: Digital technologies and distance education during the coronavirus

    emergency. *Learning, Media and Technology*, *45*(2), 107-

    114. https://doi.org/10.1080/17439884.2020.1761641

Wongyai, W., & Patphol, M. (2019). *The "3Es": Coaching model for enhancing the*

    learners' potential. Curriculum and Learning

    https://www.curriculumandlearning.com/upload/Books/The%203Es_1544217774

    .pdf

World Bank. (2020). *Guidance note: Remote learning and COVID-19.*

http://documents.worldbank.org/curated/en/531681585957264427/pdf/Guidance-

Note-onRemote-Learning-and-COVID-19.pdf

World Health Organization. *WHO director-general's opening remarks at the media*

briefing on COVID-19 - 11 March 2020. (n.d.). https://www.who.int/director-

general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-

briefing-on-covid-19---11-march-2020

Xiao, J. (2018). On the margins or at the center? Distance education in higher

education. *Distance Education*, *39*(2), 259-

274. https://doi.org/10.1080/01587919.2018.1429213

Xiao, J. (2021). Decoding new normal in education for the post-COVID-19 world:

Beyond the digital solution. *Asian Journal of Distance Education*, *16*(1), 141–

155. http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/558/341

Zawacki-Richter, O., & Latchem, C. (2018). Exploring four decades of research in

computers & education. *Computers & Education*, *122*, 136-

152. https://doi.org/10.1016/j.compedu.2018.04.001

Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: Links with

problem gambling and motivations for

purchase. https://doi.org/10.31234/osf.io/wdc2u

Zhang, M., Mou, N., Tong, K., & Wu, A. (2018). Investigation of the effects of purpose

in life, grit, gratitude, and school belonging on mental distress among Chinese

emerging adults. *International Journal of Environmental Research and Public*

Health, *15*(10), 2147. https://doi.org/10.3390/ijerph15102147

Zink, J., Belcher, B. R., Kechter, A., Stone, M. D., & Leventhal, A. M. (2019).

    Reciprocal associations between screen time and emotional disorder symptoms

    during adolescence. *Preventive Medicine Reports*, *13*, 281–288.

    https://doi.org/10.1016/j.pmedr.2019.01.014

Appendix A

Antonetti & Stice's Powerful Task Rubric for Designing Student Work

Powerful Task Rubric for Designing Student Work   The "Rigor Divide"

	Power Component	1	2	3	4
Cognitive Demand	Bloom – Revised Taxonomy Examples	Recall Name the steps	Understand Follow the steps	Apply/Analyze Infer with text support	Evaluate/Create Argue, defend, or justify
	Antonetti/Garver/Stice – Meaning	Repeat accepted meaning	Restate or reproduce accepted meaning	Making meaning; Find patterns Find use for patterns	Compare patterns Add/combine/ignore patterns
	Webb – DOK (Assessment)	Recall	Skill/Concept	Strategic thinking	Extended thinking
	Stein/Smith – Mathematics	Memorization	Procedures without connections	Procedures with connections	Making sense
Connected Learning (Tech)	Antonetti/Stice	Retrieve Copy & paste	Click here, click here, click... Prescriptive Learning Accessible Learning	Control- Interests power learning Question, share, contribute, Link, provide feedback	Produce, create Experiment, Design
Academic Strategies*	Similarities and Differences	List facts about A and B	Parallel facts about A and B	Compare or contrast by trait	
	Summarizing/Note-making	Copy	Restate	Personalize or make unique decisions about content	
	Nonlinguistic Representation	Copy other given forms	Place into other forms	Create a new representation	
	Generating/Testing Hypotheses	Copy	Restate "known" pattern	Identify and extend patterns	
Engaging Qualities**	Personal Response (Clear/Modeled Expectations)	Not necessary	Fill in the blank with "my" answer	Explain and support my ideas (open)	Explain and defend or justify my ideas
	Intellectual/Emotional Safety	Not required	Not required	Expression of concepts or recognized patterns	Expression of supported opinions or new ideas
	Learning with Others	Take turns talking	Listen and repeat	Interdependence in roles or mini tasks	Interdependence of ideas
	Sense of Audience	A partner	The class	An audience I want to appreciate me or my ideas	An audience I want to influence
	Novelty and Variety	Recall is fun or different	Product without concepts	Product with concepts	Perspective
	Authenticity	Teacher connects to world	Repeat real examples	Recognize real examples	Create real examples
	Questions	Closed with single right or wrong answers	Closed but with a "choice" of answers	Open with a range of answers, support, strategies, connections	

Appendix B

Letter of Participation for Teachers

Date:

Dear Teachers,

My name is Kristina Loveland, and I am requesting your participation in my doctoral dissertation research project at Lindenwood University. The study is entitled *Effects of Excessive Student Technology Usage on Student Cognitive Engagement.* Participants will be asked to send home and collect student consent forms to be turned into the researcher. Participants will also be asked to conduct a 15-minute student survey and complete a 30-minute one-on-one interview. I am conducting this study to identify if there is a connection between excessive technology usage and student cognitive engagement.

I have been granted permission to conduct research in the XXXX Public School District. To conduct my research, I would like to invite you to participate in one-on-one interview via video conference. The interviews should take approximately 30 minutes to complete. Your participation in this research study is voluntary, and you may withdraw at any time. Data codes or pseudonyms will be used to lessen the possibility of identifying interview participants in the published dissertation. A copy of the research information sheet accompanies this letter, and a detailed explanation of the scope of the study is provided. Interviewees will indicate consent by participating in the interviews.

Thank you in advance to those willing to participate and support this study. If you would like to participate in an interview, you can contact me at kll985@lindenwood.edu. Then, we can set a day and time for a video conference. Before our scheduled interview, I will email you a copy of the interview questions.

Thank you for your time,

Kristina Loveland
Doctoral Candidate
Lindenwood University

Appendix C

Teacher Interview Consent Form

LINDENWOOD

Research Study Consent Form

Effects of Excessive Student Technology Usage on Student Cognitive Engagement

Before reading this consent form, please know:
- Your decision to participate is your choice.
- You will have time to think about the study.
- You will be able to withdraw from this study at any time.
- You are free to ask questions about the study at any time.

After reading this consent form, we hope that you will know:
- Why we are conducting this study
- What you will be required to do
- What are the possible risks and benefits of the study
- What alternatives are available, if the study involves treatment or therapy
- What to do if you have questions or concerns during the study

---

Basic information about this study:
- We are interested in learning about the connection between excessive technology usage and student cognitive engagement.
- You will be asked to participate in a 30-minute interview.

There are no risks to this study. We will not be collecting any information that will identify you.

LINDENWOOD

Research Study Consent Form

Effects of Excessive Student Technology Usage on Student Cognitive Engagement

You are asked to participate in a research study being conducted by Kristina Loveland under the guidance of Dr. Shelly Fransen at Lindenwood University. Being in a research study is voluntary, and you are free to stop at any time. Before you choose to participate, you are free to discuss this research study with family, friends, or a physician. Do not feel like you must join this study until all of your questions or concerns are answered. If you decide to participate, you will be asked to sign this form.

Why is this research being conducted?

We are conducting this study to determine if there is a connection between excessive technology use and student cognitive engagement. We will be asking about seven other people to answer these questions.

What am I being asked to do?

You will be asked to participate in an interview about your perceptions of technology usage on student relationships with peers and how technology affects student cognitive engagement. It will take about 30 minutes to complete the survey.

How long will I be in this study?

Approximately 30 minutes.

Who is supporting this study?

There is no funding for this study.

What are the risks of this study?

There are no risks from participating in this project. We will not collect any information that may identify you. There are no direct benefits for you participating in this study.

What are the benefits of this study?

You will receive no direct benefits for completing this survey.

Will I receive any compensation?

There will be no compensation for participating in this study.

What if I do not choose to participate in this research?

It is always your choice to participate in this study. You may withdraw at any time. You may choose not to answer any questions or perform tasks that make you uncomfortable. If you decide to withdraw, you will not receive any penalty or loss of benefits. If you would like to withdraw from a study, please use the contact information found at the end of this form.

What if new information becomes available about the study?

During the course of this study, we may find information that could be important to you and your decision to participate in this research. We will notify you as soon as possible if such information becomes available.

How will you keep my information private?

We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data include members of the research team, qualified staff of Lindenwood University, and representatives of state or federal agencies.

How can I withdraw from this study?

Notify the research team immediately if you would like to withdraw from this research study.

Who can I contact with questions or concerns?

If you have any questions about your rights as a participant in this research or concerns about the study, or if you feel under any pressure to enroll or to continue to participate in this study, you may contact the Lindenwood University Institutional Review Board Director, Michael Leary, at (636) 949-4730 or mleary@lindenwood.edu. You can contact the researcher, Kristina Loveland, directly at (417) 880-3838 or KLL985@lindenwood.edu. You may also contact Dr. Shelly Fransen at sfransen@lindenwood.edu.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

Appendix D

Teacher Interview Questions

Perceptions of Tech Usage on Student Relationships with Peers

1. How has the use of education technologies aided in students' collaborative learning with each other?

2. How has the use of education technologies been a disadvantage in terms of student relationships with peers?

3. What is your perception of student conduct/student behavior when it comes to relationships with peers?

4. What is your perception of students using personal technology to connect with peers?

Perceptions of Tech Usage Regarding How it Affects Student Cognitive Engagement

5) What is the percentage of time you use education LMS technologies, such as Canvas, Gmail, and Google Drive as organizational tools in your classroom per week?

   a) What do you notice about how LMS technologies impact students in the classroom?

   b) Do these LMS technologies help you achieve your classroom goals? How?

   c) Do these LMS technologies help students achieve classroom goals? How?

6) What is the percentage of time you use learning platforms, such as Kahoot, Quizlet, Google Slides, Interactive Notebooks, and Video embedded with questions, simulations, and/or polling in your classroom per week to test mastery of learning?

a) What do you notice about how educational technologies impact students in the classroom?

b) Do these educational technologies help you achieve your classroom goals? How?

c) Do these educational technologies help students achieve classroom goals? How?

7) What is the percentage of time you use educational technologies, such as Flipgrid, Websites, Blogs, Infographic, and Canvas tools like quizzes to help you assess learning in your classroom?

a) What do you notice about how educational technologies for assessment impact students in the classroom?

b) Do these educational technologies help you achieve your classroom goals? How?

c) Do these educational technologies help students achieve classroom goals? How?

d) Do you believe these educational technologies are a distraction? Why or why not?

e) What do you notice about student engagement when you use technology versus not using it at all (discussions, paper/pencil, traditional lectures, etc.)?

f) The goal is for students to move from surface learning to deeper learning (Antonetti & Stice, 2018). How do you use educational technologies to move students across that rigor divide when you are lesson planning, creating assessments, etc.?

g) How has technology helped students be more cognitively engaged?

h) How has technology been a distraction in your classroom?

Appendix E

Letter of Participation to Parents

Date:

Dear Parent or Guardian,

My name is Kristina Loveland. I am a doctoral student at Lindenwood University, and I am conducting a research study to determine if there is a connection between excessive technology use and student cognitive engagement. The title of the study is *Effects of Excessive Student Technology Usage on Student Cognitive Engagement.*

The superintendent has given permission for me to conduct this study in the XXX School District. I would like to invite your seventh or eighth-grade student to participate in this study by completing a 15-minute survey. The statements on the survey will ask about the amount of time your child spends each day on an electronic device at school and at home and what types of activities they engage in, such as Canvas, Google Drive, Kahoot, Facetime, doing homework, TikTok, gaming, etc. Students will also be asked to rate themselves on what they feel their level of classroom engagement is. Your child will respond to each statement with strongly agree, agree, neutral, disagree, or strongly disagree.

I have attached the Research Information Sheet for you to read. If you choose to allow your child to complete the survey, please sign and return the consent form that was supplied by the school counselor.

Please contact me at 417-880-3838 or by email at KLL985@lindenwood.edu with any questions you might have.

Thank you,

Kristina Loveland

Lindenwood University Doctoral Student

Parent Consent Form

LINDENWOOD

Research Study Consent Form

Effects of Excessive Student Technology Usage on Student Cognitive Engagement

Note: "You" in this form refers to the minor participant. If an activity or requirement refers to the parent or guardian consenting on behalf of the minor, this will be clearly indicated.
Before reading this consent form, please know:
- Your decision to participate is your choice.
- You will have time to think about the study.
- You will be able to withdraw from this study at any time.
- You are free to ask questions about the study at any time.

After reading this consent form, we hope that you will know:
- Why we are conducting this study
- What you will be required to do
- What are the possible risks and benefits of the study
- What alternatives are available, if the study involves treatment or therapy
- What to do if you have questions or concerns during the study

---

Basic information about this study:

- We are interested in learning if there is a connection between excessive technology use and student cognitive engagement.
- You will take a 15-minute survey about the amount of time you spend each day on an electronic device at school and at home and what types of activities you engage in such as Canvas, Google Drive, Kahoot, Facetime, doing homework, TikTok, gaming, etc. You will also be asked to rate yourself on what you feel your level of classroom engagement is.
- There are no risks from participating in this project. We will not collect any information that may identify you. There are no direct benefits for you participating in this study.

LINDENWOOD

Parent Research Study Consent Form (Survey)

Effects of Excessive Student Technology Usage on Student Cognitive Engagement

You are asked to participate in a research study being conducted by Kristina Loveland under the guidance of Dr. Shelly Fransen at Lindenwood University. Being in a research study is voluntary, and you are free to stop at any time. Before you choose to participate, you are free to discuss this research study with family, friends, or a physician. Do not feel like you must join this study until all of your questions or concerns are answered. If you decide to participate, you will be asked to sign this form.

Why is this research being conducted?
We are conducting this study to determine if there is a connection between excessive technology use and student cognitive engagement. We will be asking about 250 other people to answer these questions.

What am I being asked to do?
You will be asked to respond to a series of statements about your technology usage in and out of the classroom and what you feel your level of classroom engagement is. You will be asked to rate the statements.

How long will I be in this study?
Approximately 15 minutes

Who is supporting this study?
This study is not funded.

What are the risks of this study?
There are no risks to this study. We will not be collecting any information that will identify you.

What are the benefits of this study?
You will receive no direct benefits for completing this survey. We hope what we learn may benefit other people in the future.

Will I receive any compensation?
There will be no compensation for taking part in the study.

What if I do not choose to participate in this research?
It is always your choice to participate in this study. You may withdraw at any time. You may choose not to answer any questions or perform tasks that make you uncomfortable. If you decide to withdraw, you will not receive any penalty or

loss of benefits. If you would like to withdraw from a study, please use the contact information found at the end of this form.

What if new information becomes available about the study?
During the course of this study, we may find information that could be important to you and your decision to participate in this research. We will notify you as soon as possible if such information becomes available.

How will you keep my information private?
We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data include members of the research team, qualified staff of Lindenwood University, and representatives of state or federal agencies.

How can I withdraw from this study?
Notify the research team immediately if you would like to withdraw from this research study.

Who can I contact with questions or concerns?
If you have any questions about your rights as a participant in this research or concerns about the study, or if you feel under any pressure to enroll or to continue to participate in this study, you may contact the Lindenwood University Institutional Review Board Director, Michael Leary, at (636) 949-4730. You can contact the researcher, Kristina Loveland, directly at (417) 880-3838 or Dr. Shelly Fransen at sfransen@lindenwood.edu.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

_____   _____

**Parent or Legally Authorized Representative's   Date
Signature**

_____

**Parent or Legally Authorized Representative's
Printed Name**

_____   _____
Signature of Principal Investigator or Designee   **Date**

_____
Investigator or Designee Printed Name

Appendix G

Teacher Script

Thank you so much for your careful attention while taking this survey. Mrs. Loveland is working on gathering research on the impact of educational and personal technology on your daily life for her doctoral degree.

This survey should only take 15 minutes. Your participation is voluntary, and you may withdraw at any time. Your name or any personal information about you will not be collected.

Thank you again for your careful attention to the statements while taking the survey.

Appendix H

LINDENWOOD

Research Study Assent Form

What is research?

We are going to conduct a research study. A research study is when a researcher or doctor collects information to learn more about something. During this research study, we are going to learn more about how excessive technology use affects cognitive engagement. After we tell you more about this study, we would like to ask you about being part of it.

We also will be asking about 250 other people to be part of this study.

What will you ask me to do?

If you choose to be part of this study, you will be asked to rate a series of statements about your technology usage in and out of the classroom and what you feel your level of classroom engagement is.

This study is going to last approximately 15 minutes, and then it will be over.

Will I be harmed during this study?
There are no risks to this study. We will not be collecting any information that will identify you.

Will I benefit from being in this study?
You will not get anything special if you decide to be part of this study. We hope what we learn will help other children.

Do I have to be in this research?
No, you do not. If you do not want to be in this research study, just tell us. You can also tell us later if you do not want to be part of it anymore. No one will be mad at you, and you can talk to us at any time if you are nervous.

What if I have questions?
You can ask us questions right now about the research study. You can ask questions later if you want to. You can also talk to someone else about the study if you want to. You can change your mind at any time. Being in this research study is up to you.

If you want to be in this research study, just tell us. Or, you can sign your name in the blank below. We will give you a copy of this form to keep.

_____   _____

Minor Participant's Signature   **Date**

_____

Minor Participant's Printed Name

_____   _____

Signature of Principle Investigator or Designee   **Date**

_____

Investigator or Designee Printed Name

Appendix I

Student Survey

Mrs. Loveland is working on her doctoral dissertation, and your parents have given their permission for you to participate in this survey. This survey will ask you to consider your technology usage in and out of the classroom and what you feel your level of classroom engagement is. You will be asked to rate the statements. Please think about your answers and answer honestly. Thank you!

Learning Management Systems (LMS)

Please think about the learning management system technologies, such as Canvas, Gmail, and/or Google Drive, etc. to rate the following statements.

1. The PERCENTAGE OF TIME in my core classes I use educational LMS technologies, such as Canvas, Gmail, Google Drive, etc. is:
   o 0%–20%
   o 21%–40%
   o 41%–60%
   o 61%–80%
   o 81%–100%

2. I believe Canvas, Gmail, Google Drive, etc. HELP ME engage and understand my learning targets, how I am reaching my learning targets, and where I'm going next in my learning targets.
   o Strongly Agree
   o Agree
   o Neutral
   o Disagree
   o Strongly Disagree

Educational Technologies

Please think about educational technologies, such as Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video embedded with questions, Simulations, and/or Polling to rate the following statements.

3. The PERCENTAGE OF TIME in my core classes I use educational technologies, such as Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video embedded with questions, Simulations, and/or Polling to help me reach my learning goals is:
   o 0%–20%
   o 21%–40%
   o 41%60%
   o 61%–80%
   o 81%–100%

4. I believe Kahoot, Quizlet, Google Slides, Interactive Notebooks, Video embedded with questions, Simulations, and/or Polling HELP ME engage and understand my learning targets, how I am reaching my learning targets, and where I'm going next in my learning targets.
   o Strongly Agree
   o Agree
   o Neutral
   o Disagree
   o Strongly Disagree

Assessing My Learning

To rate the following statements, please think about the way educational technologies, such as Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. help you assess your learning.

5. The PERCENTAGE OF TIME in my core classes I use educational technologies, such as Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. to help me assess my learning is:
   o 0%–20%

- o 21%–40%
- o 41%–60%
- o 61%–80%
- o 81%–100%

6. I believe Flipgrid, Websites, Blogs, Infographics, Canvas tools like quizzes, etc. HELP ME engage and understand my learning targets, how I am reaching my learning targets, and where I'm going next in my learning targets.
    - o Strongly Agree
    - o Agree
    - o Neutral
    - o Disagree
    - o Strongly Disagree

Personal Technology Use

Please rate the following statements about your personal technology usage outside of school. For example, social media (FaceTime, Instagram, Facebook, Tik Tok, Snapchat, Youtube, etc.), gaming online and/or offline (i.e. computer, iPad, X-Box, etc.), and/or homework to reach my classroom learning goals.

7. From 2:33 p.m. until I go to sleep, this is how much time I spend on my personal technology usage outside of school.
    - o 0 to 30 minutes
    - o 30 minutes to an hour
    - o 1–2 hours
    - o 2–4 hours
    - o More than 4 hours

8. I believe this time spent on my personal technology usage HELPS ME engage and understand my learning targets, how I am reaching my learning targets, and where I'm going next in my learning targets
    - o Strongly Agree

- o Agree
- o Neutral
- o Disagree
- o Strongly Disagree

Appendix J

Permission Letter

Date:
RE: Permission to Conduct Research in XXXX School District
To: XXXX, Superintendent of Schools

I am writing to request permission to conduct research in the XXXX School District. I am currently pursuing my doctorate through Lindenwood University and am in the process of writing my dissertation. The study is entitled *The Dark Side of Technology: How Student Cognitive Engagement is Affected by Excessive Technology Usage*. I am asking permission to invite 126 seventh grade students, 113 eighth grade students, and eight faculty members to participate. Additionally, I would like to invite the eight middle school teachers to participate in individual 45-minute interviews and a 15-minute survey. The interviews will be audio- or video-recorded and be done via Zoom or Google Meet. The purpose of the interview sessions is to assist in analyzing student data that is collected.

If you agree, please sign below, scan this page, and email to me, Kristina Loveland at KLL985@lindenwood.edu.

Your approval to conduct this study will be greatly appreciated. I would be happy to answer any questions or concerns you may have regarding this study.
Sincerely,
Kristina Loveland
Doctoral Student at Lindenwood University

Approved by:

_____
Print name and title here

_____   _____
Signature   Date

Appendix K

Proficiency Scales

Score 4.0	More complex learning goal	
	Score 3.5	In addition to score 3.0 performance, partial success at score 4.0 content
Score 3.0	Target learning goal	
	Score 2.5	No major errors or omissions regarding score 2.0 content, and partial success at score 3.0 content
Score 2.0	Simpler learning goal	
	Score 1.5	Partial success at score 2.0 content, but major errors or omissions regarding score 3.0 content
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content	
	Score 0.5	With help, partial success at score 2.0 content, but not at score 3.0 content
Score 0.0	Even with help, no success	

Figure 3.1: Generic proficiency scale.

Note. This model shows how a proficiency scale organizes identified objects as a sequence of information and skills. It moves from a simpler learning goal, to the target learning goal, to a more complex learning goal.

From (2022). Marzano Home. https://www.marzanoresources.com/

Vita

Kristina L. Loveland received her Bachelor of General Studies in 2001 and Masters in Education in Instructional Technology in 2004 from Drury University in Springfield, MO. Kristina began her teaching career in 2002 as a high school business teacher, seventh grade math teacher, and high school cheerleading coach. In 2003 Kristina joined the Willard Schools district in Willard, MO as a sixth grade ELA and Social Studies teacher. Throughout her nineteen years with Willard Schools, Kristina built a strong media and nationally recognized journalism program at the seventh and eighth grade level. In 2022, Kristina will be working for Walnut Grove School in Walnut Grove, MO as a K-12 business, media, and journalism teacher.