A QUALITATIVE PHENOMENOLOGICAL STUDY OF HISTORY DOCTORAL CANDIDATES' EXPERIENCES WITH TECHNOLOGY AND INFORMATION OVERLOAD

by

Roger Anthony White

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

Liberty University

2023

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Abstract

The purpose of this transcendental phenomenological study was to describe the experiences of history doctoral candidates at Liefrig University with technology and information overload. The theory guiding this study was Sweller's cognitive load theory, as it explains the characteristics of the information received using technology and the effect of exposure to varying levels of data. The study advances the understanding of the influence of technology on online students and their experiences with information overload. The participants consisted of history doctoral candidates completing their studies through a private online higher education institution in a Southeastern state. The three data collection methods involved journal prompts, individual interviews, and focus groups. The data analysis required bracketing, horizonalization, and textual descriptions that address the essence of the participants' lived experiences with the phenomenon. The findings of this study revealed these online history doctoral candidates experienced constant technology interaction and preferred a structured course design. Two additional themes related to information overload and experiences with information overload were also evident based on the data collected, triangulated, and analyzed all three methods.

Keywords: data transfer, information overload, laptops, networked tasks, personal devices

Copyright Page

Dedication

I dedicate this dissertation to God, my eternal source of inspiration. With the guidance of God, I feel all things are possible. In times of doubt, God was always there to provide me with strength and allow me to continue.

I also dedicate this to all the professors who have helped me complete my coursework and dissertation. The amount of guidance and motivation provided was immeasurable. The completion of this process would not be possible without the input of my professors.

Acknowledgments

I would like to acknowledge the work of my committee chair, Dr. Alisha Castaneda. I knew from the first day of your class you would be an excellent mentor. Also, my committee member, Dr. Stephanie Blankenship truly inspired me with her willingness to commit to working with me even without establishing any prior interaction before beginning the dissertation process.

My fellow students have been a true blessing. The interactions and encouragement created the faith to complete all tasks. My ability to focus on required tasks gained continual support from my peers. Simple words of encouragement were a constant presence from my fellow students.

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List of Abbreviations

Coronavirus-19 (COVID-19)

Central Research Question (CRQ)

Internet Phone (iPhone)

Institution Review Board (IRB)

Sub-question (SQ)

CHAPTER ONE: INTRODUCTION

Overview

Different uses of technology continue to rise throughout society, including in education. As early as 2015, 92% of students reported using cell phones and laptops to complete assignments (Russo et al., 2015). This access produces benefits and challenges. Students can communicate and complete research using technological platforms (Peterson & Scharber, 2017); however, the drawbacks of distraction and information overload experiences are present (Beckman et al., 2019). As a result, the purpose of this transcendental phenomenological study is to understand the technology-based learning and information overload experiences of online history doctoral candidates. The background section of this study provides a contextual explanation, including the historical, social, and theoretical aspects. The problem statement and purpose of the study are discussed, and the significance of the research for online learning precede a discussion of the research questions. Finally, the chapter thoroughly lists the key definitions relevant to the research study topic.

Background

Technology in the online learning environment has evolved to include varying levels of data, producing challenges for offline tasks, and increasing the level of information consumption (Cheng et al., 2018; Svensson & Johansen, 2017). Students access a variety of online sources, including social media, games, entertainment articles, and scholarly publications. Each format provides a different level of engagement (Malhotra et al., 1982). Online interaction through email and instant messaging can become the preferred method for all activities and cause an overload of information (Bawden & Robinson, 2008). In general, online education continues to develop, and with the increasing likelihood of data exposure through online activities, the

cognitive demands of online learning and data consumption require consideration (Sweller, 2011).

Historical Context

The uses and implementation of technology within education have advanced significantly over time. In 1890, modern technology would have been considered chalkboards, which later extended to using pencils in the classroom in 1900 (Gordon et al., 2019). Students had to adjust their habits to complete tasks with the new tools. The 1930s through 1950s produced the introduction of projectors into classrooms (McCabe & Meuter, 2011). As schools adapted updated formats, technology also advanced outside of school. The emergence of home computers began in the 1990s (Zheng et al., 2016), and computers outside of school became a norm. The ability to disconnect from information became reduced with household devices, and, with the advancement of technology, students began accessing a constant data stream.

Today, students have previously unimagined computer technology with their laptops, tablets, phones, and even watches. In 2021, research suggested that almost all students have access to a minimum of one computer (Al Shara, 2021). Students continue to expand their use of networked tablets and watches, creating unprecedented access to information.

The rise of technology utilization in education continues with new platforms every year, creating information overload experiences. Teachers regularly institute new networked programs (Badia & Iglesias, 2019). These implementations create the need to interact with new information to learn the formats. As a result, the growing number of applications creates overstimulation (Keaton & Gilbert, 2020). The expanding forms of technology, including laptops, smartphones, watches, and varied formats of Google Classroom, Canvas, and Blackboard in education, influences students by creating a continuous stream of information and

information overload experiences.

Theoretical Context

The theoretical context related to online students' use of technology and information overload experiences involves various theories; however, two theories stand out. The first related theory is cognitive load theory (Sweller, 1988). This theory explains the intrinsic, extraneous, and germane load characteristics required for information to transfer from short-term to long-term memory. Cognitive load theory has been used to explore the data details required for the most productive format for presentation with networked devices (Paas et al., 2003). Researchers have also used the theory to determine the preferred designs and techniques for teaching the curriculum (Sentz et al., 2019). Cognitive load theory relates to the study by establishing the influence of both the platform and presentation method on data accumulation by students when completing assignments, which can influence information overload experiences.

In addition to cognitive load theory, researchers in the field of education use social constructivism to understand online students' technology habits and information overload experiences (Hew & Tan, 2016). Social constructivism requires interactions with elements to expand knowledge (Vygotsky, 1978), and students can identify the interactions that could create information overload experiences when using networked devices for online assignments (Cheng et al., 2018; Feyzi Behnagh & Yasrebi, 2020). Researchers have used social constructivism to determine that online students using technology construct an individualized understanding of information overload experiences and any effects of overstimulation based on their specific data consumption capabilities (Lauri et al., 2020). As a result, the lens of social constructivism provides insights into how online students construct an understanding of information overload experiences in the online learning environment.

Social Context

Students' connection to personal devices for online education produces challenges for community involvement and increases information overload experiences (Lian et al., 2018; Pratama & Scarlatos, 2019). Specifically, the society, community, and education systems are unable to gain the complete focus of students in any setting with the growing presence of technology (Aagaard, 2016). This divided attention for students between their devices and their environment influences peers, community members, and teachers. Students may not understand the dynamics of the attachment to their devices and the unwillingness to participate in non-networked activities. This connection to technology can create barriers to in-person communication and community functions while increasing data consumption and information overload experiences (Brockfeld et al., 2018; Reich et al., 2012). When students cannot disconnect from virtual interaction, participation in community activities such as concerts, shared meals, and athletic activities can decrease. Technological formats can produce a reliance for students on the tool for all activities, less community involvement, and information overload experiences. The understanding of the connection to technology by students, as described in this study, will benefit parents, educators, and administrators to create strategies to minimize information overload experiences.

Problem Statement

The problem is that history doctoral candidates learning in an online environment maintain a continuous connection to technology (An et al., 2016), completing too many tasks using devices and creating information overload experiences (Neiterman & Zaza, 2019). Researchers suggest that students rely on devices and the internet to accomplish many tasks (Gan & Balakrishnan, 2017; Qian & Li, 2017), including communication, entertainment, and

distraction (Cheng et al., 2018; Vahedi et al., 2019). Students can use over half of their waking hours to complete interactions and tasks involving technology (Lian et al., 2018). Many students no longer complete any activities without the involvement of a networked device (Bubb & Jones, 2020; Nicol et al., 2017).

According to Lauri et al. (2020), information overload experiences require researchers to understand the effects of mass data consumption by students using technology. Increased technology utilization provides more data interaction (Bozkurt & Ruthven, 2016; Heitink et al., 2016); however, research on students' experiences with information overload is limited and lacks a clear definition for the optimal amount of technology interaction to effectively complete tasks without producing overstimulation (Jackson & Farzaneh, 2012; Roetzel, 2018). Additionally, empirical research examining the influence of online instruction on the information overload experiences of online doctoral candidates lacks research (Keaton & Gilbert, 2020).

Purpose Statement

The purpose of this transcendental phenomenological study was to understand the technology-based learning and information overload experiences of online history doctoral candidates at Liefrig University. At this stage in the research, the technology-based learning and information overload experiences were generally defined as device usage while completing online classes and the potential of overstimulation from these activities (Ge et al., 2021).

Significance of the Study

The theoretical significance of this study related to the application of Sweller's (2011) cognitive load theory to the exploration of doctoral candidate technology and information overload experiences in an online degree program. Cognitive load theory examines different levels of data accumulated in education (Sweller, 2011). Candidates' lived experiences with

technology-based stimuli have a theoretical connection to the underpinnings of cognitive load theory, particularly regarding the need to develop an understanding of the proper amount of data to allow the retention of information. Cognitive load theory addressed the study by explaining the need to consider characteristics, delivery, and familiarity of data to avoid information overload experiences for online doctoral candidates when completing assignments.

The empirical significance of the study centered on the influence of technology, including e-books, laptops, smartphones, and internet search engines, on doctoral candidates as they complete an online degree program within the field of history. Information relevant to these experiences was explored through journal prompt responses, individual interviews, and focus groups. Similar studies have established the influence of technology in classrooms (Aagaard, 2016; Sprenger & Schwaninger, 2021); however, specific interactions of candidates and information overload experiences require additional exploration (Bawden & Robinson, 2008; Ge et al., 2021). The information consumption from technology requires more research to understand the level of stimuli present (Danielsson et al., 2017). This study revealed data on the influence of consistent connection to networked devices for students in the online learning environment and the information overload experiences that may result from these interactions.

This study's practical significance helps students, teachers, schools, and researchers understand the technology and information overload experiences for doctoral candidates in an online degree program. Future students can choose preferred technology formats through current students' experiences (Brockfeld et al., 2018). As online technology and learning opportunities expand, teachers and professors can apply the information revealed through this study while planning the course content, resources, and assignments for online classes in ways that meet students’ needs and help them gain greater content mastery while helping them avoid

information overload experiences. Researchers will also be able to use the data to extend studies to future students and various contexts to understand their lived experiences with technology and information overload.

Research Questions

The transcendental phenomenological study sought to understand online history doctoral candidates' experiences with technology and information overload. Online classes utilize networked devices, increasing information overload experiences when completing assignments (Beckman et al., 2019). The research questions helped describe technology habits and the information overload experiences in the online learning environment and guided the procedures implemented throughout the completion of this study.

Central Research Question

What are history doctoral candidates' experiences with technology and information overload in online courses?

Research Sub-Question One

What are history doctoral candidates' experiences with technology in online courses?

Research Sub-Question Two

What are history doctoral candidates' experiences with cognitive load and information overload while taking online classes?

Research Sub-Question Three

What symptoms of technology-related information overload do history doctoral candidates experience?

Definitions

1. *Cognitive Load Theory* – A learning theory focused on the different levels of information interaction to develop long-term data memory (Sweller, 2011). The approach focuses on short-term memory connection, leading to a comprehensive understanding of information in long-term memory. The theory explains the need for steps to create usable memory.
2. *Data Transfer* – The transfer of information from temporary understanding to extended retention (Sweller, 1988). Data transfer is a tenet of the cognitive load theory.
3. *Information Overload* – The continuous exposure to information producing lowered comprehension level and a diminished ability to process data (Dolezelak, 2004). Information overload has continued to develop with the expanding use of technology (Eppler & Mengis, 2004). For example, personal devices, such as laptops and smartphones, have increased data connection, creating a more widespread opportunity for information overload.
4. *Learning Environment* – The setting to complete instruction, including online options (Gordon et al., 2019). Establishing an online learning environment requires understanding the use of various tools to complete assignments. Teachers can encourage the preferred resources to complete projects in an effective learning environment.
5. *Networked Tasks* – Activities requiring the use of devices with an established connection to the internet (Cheng et al., 2018). Some networked tasks in online learning include research, communication, and viewing lesson content.
6. *Personal Devices* – Smartphones, laptops, and other individual tools that connect individuals to the internet (Lian et al., 2018). The definition of personal devices continues to expand as smartwatches, and other forms of technology are developed.

7. *Technology Policies* – The guidelines and norms established to complete assignments by using preferred tools (Schneider, 2018). The technology policies in schools can vary based on local, district, or state requirements.
8. *Virtual Communication* – Online interaction with other students or teachers (Sprenger & Schwaninger, 2021). Virtual communication includes email, online forums, and direct messages.

Summary

This study sought to examine the use of technology in the online learning environment and information overload experiences as history doctoral candidates complete online classes. While technological advancements have many benefits, they also produce challenges (Pareja Roblin et al., 2018). The use of technology in online courses requires consideration of both the benefits and drawbacks. These challenges include information overload experiences (Jackson & Farzaneh, 2012) and the prospect of excessive demands on individual cognitive load (Paas et al., 2003). With technology becoming ingrained in society, more research is required to understand the technological habits of students and overstimulation.

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was conducted to explore online history doctoral candidates' experiences with technology and information overload. This chapter provides a review of the current literature on the topic. In the first section, the theories relevant to technology presence in online classes and information overload experiences are discussed, followed by a synthesis of recent literature regarding technology in online learning environments and the causes and effects of information overload. The literature surrounding the processes to manage information overload is addressed. Finally, a gap in the literature related to student experiences with technology in the online learning environment and information overload is identified, presenting a viable need for the current study.

Theoretical Framework

This literature review examines the application of cognitive load theory to understand online students' experiences with technology and information overload. Cognitive load theory establishes the amount of data consumed when completing different online tasks and explores information processing from the initial short-term interaction to long-term memory (Sweller, 1988). Therefore, applying this theory in the study enhanced the understanding of any overload for online students and its effects on their technology experiences (Fisch, 2017; Sweller, 2011). The theoretical framework illustrates a connection between data accumulation and information overload experiences for students studying at the doctoral level in an online learning environment.

Historical Context

Cognitive load theory was developed to examine the required steps to transfer data from short-term to long-term memory (Sweller, 1988). The theory's elements were not entirely unique because Sweller used principles established in information processing theory (Miller, 1956) to develop cognitive load theory. In information processing theory, adequate short-term memory involves five to nine pieces of data creating a schematic connection to establish long-term memory (Miller, 1956). Cognitive load theory builds on this concept by showing how a schema is established from the shared features within the information, which allows better data retention (Sweller, 1988). The introduction of the cognitive load theory affected the understanding of data transfer by further developing the need to establish a schema connection for effective information processing.

Major Principles

Cognitive load theory defines the data characteristics required to transfer information from short-term to long-term memory (Sweller, 1988). According to this approach, retention involves building a schema within the data (Sweller, 1988). Schema occurs with the presence of commonalities in the material. Therefore, establishing a schema within the data creates a manageable intrinsic, extraneous, and germane cognitive load (Sweller, 2011). The result of an effective cognitive load is the ability to retain information.

In cognitive load theory, the intrinsic cognitive load is the first consideration for transferring data from short-term to long-term memory. Intrinsic cognitive load involves the materials' complexity and reflects the amount of detail present (Plass et al., 2010). The intrinsic load rises as the difficulty level, length, language, or graphics increase. Therefore, students extend their intrinsic load when required to engage with unnecessarily complex data (Ayres & Paas, 2012). For example, using a paragraph with compound language and graphics as a reading

assignment requires more intrinsic cognitive load when compared to a paragraph consisting of short, simple sentences. Cognitive load theory application begins with the characteristics associated with information, which determines the intrinsic load.

The second principle of the theory is extraneous cognitive load. This principle of cognitive load is the method and format used to present information (Plass et al., 2010; Sweller, 2011). It is essential to understand that the delivery platforms and techniques can produce a manageable or overloaded extraneous cognitive load for students (Fisch, 2017). Beginning with complex material and providing the information in an unnecessarily complicated presentation burdens the students' cognitive load (Ayres & Paas, 2012). For example, the presentation of a complex paragraph format for an assignment increases students' cognitive load and may, as a result, create an unnecessary burden on their cognitive load. Including a worksheet with the paragraph may also burden the extraneous load and further extend a student's cognitive load. Alternatively, if the teacher chooses to read the paragraph to students with no requirements to take notes, the students' extraneous and overall cognitive load is lessened. The choices for presenting data that create the students' extraneous load require consideration and intentional planning to build a manageable overall cognitive load (Van Merrienboer & Sweller, 2010).

The final principle of cognitive load theory is germane load. The accepted definition of germane cognitive load is the level of familiarity with the information (Van Merrienboer & Sweller, 2010). This familiarity provides the schema, which connects the common themes from prior knowledge (Plass et al., 2010). A schema within the information results in a lowered germane cognitive load by reducing the need to learn new concepts. For example, even a complicated paragraph can lessen the germane cognitive load with shared vocabulary from previous material because students can apply the familiar language. As a result, the repeated

features create a manageable germane load. An effective cognitive load involves including common language to create a schema to establish a manageable germane load (Haji et al., 2015).

Cognitive load theory is a tool for developing strategies to create long-term memory (Plass et al., 2010). Retaining data requires the consideration of the characteristics of the material, the delivery method, and the presence of a preexisting connection to the information (Sweller, 1988). In cognitive load theory, examining the cumulative effects of intrinsic, extraneous, and germane load helps establish methods to teach knowledge in a retainable manner. The principles of cognitive load theory focus on creating the optimal formats for presenting information, allowing transfer from short-term to long-term memory.

Relevance to Research Topic

Cognitive load theory is relevant to online students' experience with technology in education and information overload because of the different levels of data interaction when completing various networked tasks in classes. Online students are provided information through their devices, including lectures, videos, and assignments. This multitude of activities involves different levels of intrinsic, extraneous, and germane cognitive load based on the material's characteristics (Sentz et al., 2019). Furthermore, the theory addresses the accumulative effect of all technology interactions on the overall cognitive load of students (Ayres & Paas, 2012). Cognitive load theory assists in understanding the data accumulation from technology and information overload experiences when completing online classes.

Teachers' technology choices in online classes influence students' cognitive load (Sweller, 2011). With the information available with networked devices, unnecessarily complex material for lessons occurs. This detailed information creates an extended level of intrinsic load (Sweller, 1988). Additionally, choosing a technologically advanced presentation can create an

advanced level of extraneous cognitive load (Ayres & Paas, 2012). Finally, the germane cognitive load is elevated if the topic contains little or no connection to previous subjects (Sweller, 2011). Throughout engagement in online classes, teacher technology choices regarding the format, presentation, and subject material influence students' cognitive load.

The use of new devices and programs in the online learning environment and the subsequent data accumulation from the formats also make cognitive load theory relevant to this study. Using new forms of technology, such as online learning platforms, e-books, and digital programs, requires interacting with additional data to learn about the technology, which can involve reading user manuals, watching tutorial videos, and using trial and error with the device (Kalonde, 2017). The characteristics of the information about the new technology expand the intrinsic load and the extraneous load with the presentation format (Plass et al., 2010). Additionally, the germane cognitive load is influenced based on the presence or absence of a common language for the technology. Involving unfamiliar tools can create unneeded stress on students' cognitive load (Ayres & Paas, 2012). Therefore, cognitive load theory is essential to understanding new forms of technology in online classes, as described in this study.

Cognitive load theory's connection to this study also applied to the distracting use of devices. Filling the cognitive load with unneeded and distracting information can reduce the ability to retain data (Plass et al., 2010). Students engaging in non-academic tasks, including social media interactions, off-task communication, and gaming, while working on course materials and assignments influence their ability to interact with assignment requirements (Lian et al., 2018; Neiterman & Zaza, 2019). The accumulative effect of unnecessary information from distracting use of technology can cause an overload of students' cognitive load and in an inability to process data relevant to their coursework (Paas et al., 2003). As a result, cognitive load theory

is suitable for understanding the distracting use of devices and information overload experiences of online doctoral candidates experience as they work to complete their degrees.

The disengagement from information overload experiences explored in my study is directly related to the principles found in cognitive load theory. Disengagement from information occurs when a point of overload is reached (Brown, 2012). Students' ability to interact with data is not limitless. The accumulative effect of interaction with stimuli can create an unmanageable cognitive load and an inability to engage with new data and disengagement from current information (Ayres & Paas, 2012). Doctoral candidates, at times, struggle to persist through degree completion for various reasons (Lim et al., 2019; Van der Linden et al., 2018). Cognitive load theory explores information overload experiences and the inability to remain engaged with the data. By using cognitive load theory as a framework, this study explored doctoral candidate engagement and persistence by examining their experiences with technology and information overload.

Managing information exposure to avoid overload involves the principles of cognitive load theory. In online education, multiple interfacing systems create access to a vast amount of data to complete assignments, solve problems, and build knowledge (Musti-Rao, 2016; Schneider, 2018). These interactions require effective management of the cognitive load to prevent overload. A proper balance of the data, delivery of the stimuli, and the presence of similarities within the material produce a reasonable cognitive load (Sweller, 2011). The understanding of the cognitive load theory allows the proper use of technology to enhance students' experiences when completing online studies at the doctoral level.

Related Literature

Students consume data for online classes and non-academic activities, affecting their experiences with technology and information overload (Aagaard, 2016; Neiterman & Zaza, 2019; Vahedi et al., 2019). The current literature describes online tasks involving communication, assignment completion, research, and distraction (Danielsson et al., 2017; Heitink et al., 2016). With the expanding use of technology in the online learning environment, information overload experiences continue to develop (Jackson & Farzaneh, 2012). As a result, the causes, effects, and processes to manage information overload experiences require discussion to understand online students' experiences with technology.

Technology in Education

The presence of technology continues to grow in all environments, including academia (Salas, 2016; Santos et al., 2020). It is rare for students to be without some form of technology, and the expansion of connectivity creates a constant flow of information through devices (Tatum et al., 2018). Students use smartphones, laptops, and iPads to complete online assignments, communicate, and view social media (Sprenger & Schwaninger, 2021). This expansion of technological engagement produces a continuous connection to stimuli in all settings, increasing information overload experiences.

Benefits of Technology in Education

In education, technology benefits online students by offering tools that can help them understand lessons with challenging topics. For example, in an online biology class, students can use a laptop to view a lecture and a video detailing the process of completing an experiment (Ojennus, 2015). This preparation creates the opportunity to take notes, access more information, and understand the steps to finish the online biology lab before starting the activity. Using technology to access resources such as periodicals or videos also helps explain complex concepts

present in challenging topics (Chauhan, 2017; Hibbard et al., 2015). Additionally, a virtual reality game can also allow online students to complete experiments in a simulated lab. This format provides interactive and visual aids about the learning material as students complete the labs (Maas & Hughes, 2020). The use of technology assists the understanding of challenging topics and lessons by providing varied formats and sources to enhance learning experiences for online students in academia.

Another benefit of technology in education is timely access to information for online assignments. Smartphones and laptops allow immediate connection to vast sources of data (Nicol et al., 2017; Schneider, 2018), and online students can use the devices to quickly complete internet searches, communicate with various experts, and resource scholarly publications. The prompt access to multiple perspectives and descriptions with devices improves online assignment completion (Bawden & Robinson, 2008). With the increasing presence of smartphones and laptops, online students can instantly connect to information capable of assisting their academic tasks.

Drawbacks of Technology in Education

As with any learning tool, drawbacks exist with technology in education. Distraction is present within a technology-centered learning environment (Lai et al., 2017). Students can be distracted by access to Facebook, Twitter, Instagram, websites, and games on networked devices (Peterson & Scharber, 2017). These applications increase the opportunity to engage in unimportant tasks (Lai et al., 2017) and may distract students, particularly those studying in the online environment, from staying on task as they complete their assignments and other coursework (Qian & Li, 2017). Therefore, the drawback of distraction requires consideration when using technology in an online learning environment.

In addition to the risks of distraction from technology in online classes, dependence on devices is a growing concern. Students have become accustomed to the convenience of retrieving data and communicating online with their devices (Lee et al., 2017). This convenience of interaction creates resistance to disconnecting from the tool (Buchele Harris & Chen, 2018), and technology has become the primary choice for research, communication, and all required activities (Guo et al., 2020). As the presence of technology in education grows, the potential drawback of dependence on devices continues to develop.

Another observed drawback to using technology in online classes is a loss of confidence. Unsuccessful results can create a loss of enthusiasm for students with networked tasks but also provide the questioning of overall academic expertise (Admiraal et al., 2020). For example, difficulties using a networked writing assistance program can lead students to question the use of the format and their actual writing abilities (Andrei, 2018). Both positive and negative experiences with technology can influence students' overall confidence in their abilities as scholars, with negative experiences affecting students' confidence in various detrimental ways (Sprenger & Schwaninger, 2021). For example, students who struggle with online and virtual test formats, including the presence of a timer or issues with the ability to go back to questions, can begin to question their overall knowledge of the subject resulting in the inability to complete the exam. Networked devices offer a helpful tool when appropriately utilized, but they also can create the questioning of academic skills (Aagaard, 2016; Mercer et al., 2019).

The advancements in virtual tools used in online education require balancing the benefits and drawbacks. Views on the appropriate involvement of personal and school-issued devices in academia vary based on personal preferences (Oinas et al., 2020; Zee & Koomen, 2016), from complete immersion to minimal use (Cela et al., 2016; Cheng et al., 2018; Heitink et al., 2016).

Perhaps establishing practical use of technology in online education involves the consideration of students' views on the benefits and drawbacks. By encouraging students' input, the choices of technological formats can reflect current views based on their positive and negative interactions.

Teacher Influence Over Technology Use

Teachers have an essential role in students' experiences with technology. The decisions made by teachers directly affect the use of devices in online classes (Powers et al., 2020; Zheng et al., 2016). For example, the use of specific programs for assessment, communication, and content manipulation can be integrated or removed by educators based on their policies and preferences (Admiraal et al., 2020). Therefore, teachers must consider the influence of their choices on the online classes' technological environment.

Educators have a responsibility to ensure that chosen technology enhances the learning experience. Integrating selected formats in online classes requires establishing goals for the tool (Liu et al., 2020). Throughout integration, an assessment of the technology's effectiveness is imperative. A technological design with ineffective results can cause frustration without establishing an increase in knowledge for students (Van Merrienboer & Sweller, 2010). Educators' decisions regarding the technology platforms and tools they use in the online learning environment require a clear vision of the intended outcome and continual evaluation to measure effectiveness.

Schools' investments in advancing online learning produce an expectation for teachers to implement preferred formats into lessons. Educational institutions spend millions of dollars annually on technology (Kalonde, 2017; Pindiprolu & Forbush, 2021). As a result, teachers become responsible for including the appropriate involvement of the tools to justify the investment (Heitink et al., 2016; Mercer et al., 2019). The increased financial commitment by

schools and universities to various technological devices such as Google Classroom or Canvas produces an expectation for educators to integrate these platforms and tools into the online learning experience.

Teachers' personal experiences with technology affect the inclusion and exclusion of different tools in online classes (Svensson & Johansen, 2017). Technological preferences for teachers begin to form when completing educational requirements and pre-service instruction (Jin & Harp, 2020). These preferences are created based on the availability of networked tools and positive experiences with those chosen technology resources (Alstete & Beutell, 2016). When educators experience rewarding interactions with technology, those specific resources generally become their preferred online tools.

Virtual Communication Among Students

With the expanded availability of personal devices, virtual communication in education continues to change, contributing to information overload experiences (Varier et al., 2017). Online student interaction constantly occurs with technology (Wood et al., 2018). For example, students communicate online even when physically present in the same room (Lo & Hew, 2020). As a result, the influence of virtual communication in online classes requires further development to understand the influence of the interaction on information overload experiences (Keaton & Gilbert, 2020). With virtual communication continuing to develop among students, it is crucial to consider the appropriate balance for the varied types of collaboration to avoid information overload experiences.

Clarifying expectations for appropriate and effective communication with technology in online classes assists students in using devices without creating an overload (Lubniewski & Kiraly, 2020). Potential resistance to controls for online communication is present, creating a

need for specific guidance for interactions in online classes to limit information overload experiences (Maltby & Mackie, 2009). This guidance can establish the required frequency, the expectation of courtesy, and the format for communication within online forums. For example, discussion boards can encourage interaction in the online learning environment while functioning as an assignment requirement (Sprenger & Schwaninger, 2021). However, without establishing guidelines for posting on the discussion board, students are more likely to create and reply to posts without appropriate content or with a frequency that increases the likelihood of information overload experiences.

Policy Influences on Technology Use in Online Classes

Implementing technology policies for online learning facilitates utilizing laptops, smartphones, and iPads properly and effectively without creating information overload experiences. As online learning environments continue to emerge, the policies for the acceptable use of devices for activities are still developing (An et al., 2016; Badia & Iglesias, 2019), and when assignments are completed in this setting, teachers cannot monitor technology use (Cheng et al., 2018). Due to this lack of supervision, it is imperative to establish guidelines to ensure students use technology responsibly without creating overstimulation (Dichev & Dicheva, 2017). Technology policies must also reflect educators' expectations when completing assignments in the online learning environment to reduce overload experiences.

Effective technology policies in online classes require the consideration of the current utilization of technological formats to effectively reduce information overload experiences (Cayvaz et al., 2020). For example, with the increased ownership of smartphones, a policy requiring students to eliminate the use of the tool while completing assignments online could seem unrealistic. With the availability of computers, iPads, Wi-Fi, and laptops, students are

motivated to use them to complete tasks (Andrei, 2018) and develop a preference for different forms of technology to communicate, post assignments, and review feedback (Danielsson et al., 2017). Perhaps implementing effective technology policies in the online learning environment requires considering students' preferences to reduce information overload experiences.

Information Overload

Information overload is the result of an abundance of data creating an inability to process material (Benselin & Ragsdell, 2016; Savolainen, 2007; Tidline, 1999). With the increasing presence of data provided with technology, consuming such large quantities of stimuli can be challenging (Cela et al., 2016; Vahedi et al., 2019). Additionally, the use of technology for online classes has increased students' information exposure significantly (Bubb & Jones, 2020; Valika et al., 2020). This growing exposure to data can overload students, creating problems interacting with required data.

As the presence of technology expands in all settings, information overload experiences occur through academic and non-academic activities. In one example, 339 technology applications were used to complete 157 lessons in an online class (Heitink et al., 2016), which created a significant amount of data for students to process on various levels. Additionally, before, during, or after the completion of required research, assignment postings, or scholarly communication, students also use devices for personal tasks such as playing games or non-academic communication. Students also often complete academic work while engaging in unrelated interactions through technology (such as using social media while completing homework). With this amount of exposure, the experiences with overload increase, and information overload can occur due to the requirements for assignment completion or personal tasks (Blok et al., 2002; Vahedi et al., 2019).

Development Over Time

Understanding that the progression of technology's connection to providing information has been around for centuries is an essential concept. For example, at the end of the Renaissance, the increased information sources created a significant amount of data that was disseminated around the world (Sax, 2006). The development of printed materials, including books and journals, produced a situation where the amount of data available exceeded the time it took to comprehend the progression of ideas in the material (Bawden et al., 1999). In the 1950s and 1960s, continued technological advancements increased publications, further straining abilities to consume desired information within a reasonable amount of time (Bawden & Robinson, 2008).

Though the presence and variety of formats for data have continually increased over time, understanding the effects on individuals took time to recognize. For example, information overload appeared fewer than five times in the guides for Information Science Abstracts between 1976 and 1996 (Tidline, 1999). It was not until the late 1990s that information overload became accepted as an emerging issue (Bawden et al., 1999). This acceptance provided opportunities for more studies to become implemented, furthering understanding of the phenomenon's components. As more research is accumulated on information overload, personalized descriptions of the influence on students continue to grow (Dolezelak, 2004).

With current students' ability to reference a large cache of data with a basic understanding of technology, information overload has progressed significantly (Pratama & Scarlatos, 2019; Savolainen, 2007). The connection available through smartphones and laptops creates immediate access to data with even the most basic understanding of the subject (Moodley et al., 2020; Sax, 2006). Search engines, such as Google, require only a one or two-word prompt to produce a large cache of information on wide-ranging topics. This access has expanded with

the presence of personal devices and the growth of online databases, increasing information overload experiences for students.

Characteristics

Information overload is characterized by the presence of data to such a significant level that the individual experiences an inability to process material properly (Bawden et al., 1999; Brown, 2012). As the amount of available data grows, online students' desire to connect to various forms of information also increases (Inaltekin, 2020). But individuals cannot interact with an infinite amount of information. Therefore, the accumulation of critical and unneeded data creates experiences of overload, requiring students to choose the preferred stimuli for interaction, such as engaging in online conversations with classmates, instead of completing research to lower their information exposure (Brown, 2012; Hoffmann & Ramirez, 2018).

Another characteristic of information overload experiences is the development of emotional challenges from the reception of large quantities of data and the inability to connect to all the stimuli (Bawden & Robinson, 2008; Dolezelak, 2004). Overstimulation stresses the individual's senses and manifests in feelings of being overwhelmed, which may affect personal well-being (Jackson & Farzaneh, 2012). This stress becomes more prominent with continued exposure to unmanageable levels of data (An et al., 2016; Lauri et al., 2020). Emotional responses continue to expand unless strategies are developed to reduce the strain placed on the senses from an overabundance of stimuli.

Information Overload and Technology

Information overload experiences continue to increase with the growth of technology (Nematzadeh et al., 2019). Networked devices are utilized for assignment completion, communication, and research in the online learning environment (Hew & Tan, 2016; Maltby &

Mackie, 2009). However, they also provide entertainment and interaction outside of academic needs, resulting in a mass accumulation of information throughout the day (Dolezelak, 2004; Qian & Li, 2017). The combination of data interface for school requirements and personal use presents a constant presence of stimuli. With the rise in technology use for online instruction and non-academic tasks, information overload experiences require additional focus.

The individual use of devices influences data exposure and information overload experiences for online students (Kalonde, 2017). The constant online interaction using personal devices is a growing concern when considering information overload experiences (Savolainen, 2007). An expectation of unending availability continues to develop with advancements in smartphones, laptops, and iPads (Schneider, 2018). These devices allow interaction without interruption (Lauri et al., 2020). As a result of this constant stream of information through various devices, online students become inundated with stimuli. The amount of data consumption through multiple devices continues to grow, with the vast opportunities to interact online, increasing information overload experiences.

Current Trends

An advancing trend regarding information overload experiences and technology is the increase in exposure to inadvertent information while using the internet. Studies have determined that accessing data online establishes a connection to residual stimuli (Oinas et al., 2020; Schmitt et al., 2017). Interaction with information is no longer limited to the intended material. The invention of the world wide web created an opportunity for advertisers and media outlets to attach data throughout all online interactions (Ge et al., 2021). While completing tasks, advertisers interject pop-up advertisements, which increases data consumption. This exposure

creates additional and unintended interactions with information, expanding experiences with overload.

Technology can create a desire for constant updates from social media, and data consumption increases information overload experiences (Beckman et al., 2019; Guo et al., 2020). Students receive updates from Facebook, Instagram, Twitter, Tik Tok, and other social media platforms, which establishes a perceived need to interact with the information immediately, even while completing online coursework (Tatum et al., 2018). Though some students feel comfortable with a stream of alerts and notifications from social media, the constant stimuli can create a sense of overload for others (Valika et al., 2020). As more forms of online interaction develop, the perceived need to engage in immediate consumption of updates increases information overload experiences.

Influence of New Technology

With the introduction of new technology, the use of unreliable and unverifiable data in online classes continues to progress, which may produce information overload experiences. Many details are easily accessible with smartphones, laptops, and iPads, but with the convenience of immediate interaction with varied sources, authenticating the veracity of the material is essential (Misra & Stokols, 2011; Roetzel, 2018). Before using online resources in academic coursework, a complete and extensive verification process to ensure articles and other resources are valid reduces unnecessary information exposure (Bubb & Jones, 2020). Without establishing the validity of online sources, students can consume unusable data, creating an overload (Roetzel, 2018). Additionally, using inaccurate information requires engaging with more resources to obtain reliable information, adding to data exposure. The presence of vast amounts of details on the internet creates a need for validating resources to reduce unnecessary

exposure to unreliable information and data that may increase the chances of overload when completing online classes.

Experiences of information overload exist for online students through the perceived need to find every source of information when using technology to conduct research for assignments (Eppler & Mengis, 2004). While completing online research, students may attempt to find every source of data (Ge et al., 2021; Guo et al., 2020). Digital links for additional information exist within online material, which leads to related details to the current subject. This linking of data can lead to an unnecessary search for more material and an information overload experience. For example, some students who desire to overachieve often try to make every assignment perfect and feel a need to use all the sources available through their devices (Cetin & Cetin, 2018). As a result, information overload experiences can occur with the desire for online students to connect to all forms of applicable data when completing assignments.

Causes of Information Overload

Using technology for unnecessary tasks while completing online learning can cause information overload experiences (Eppler & Mengis, 2004; Pratama & Scarlatos, 2019). Finding the balance between academic and non-academic technology activities is challenging for educators in online classes. For example, while acknowledging the importance of focused device use, multiple researchers have accepted some off-task use of devices as a byproduct of using technology to complete online assignments (Aagaard, 2016; Salas, 2016). Therefore, teachers must clarify the acceptable use of devices while completing online instruction to reduce overstimulation (Reich et al., 2012; Vongkulluksn et al., 2018). While eliminating all off-task activities in the online learning environment is unrealistic, limiting unproductive device use while completing online instruction can reduce information overload experiences.

Presence of Multiple Screens

Multiple device screens present a magnitude of information requiring simultaneous consumption and creating an overload. In a qualitative study, 49% of students (n = 478) reported using multiple screens to view content unrelated to the instruction module (Neiterman & Zaza, 2019). Online students with access to numerous screens can accumulate unneeded information and unnecessary interactions with various stimuli (Lai et al., 2017). For example, students use their laptops to complete assignments while having separate communication using their smartphones. This interaction involving multiple screens creates increased stimuli and experiences with overload.

Unnecessary Interactions

Unnecessary student interactions through technology and information overload experiences are a reoccurring theme throughout the literature. According to Bozkurt and Ruthven (2016), online communication with productive intentions can lead to conversations that add no value to assignments. Online students may communicate to complete a project and quickly become distracted by unproductive exchanges (Lian et al., 2018; Neiterman & Zaza, 2019). These interactions change the focus of interactions and increase data consumption. For example, students working on a research paper may start an instant message to discuss available resources. The conversation soon changes to non-academic topics. Several students become focused on unrelated discussions and consume unneeded data. The use of technology for interaction provides a platform to communicate about assignments, but off-topic interactions can produce overload.

Digital communication formats continue to progress in online learning, influencing information overload experiences. The presence of personal devices in online classes has

increased data consumption by extending interaction. In a traditional classroom, student communication predominantly occurs as an in-person verbal exchange. However, technological platforms are the primary source of interaction in online classes. As a result, students' attention can be occupied by simultaneous messaging, texting, and face-to-face interactions. Aagaard (2016) found that students became involved in digital conversations while completing in-person interactions in three colleges. For example, students engaged in online assignments can talk with others physically at their location and simultaneously with fellow students online. Students become accustomed to completing digital and non-digital interactions without any break, presenting large amounts of stimuli, leading to an overload (Lian et al., 2018; Svensson & Johansen, 2017).

Technology Fatigue

As online classes continue to expand, technology fatigue can create information overload experiences, disengagement, and an inability to process new material (Lian et al., 2018; Qian & Li, 2017). While examining the presence of technology in the online learning environment has occurred in various studies (Pareja Roblin et al., 2018; Reich et al., 2012), the potential drawback of fatigue and information overload experiences from the interactions requires more investigation. Technology fatigue occurs through the accumulation of unneeded communication, games, and information interaction (Higgins et al., 2017; Lian et al., 2018; Nicol et al., 2017). For example, students completing an online quiz receive alerts of incoming messages on their smartphones and laptops. These alerts produce stimuli and, when added to the data accumulation from completing the online quiz, create technology fatigue, resulting in a desire to disengage from the quiz, messages, or both. As a result, technology fatigue can create information overload experiences and disengagement from academic tasks.

Distracting Use of Devices

Distracting utilization of technology occurs when students focus on off-task activities while completing online learning (van den Eijnden et al., 2016). For example, in a study on e-learning, 59% of online students engaged in activities involving technology for tasks unrelated to assignment completion, including social media, games, and unrelated communication, while engaging in online learning (Abdullah & Ward, 2016). Involvement in these tasks leads to unnecessary information exposure (Azi & Gunduz, 2020). Online students can become overloaded with unrequired information when they use devices for distracting activities while working on their online course content and requirements.

While completing online assignments, the off-task utilization of devices for one student can create an excess of data for multiple students (Neiterman & Zaza, 2019; Okal et al., 2020). For example, some researchers have found that gaming can cause distractions affecting groups of students (Neiterman & Zaza, 2019; Schneider, 2018). Playing video games on computers or gaming consoles can involve numerous students and become a distraction (Ofosu-Ampong, 2020). While students connecting with one another in a fun activity may have some benefits, these interactions can also cause an excess of data consumption. Consequently, the information exposure from the distracting use of technology can create an overload for multiple students.

External Factors

External factors can encourage the distracting use of technology and result in information overload experiences (Maltby & Mackie, 2009; Pressley, 2021). Awareness of these influences is essential to reducing overstimulation for online students (Beckman et al., 2019). Fellow students and family members or outside interests such as other classes, social media, or games can influence students to engage in distracting use of technology (Kim & Padilla, 2020). For

example, students can become involved in playing a game or engaged in an online conversation with people before the start of an assignment, and with the accessibility provided by technology, this interaction continues throughout time originally designed for completing academic tasks. Additionally, the presence of technology creates instant access to different classes, Facebook, TikTok, or gaming platforms during online learning sessions. These sources encourage distracting use of technology and exposure to unneeded stimuli, creating information overload experiences.

Internal Factors

The internal factors of lack of interest, physical fatigue, and feelings of discouragement can create a desire to engage in distracting use of technology (Guo et al., 2020). Online students have a variety of emotions when completing assignments due to the vast amount of data interaction (Savolainen, 2007). These emotions can create a desire to use technology in a distracting manner. For example, online students can become disinterested in an assignment and decide to spend time on social media. The interaction with the information on the non-academic topic creates an influx of data, information overload experiences, and a lowered desire to complete academic tasks. Therefore, the awareness of the internal factors that promote the distracting use of technology can reduce information overload experiences (Brink et al., 2020; Paddison & Mortimer, 2016).

Incorrect Information

Access to incorrect information through technology can significantly influence data exposure and create overload (Rowlands et al., 2008). Resources on the internet have varied levels of validity based on the publication standards (Cayvaz et al., 2020). Often, students can unknowingly accumulate incorrect data, adding to their information exposure and creating an

overload. Referencing false information can also result in the need for additional data exposure to find credible sources (Lauri et al., 2020). When they use incorrect information, students need to sift through additional resources and research to find accurate and appropriate resources to finish an assignment. As a result, the issue of consuming inaccurate material while using technology can increase information overload experiences for students.

Format Changes

Using various technology formats, such as Google Scholar and Research Gate for resources, Blackboard or Canvas for assignment submission, and email or the student portal to access grades in the online learning environment, increases data interaction which can result in overload (Qian & Li, 2017). The progression from traditional education settings focusing on textbooks and hardcopy assignments to the vast amount of data interaction in online classes has increased information accumulation (Aagaard, 2016; Cela et al., 2016). For example, students use Google Scholar to research an article for their topics and a writing application to format the reference pages, and they submit the assignment through Google Classroom or Canvas. All these technological formats create exposure to varying levels of data. Therefore, the risk of overload is present when completing tasks using various networked tools in the online learning environment and requires additional research.

As technology formats progress, changes to online assignment submission requirements can create overload. A Swedish study determined that 78% of online students (n = 16) experienced feelings of overload from significant assignment formatting changes (Danielsson et al., 2017). For example, changes to the steps to upload a paper require online students to become exposed to the data in the research and additional information regarding how to turn in the work. A task such as submitting a worksheet might seem simple, but students can become

overwhelmed by the format changes due to their existing data accumulation related to previous steps and instructions for assignment requirements (Ledger & Fischetti, 2019). Assignment submission requirements can change in the online learning environment but understanding the increased information overload experiences from the new steps is essential.

Device Addiction

Device addiction is the inability to disconnect from smartphones, laptops, or other forms of technology (Lian et al., 2018; Qian & Li, 2017), which can also create an information overload experiences for students. Even the critical use of mobile devices for communication, expansion of knowledge, and research can lead to addiction (Brady et al., 2017; Pulukuri & Abrams, 2020). In a study by Gan and Balakrishnan (2017), over 94% of the 328 participants surveyed using a partial least square structural equation model (PLS-SEM) reported some form of addiction to their devices. This device addiction influences students by establishing a constant connection to data (Lian et al., 2018). When students cannot disconnect from their devices, the continuous interactions with information can create an overload.

Another element of device addiction that can potentially lead to information overload experiences is the desire for immediate feedback (Cetin & Cetin, 2018). The presence of technology provides instant access to assignment status for online students (Laher & Boshoff, 2017; Muhammad et al., 2020), and students can develop addictions to their devices because of their need to receive information and updates (Kara & Tekin, 2017; Moodley et al., 2020). A quantitative study using an ANCOVA determined students' significant dependence ($X2 = 171.431$, $p<05$) on immediate feedback when using technology (Kara & Tekin, 2017). Assignments are repeatedly accessed to look for updates. As a result, students become dependent on their devices for immediate feedback, contributing to information overload experiences.

In addition to a desire for immediate feedback, online gaming can create an addiction to devices and result in high levels of data interaction, increasing overload (Byun & Joung, 2018; Kabak & Korucu, 2021). The gamification of education increases motivation in the online learning environment, but the format can create a device addition and requires immense data interaction (Biryukov et al., 2021). Gamification incentivizes students through digital achievements (Dichev & Dicheva, 2017; Yildirim, 2017), and the presence of devices creates an opportunity to implement online rewards for students through gamification. Using networked games in the online classroom as part of coursework provides a tool to increase student engagement with varied formats (Yıldırım & Baran, 2020). However, using this design can lead to technology addiction for students and create overstimulation (Zhang et al., 2020). As the access to various networked games become more widespread in online classes, the subsequent risks and rewards require consideration. Though using games in online education can advance engagement, there is a potential danger of addiction to the format and information overload experiences (Dichev & Dicheva, 2017).

Effects of Information Overload

With the causes of information overload experiences identified, it is essential to establish the associated effects. When experiencing extended data levels from academic and non-academic tasks, the ability to comprehend more information can become challenging due to data saturation (Lauri et al., 2020). Online students reach a point where the accumulation of information exceeds their processing capabilities. This data saturation creates an overload and disengagement from material deemed unimportant to students (Lian et al., 2018). As students accumulate more stimuli, their understanding of new and existing data can decrease due to disengagement due to information overload experiences (Lauri et al., 2020). Data saturation and disengagement require

consideration as effects of information overload experiences from the vast amounts of stimuli accumulated through technology in online classes.

Data Saturation

Data saturation contributes to information overload experiences by exposing students to large amounts of repeated or similar data (Valika et al., 2020). The interaction through technology with varied stimuli creates the opportunity for viewing the same information published on different websites (Inaltekin, 2020). Students quickly move from one source to another using a networked device and become inundated with overlapping material, creating data saturation (Keaton & Gilbert, 2020). Exposure to various sources for students using technology provides the opportunity to interact with multiple sources using the same information, which can also result in data saturation and information overload experiences.

The continuous interaction with material in the online learning environment can produce data saturation and information overload experiences. Data consumption is increasing with the widespread use of technology for online classes (Edmunds & Morris, 2000). Material is repeatedly displayed and referenced to complete online tasks producing student immersion in the information (Schmitt et al., 2017). This data saturation increases information overload experiences (Eppler & Mengis, 2004). Students reach a saturation point and soon become overloaded with any additional information. Without the proper understanding of data consumption reaching saturation for students in online classes, information overload experiences increase when completing assignments.

Disengagement

Students continuously interact with information to complete transactions, communicate, learn more about topics of interest, and complete various activities simultaneously, which creates

decisions to interact or disengage with the stimuli and results in information overload experiences (Nicol et al., 2017; Wood et al., 2018). Disengagement has increased with the vast amounts of accessible material available through technology to complete tasks and the overload from data consumption (Schmitt et al., 2017). For example, students who communicate with classmates while accessing reference material must decide which activity is more important. In a study of 74 online students, choosing which information and tasks to focus on while completing online assignments was their most challenging issue (Nicol et al., 2017). The increased information interaction for students to complete daily activities produces an overload that may cause disengagement.

As more technology becomes utilized in the online learning environment, disengagement from academic resources is due to information overload experiences (Blok et al., 2002; Danielsson et al., 2017). In a study by Varier et al. (2017), 95% of the teachers surveyed (n = 18) observed disengagement from students completing over an hour of continual interaction with devices. When online students communicate, plan and research with several sources using networked devices for extended periods, they feel overloaded and disengaged from information (Schneider, 2018). For example, if online students work on completing a Microsoft Teams conversation while also researching an assignment as well as posting on a discussion board, they may feel overwhelmed. These different forms of data consumption create an overall information overload experience and result in disengagement from one of the sources to focus on preferred activities, prioritizing one action over the others, or lowering attention and engagement in all three tasks. When students experience information overload from the variety of stimuli in online classes, they may choose to disengage from material they view as unimportant.

Strategies to Avoid Information Overload from Technology

Due to the amount of data accessible with technology, especially for online students completing multiple concurrent activities, strategies are required to avoid information overload experiences. While completing various networked activities produces an abundance of data interaction, preventing an overload requires proper prioritization of tasks. This precedence of data consumption in online classes allows students to focus on the intended material (Powers et al., 2020) and engage with instruction (Ackerman et al., 2014). When stimuli from technology in online classes overload students, their ability to engage in academic activities becomes lowered (Bawden & Robinson, 2008). As a result, developing strategies to ensure appropriate interaction with data while completing online instruction reduces information overload experiences.

Management of the Online Learning Environment

The limitation of platforms for instruction in the online learning environment can assist in avoiding information overload experiences (Valika et al., 2020). Reducing the involvement of a large variety of technological applications for online education reduces information interaction (Avendano et al., 2018). With fewer forms of technology in the online learning environment, students can shift their focus from learning new formats to completing assignments. This focus can assist in avoiding an overload of information. Therefore, reducing the variety of networked formats used for education in online classes provides the opportunity to lower information overload experiences.

The identification of appropriate academic sources for online students assists in avoiding information overload experiences by reducing their interaction with counterproductive material. Due to the immense presence of unvalidated data on the internet, the resources used by online students require teachers' input (Cayvaz et al., 2020; Neuwirth, 2020). This oversight reduces exposure to incompetent information that has the potential to create an overload (Bawden &

Robinson, 2008; Miller, 2018). Managing the learning environment by including preferred resources in assignment instructions or through personalized guidance from the instructor in online classes reduces information overload experiences.

Avoiding information overload experiences when completing complicated lessons for online classes requires a focused approach to identifying the most influential data. Laptops and smartphones provide access to limitless information on a variety of topics. However, using these tools for complex projects must focus on the best data to avoid overload and maintain a productive learning environment (Cullen et al., 2020; Garcia-Santillan & Molchanova, 2018). For example, information on the effects of war on the global economy is vast and requires the identification of the most influential references for use in assignments to avoid overload. Online students can become overloaded with the available material on the subject without proper guidance to find influential information. The key to using technology to present complex lessons with an appropriate level of interaction is focusing on the most valuable sources, not the largest quantity of data (Badia & Iglesias, 2019). The amount of information exposure required for diverse subjects can create an overload without proper planning (Alshehri, 2017; Muhammad et al., 2020).

Smartphones and laptops are needed for an online learning environment, but specific control measures are required to avoid information overload experiences (Barrett et al., 2016; Svensson & Johansen, 2017). With each student having varied habits for interaction utilizing technology, it is essential to establish precise instructions for the acceptable use of devices when completing online assignments to manage data accumulation (Nicolle & Lou, 2008). For example, teachers could strongly encourage students to avoid using multiple devices simultaneously and suggest that students manage their time and energy wisely by avoiding

distractions and concentrating on one device, as well as one task at a time. Eliminating unneeded data interaction while receiving instruction requires considering online students' devices and technology habits to reduce information overload experiences.

Information Breaks

As technology influence grows, breaks from data interaction can reduce overload (Buchele Harris & Chen, 2018). Networked tools provide students with large caches of information in an immediately accessible format (Ackerman et al., 2014; Rosenberg & Lawson, 2019). However, a break from digital interaction allows for data processing (Stobaugh, 2019; Wood et al., 2018) and decreases overload (Cayvaz et al., 2020; Ge et al., 2021). For example, students getting up from a stationary position, stretching, and taking a brief walk around the room or outside without any interaction with technology can achieve a break from data immersion and manage information overload experiences (Buchele Harris & Chen, 2018). As a result, scheduling technology breaks allows students to reduce information overload experiences (Ledger & Fischetti, 2019; Vahedi et al., 2019).

When using information breaks to decrease overload, it is essential that these breaks include disconnection from all digital information interaction, including iPhones, iPads, and laptops (Buchele Harris & Chen, 2018; Salas, 2016). For example, when a student goes for a walk to take an information break, if they take their smartphone and interact throughout the exercise, an effective information break does not occur. Online educators can encourage students to incorporate weekly and even daily information breaks into their study and work habits through the course materials and various methods of communication. Ultimately, these breaks help students manage the amount of time they spend on their devices and avoid information overload experiences as they progress through their online classes.

Non-Networked Reasoning Tasks

As the number of online classes grows, non-networked reasoning tasks are needed to reduce information overload experiences (Nicol et al., 2017). The constant involvement of online resources to complete assignments can produce a high level of data exposure (Dolezelak, 2004; Nicol et al., 2017). With this amount of interaction with stimuli, it is crucial to provide an opportunity for non-networked reasoning tasks to reduce data consumption (Stobaugh, 2019; Vahedi et al., 2019) and apply current knowledge (Barak, 2017; Stobaugh, 2019). The inclusion of online assignments focused on reasoning tasks without the use of networked devices can reduce the presence of information overload experiences.

Using non-networked reasoning tasks creates confidence in students' existing knowledge, which may also assist in avoiding information overload experiences (Erdem et al., 2018). For example, online students can become reliant on technology to complete even basic reasoning tasks and resist using their current understanding for assignments (Sprenger & Schwaninger, 2021). This reliance results in additional daily data interaction. The absence of offline reasoning tasks in the online learning environment can create a need for constant data verification, a lack of confidence in personal ability and previous knowledge, and information overload experiences (Feyzi Behnagh & Yasrebi, 2020; Kim et al., 2017).

Group Activities

Incorporating group activities in online learning reduces networked interaction and helps prevent overload (Bush et al., 2017). Studies have demonstrated that learning from fellow students in group activities creates access to knowledge which can lower the research requirements to complete assignments (Koppelman, 2017; Orlich et al., 2018). Students can communicate known information about the subject of the project to the group. This knowledge is

added to the collaborative assignment resulting in a lessened need to browse multiple sources of information to access more data for the other group members. Additionally, one student can look up resources for the introduction of a presentation while another student searches for applicable graphics based on their area of expertise. This division of work for the assignment also lowers the required data interaction for each student. As a result, group activities offer the opportunity to develop classmates as a resource and reduce information overload experiences.

Summary

This study focused on exploring the varied lived experiences of online history doctoral candidates with technology and information overload. Cognitive load theory served as the framework for the study (Sweller, 1988), and the application of the theory describes the data characteristics required to process information from short-term to long-term memory (Van Merrienboer & Sweller, 2010) and established the context surrounding information overload experiences. Cognitive load theory also details proper data presentation to create retention and assists in understanding technology interactions that could lead to information overload experiences (Ayres & Paas, 2012). With the continued expansion of technology involving large amounts of data interaction for online students, it is necessary to consider the causes, effects, processes, and management of information overload experiences (Jackson & Farzaneh, 2012).

A gap in the literature exists for research related to the lived experiences of online students with technology and the continuous connection to devices creating an information overload (Valika et al., 2020). This gap involves the lack of a defined level of data accumulation and information overload experiences for students through advancing technological environments, including online instruction (Goulding, 2001). Students accumulate different levels of information and have varied abilities to process stimuli. As a result, research is required

to create a baseline for interaction with technology that can produce information overload experiences.

CHAPTER THREE: METHODS

Overview

The purpose of this transcendental phenomenological study was to understand the technology-based learning and information overload experiences for online history doctoral candidates at Liefrig University. At this stage in the research, the technology-based learning and information overload experiences was generally defined as device usage while completing online classes and the potential of overstimulation from these activities (Ge et al., 2021). This chapter provides the research design, including research questions, setting, and participants. Next, the research positionality explains the framework and assumptions. Additionally, the procedure portion of the chapter clarifies the permissions and recruitment plan, and the data collection section addresses the methods, procedures, and data synthesis process. The trustworthiness details of the research discuss the credibility, transferability, dependability, and conformability of the study, and the chapter ends with a focus on describing the ethical considerations relevant to the study.

Research Design

The study utilized a qualitative research method because this format provided descriptive and detailed data on doctoral candidates' experiences with technology and information overload. Qualitative research involves investigating the participants' individual and personal experiences (Patton, 2014), and using this method allowed me to gather thick, rich data regarding the participants' lived experiences with information overload while learning in the online environment. Students have unique and varied perspectives on technology (Aagaard, 2016), further reinforcing the rationale for using a qualitative study. The descriptions provided by candidates created a better understanding of experiences in technologically enhanced online

courses, and a qualitative design allowed participants to communicate detailed descriptions of their interactions with technology in these environments and share their information overload experiences.

The participants' explanations of their different experiences are essential in research, and a phenomenological approach provides the varied meanings present in a phenomenon (Moustakas, 1994). In phenomenological research, a phenomenon is an element or an experience that creates an impression on an individual. This type of research addresses the human aspect of using technology and information overload experiences (Lai et al., 2017). Additionally, the data collection methods of journal prompts, individual interviews, and focus groups in phenomenological research create personalized descriptions of lived experiences appropriate to understanding technologically advanced online learning environments (Patton, 2014). Using this phenomenological design provided the opportunity for participants to describe their personal experiences with technology through journal prompts, individual interviews, and focus groups.

The progression of transcendental phenomenological research occurred over time. Transcendental phenomenology emerged due to dissatisfaction with science's lack of human elements (Moustakas, 1994). Researchers recognized a need for more involvement of personalized experiences in collecting data and the application of metaphysical philosophies (Husserl, 1970; Moustakas, 1994). This involvement led to the inclusion of conscious choices and lived experiences (Husserl, 1970; Moustakas, 1994). Before designing and refining transcendental phenomenology, science focused on the measurable and material matter but progressed with personalized descriptions through the involvement of metaphysical philosophies.

Transcendental phenomenological research includes epoché, transcendental-phenomenological reduction, and imaginative variation to explain participants' experiences

(Moustakas, 1994). Epoché is the process of withholding previous understanding of elements (Moustakas, 1994) and accepting the data without undue influence. I used epoché to separate my personal experiences as an online Education doctoral candidate from the study by using a journal to acknowledge my feelings and accepting each participant's information throughout data collection, analysis, and reporting as entirely separate and unrelated to my experiences. My inclusion of transcendental-phenomenological reduction also created an unbiased approach, and imaginative variation provides additional context to residual factors involved with the phenomenon (Moustakas, 1994).

I chose to use a qualitative transcendental phenomenological method for my study because doctoral candidates' experiences with technology and information overload involve lived experiences requiring individual interpretations. In the transcendental phenomenological method, participants develop personalized meanings for a phenomenon (Moustakas, 1994). As a doctoral candidate in an online Education program, I have personal experience with the phenomenon at the center of this study; however, I chose to use the transcendental research method in order to remove myself and my personal experiences from the research through bracketing in an effort to collect, analyze, and report on the data from an objective perspective. A transcendental phenomenological study design offered the ability to explore the use of technology by doctoral candidates in the online learning environment and their experiences with information overload without undue influence from the researcher.

Research Questions

Central Research Question

What are history doctoral candidates' experiences with technology and information overload in online classes?

Sub-Question One

What are history doctoral candidates' experiences with technology in online classes?

Sub-Question Two

What are history doctoral candidates' experiences with cognitive load and information overload while taking online courses?

Sub-Question Three

What symptoms of technology-related information overload do history doctoral candidates experience?

Setting and Participants

Selecting a proper setting and preferred participants required understanding the study's elements. The optimal location includes the availability of resources and support (Miles et al., 2020). Furthermore, recruiting a participant population based on their experiences with a phenomenon is critical in developing a study with future applications (Moustakas, 1994). Based on these considerations, the setting and participants were carefully selected to align with the focus on studying online history doctoral candidates' experiences with technology and information overload.

Site

The transcendental phenomenological study utilized Liefrig University as the desired site. This institution is a continually growing private, non-profit university in the Southeastern region of the United States with a diverse population of students. The current overall enrollment is over 100,000 online and 15,000 on-campus students with over 700 unique programs, including 450 online programs. Due to the continued advancement of distance learning, the student/professor ratio is 20:1 on campus and 17:1 online.

The leadership structure at Liefrig University consists of a president, executive, and senior leadership. Decisions affecting long-term procedures and policies require approval from senior leadership and executive leadership, ending with the president before implementation. The final approval authority is dependent on the level of involved resources.

The university has an online program for history doctoral candidates that offers various terminal degree options. Students complete their online courses through the Canvas platform, which houses their weekly study materials, coursework, assignment instructions, discussion forums, professor announcements, and more. Students are able to communicate with each other and the professor directly through the Canvas Inbox, as well as any discussion forums that may be included in the course shell. Additionally, professors are able to provide written and verbal feedback directly on student assignment submissions through the Canvas platform annotation and feedback tools. The university also provides various education support services, including tutoring, research librarian appointments, and personalized academic advising among others.

The location for the study, Liefrig University, provides a combination of online courses and varied technological formats for communication, research, and assignment completion. Doctoral candidates use technology to research, study, and complete online assignment requirements as well as non-academic tasks. As a result, their lived experiences provided thick, rich data and unique insights that directly related to the main purpose of this research study. Additionally, the students at Liefrig University have diverse backgrounds, creating a wide range of technology interactions before and while enrolled at the university. For these reasons, Liefrig University served as the ideal setting for this study.

Participants

Participants included history doctoral candidates. The predominant ages of the

participants consisted of 35 years and older. No mandated ethnicity or gender was required for the study (Creswell & Poth, 2018). However, diversity in race and gender for the participants was ideal. The student population consists of 41% males and 59% females. Additionally, with 50% White, 14.6% Black or African American, 6.25% Hispanic or Latino, 3.07% two or more races, 1.88% Asian, 0.467% American Indian or Alaska Native, and 0.247% Native Hawaiian or Other Pacific Islanders population, the opportunities for diversity were available in this study. Creswell and Poth (2018) describe the need to involve enough participants to understand the essence of a phenomenological study. The preferred sample size for this study was 10-15 participants.

Researcher Positionality

The details included throughout this section address the interpretative framework of the study and my philosophical assumptions. This positionality established the influence of the frameworks and assumptions (Holmes, 2020). In this study, identifying the philosophical beliefs provided insights regarding my personal views.

Interpretive Framework

The study used an interpretative framework consistent with a social constructivism approach. Social constructivism broadens understanding by creating meanings for the elements present in people's interactions and focuses on the collaborative nature of learning (Vygotsky, 1978). Within the context of education, students construct meanings in social constructivism through exposure to elements, other students, and the environment (Vygotsky, 1978). In social constructivism, an interpretive learning process creates meaning and an overall understanding of the curriculum, the learning environment, and expected results (Hay, 2016). Social constructivism is directly tied to information overload experiences and the online learning

environment because different technological formats create varied interactions based on usage (Barak, 2017). As online students use technology to complete assignments, they construct different meanings for the elements involved in networked learning (Feyzi Behnagh & Yasrebi, 2020). Additionally, students in online coursework develop varied perspectives on information overload experiences from technology with academic requirements and personal use (Roetzel, 2018). The presence or absence of information overload experiences in online courses is constructed over time and through technological interaction (Sentz et al., 2019). Therefore, social constructivism was appropriate for understanding participants' experiences with technology and information overload in the online learning environment.

Philosophical Assumptions

The philosophical assumptions for the study included my core values, belief system, and worldview. Ontological assumptions represent my view of the nature of reality. Epistemological assumptions explain my feelings about the importance of knowledge-focused research. Additionally, the axiological assumptions describe my attitudes toward technology before starting the study.

Ontological Assumption

My ontological assumptions involve the view of a singular reality. As a researcher with a biblical viewpoint, my understanding involves the lessons of Jesus. A universal reality exists, but people have perceived differences in understanding the world's elements. Phenomenological research requires accepting the information provided by participants without influencing results (Moustakas, 1994). Completing transcendental phenomenological qualitative research requires reporting the data according to the lived experiences of the participants and not my personal experiences. As such, my knowledge of a singular reality did not influence the different

perspectives shared by participants and reported in this study.

Epistemological Assumption

As a human instrument for the research, my epistemological assumption for this study relied on data collection to understand experiences. Phenomenology focuses on individuals' perceptions of a phenomenon (Fetterman, 1988). I am currently an online Education doctoral candidate while also conducting research on my peers and understand the phenomenon through my own interactions while completing coursework. Therefore, I bracketed my personal experiences and used focused interactions with participants to develop themes. This process provides the information without judgment from previous attitudes (Moustakas, 1994). The descriptions of interactions with the phenomenon received from participants created knowledge. Therefore, the expansion of understanding occurred by comparing the different perspectives. Phenomenology focuses on individuals' perception of an element (Fetterman, 1988). My epistemological assumptions recognized the reliance upon the participants' views as a means of establishing knowledge about online history doctoral candidate experiences with technology and information overload.

Axiological Assumption

Due to my experience as a student who completed education through the high school level with limited technology access and postgraduate level work in fully online learning environments, my axiological assumption includes bias about complete immersion into networked interaction to communicate, research, and complete assignments. In my experience, students thrive with a combination of online and in-person interaction. Additionally, in my observations, the utilization of both networked and hard-copy academic references works best for completing research. I believe using technological formats requires balance with non-

networked activities and an appropriate plan for responsible use of the devices because technology presents positive and negative effects. The accessibility to laptops and smartphones provides the positive result of instant access to data but can create the negative outcome of information overload experiences from this access (Aagaard, 2016; Wolcott, 2008). Furthermore, using devices in online classes requires consideration of the technology's immediate and tertiary effects to ensure the benefits outweigh the drawbacks (Pareja Roblin et al., 2018; Valentine et al., 2018). My awareness of this existing bias created the need to control my beliefs. I fully engaged in the epoché process in order to bracket my personal beliefs, limit my bias, and focus on the lived experiences participants shared in the journal prompt responses, individual interviews, and focus groups (Moustakas, 1994).

Researcher's Role

Throughout the completion of this study, my role was to serve as a human instrument (Creswell & Guetterman, 2019). Qualitative researchers act as a tool to conduct the study (Rutberg & Bouikidis, 2018). The study required my involvement as a data collection device. As I integrated bracketing or epoché throughout the completion of the study to remove my influence (Moustakas, 1994), I worked to ensure that my bias or assumptions, which involve believing in a balance of technology when completing online courses, did not influence the analysis. I also believe individuals should set aside various time periods throughout the day to avoid using technological platforms. A constant connection to stimuli challenges students to absorb information in online education and creates distractions. I unbiasedly designed journal prompts, individual interviews, and focus group questions and had them reviewed by qualitative research experts in the field. The format of the questions focused on the experiences of participants.

With regard to my relationship with the participants of the study, I had no personal relationship or authority over them. The location is known to me due to my familiarity with the university's programs and my friendship with students who have graduated from Liefrig University's Ph.D. programs in the past. I had never met or interacted with any of the proposed participants, and I had no professional affiliation with Liefrig University. My familiarity with the area relied on my experiences as a student at the site.

My teaching journey started with student instructing for my master's degree. Those teaching experiences took place in the face-to-face classroom environment. After program completion, I immediately worked as a substitute teacher for various schools. My interest in conducting the study began with observing the policies for using technology in different schools and classrooms. The guidelines for using the devices varied greatly, and when I began my online coursework for a doctoral degree in Education, my interest in the subject area heightened. The opportunity to learn more about students' experiences and educators' best practices for technology use in education continued to intrigue me and served as the driving impetus for this study.

Procedures

The study required the approval of the Liberty University institution review board (IRB) before collecting data. For IRB approval, consent forms for the site and participants were needed (Liberty University, 2021). The IRB checklist required completion to secure approval for ethical compliance of the methods, site, and participants (Liberty University, 2021). Then the recruitment plan began in order to achieve the intended sample size.

Permissions

After completing the IRB process, I sent a site consent request email (see Appendix C) to

the Department of history chairperson at Liefrig University. This consent was approved before contacting professors within the department. Following the site consent, the Department of history chairperson contacted individual professors for history doctorate classes requesting their students' participation in the study. The necessary approvals were secured before beginning the recruitment plan for the participants. The Liberty University IRB approval letter is in Appendix A, followed by individual consent in Appendix B, and site consent in Appendix C. The permission procedures followed the guidance provided by the Liberty University IRB.

Recruitment Plan

Liefrig University has a robust enrollment in the department of history, providing a sample pool of over 6,000 history doctorate candidates to meet the target size of 10 to 15 participants. According to Moustakas (1994), participant selection requires choosing people with experience with a phenomenon, interest in the topic, and willingness to complete all the study requirements. Liefrig University provided enough online history doctoral candidates to conduct an influentiall study.

The participants in the study were identified through criterion sampling to ensure that the history doctorate candidates chosen had exposure to online courses (Gall et al., 2007). A criterion sampling approach is effective for understanding experiences with digital technology in the online learning environment (Andrei, 2018; Florenthal, 2018). The proposed choice of criterion sampling created the opportunity to identify participants interacting within an online learning environment.

Participant recruitment began after securing permission from the department of history chairperson and applying the criterion sampling method. This recruitment started by coordinating with the history doctoral studies professors at Liefrig University to post an announcement in each

of their classes. Interested participants responding to the posting were sent a recruitment email (see Appendix E), including the adult consent form (see Appendix B).

When the candidates returned the adult consent form via email, I responded with the journal prompts. After receipt of the journal prompts, I scheduled an individual interview and focus group with each participant. After the journal prompts and individual interviews, I provided each participant with a $5 Amazon gift card, followed by an additional $5 Amazon gift card after the focus groups for their completion of the study.

Data Collection Plan

The data collection plan involved journal prompts, individual interviews, and focus groups (Creswell & Guetterman, 2019). The use of triangulation enabled the comparison of all three sources to identify reoccurring themes in the participants' lived experiences (Creswell & Guetterman, 2019). The data collection and triangulation sequence began with journal prompts, moved to individual interviews, and concluded with focus groups. This sequence and method created an opportunity to understand the phenomenon better by developing and comparing detailed descriptions of online education and information overload experiences from the participants.

Journal Prompts (Data Collection Approach #1)

Journal prompts were the first data collection technique. The journal prompts analyzed participants' personal views and experiences (van Manen, 2016) and provided descriptions without the pressure of immediate answers in the individual interviews or focus groups format (Creswell & Guetterman, 2019). When completing individual interviews and focus groups, the real-time video interaction can feel intimidating for participants who require more time to answer

questions. Journal prompts allowed participants to consider their responses longer before submission and provided a measured view of the phenomenon.

I sent the journal prompts, including an explanation of information overload and cognitive load theory, in an email to participants. These explanations advanced this study by helping participants to understand the tenets of information overload experiences and cognitive theory while completing the journal prompts. I assigned pseudonyms to eliminate confusion and safeguard anonymity when processing the responses. To continue the movement through the data collection process, participants had seven days to respond. Participants with missing responses within the initial timeframe were sent a reminder email with seven more days to respond. Replies missing after the initial reminder received a second reminder and an additional seven days to answer.

Journal Prompt Questions

1. Information overload is a growing concern, and completing online classes requires prolonged interaction with networked devices. This sustained exposure to technology presents the risk of disengagement due to data saturation (Bawden & Robinson, 2008). The data accumulated from interactions with both productive and unproductive stimuli can result in overload, decreasing interest in the information (Berghel, 1997). With this explanation in mind, how would you describe your experiences with information overload in your online classes? SQ3
2. What are some techniques you use to avoid information overload experiences as you complete your online classes? SQ3
3. Cognitive load theory focuses on the process of transferring information from short-term to long-term memory (Sweller, 2011). As exposure to more data occurs, the brain must

choose the most important information to retain. In short cognitive load theory deals with how the brain prioritizes and retains information. How do you prioritize the information you interact with in your online classes? SQ2

4. As you are completing your online classes, what activities create an unnecessary burden on your cognitive load? SQ2

Question one established a definition of information overload experiences for the candidates and related to the CRQ and SQ3. To answer the question, students needed to express their experiences with information overload. The involvement of devices in online learning allows students to expand their knowledge but produces an overload (Lubniewski & Kiraly, 2020). The answers to the question addressed students' experiences with information overload.

Question two connected to the CRQ and SQ3 and focused on information overload experiences. Students' beliefs about technology may determine their level of exposure to information from devices to complete assignments (Holian & Kelly, 2020). These interactions with data through technology could create an information overload experience. Involvement with networked devices is individualized and results in unique perspectives of information overload (Misra & Stokols, 2011).

Question three related to the CRQ and SQ2 and established the influence of participants' device use on their cognitive load. Different digital formats present varying cognitive load requirements for students (Oinas et al., 2020). Students' technology choices can increase or decrease their cognitive load (Oinas et al., 2020). The answers to the question established the relationship between technology preferences and the cognitive load of the participants.

Question four focused on CRQ and SQ1. Students expressed their experiences with technology and their awareness of their cognitive load when using networked devices as they

responded to the prompt. The involvement of laptops and smartphones allows students to expand their knowledge but can produce an unmanageable cognitive load (Lubniewski & Kiraly, 2020). The answers clarified students' interactions with their cognitive load while using technology and describe information overload experiences.

Journal Prompts Data Analysis Plan (Data Analysis Plan 1)

Analyzing participants' answers to journal prompts utilized established and proven techniques, such as the modified Van Kaam method (Moustakas, 1994). I analyzed the journal prompt answers using horizonalization, which views the information as equally important (Moustakas, 1994). After horizonalization, I began coding by highlighting the answers for reoccurring education, technology, and information overload experience terms. I placed the terms on a Microsoft Excel document, and when the record was completed, I emailed it to the participants for their validation. In the email, participants received a copy of their journal prompt responses and the textural and structural descriptions, and they had the opportunity to validate, add to, or eliminate information based on their experiences.

Once participants had the opportunity to validate the journal prompt data, I saved all data for triangulation with the individual interview and focus group data. During triangulation, I compared the identified themes in the Microsoft Excel document with the individual interviews and focus groups. Triangulation is essential to create one focused conclusion and validate the results of a study (Schwandt, 2015). The use of triangulation contributed to the reliability and trustworthiness of the study.

Individual Interviews (Data Collection Approach #2)

The second data collection method was individual interviews. This technique connected the researcher and participants in a comfortable setting to provide details about the participants'

experiences with a phenomenon (Patton, 2014). Individual interviews are most effective when completed in a conversational manner with participants (Patton, 2014). These conversations ideally feel organic and unforced. Participants shared about their interactions in online courses and information overload experiences throughout the interview process.

The individual interviews lasted approximately 45 minutes during an agreed-upon time and were scheduled within two weeks of participants completing the consent form and journal prompts. The interviews utilized a semi-structured approach to provide a conversational element for the questions (Schwandt, 2015). I used the Microsoft Teams application to host and record individual interviews with my iPhone as a backup source. Additionally, I used a Microsoft Word document to identify tone, facial expressions, and subtle changes to posture. I transcribed the individual interviews using Microsoft Teams and Otter Ai. The Microsoft Teams recordings, Microsoft Word document, and transcripts are stored on my password-protected computer to ensure confidentiality. All 12 participants individually completed an interview using the protocol in Appendix E and the questions in Appendix H.

Individual Interview Questions

1. Would you, please, tell me about your interest in doctoral studies and why you are taking classes in the field of history? CRQ
2. Describe your use of technology for your online classes on an average day. CRQ
3. When given the option, would you prefer e-books or hard-copy textbooks in your online classes and why? CRQ
4. What are some online course assignments that require you to use technology? CRQ
5. How much time using networked devices is needed to complete your online learning requirements in an average day? SQ1

6. Describe your use of any devices (such as phones, tablets, and computers) throughout the average day. SQ1
7. How much time do you spend using your devices for online assignments in an average day? SQ1
8. What online learning tasks are possible without using technology? SQ1
9. What guidelines does your school or professor have for using devices in online courses? SQ1
10. What is the most significant benefit of using personal devices as an online doctoral candidate? SQ2
11. What is the biggest drawback of using personal devices in online coursework? SQ2
12. What are some tasks you prefer to use your smartphone to complete (even with the availability of a laptop)? SQ2
13. Information overload is an accumulation of data to such a level or degree that it becomes challenging to effectively process stimuli (Benselin & Ragsdell, 2016). With this definition in mind, describe your thoughts about the presence of information overload experiences in your online learning experiences. SQ2
14. When a new online class begins, how do you acclimate to the course content, such as assignment instructions, rubrics, and course resources, while avoiding information overload experiences? SQ3
15. Using multiple browsers on one device can be common in online learning. What are your experiences using multiple browsers or devices for your online classes? SQ3
16. When completing online classes, what are your experiences with fatigue or other physical effects from information overload? SQ3

17. What else would you like to add to our discussion of your experiences with technology or information overload in the online learning environment? SQ3

The first four questions focused on learning about the participants' technology and information overload experiences while connecting to the purpose of the study and the CRQ. Technology preferences are established through interaction (Cela et al., 2016). The explanation of the average use of networked devices in a day created a personalized description of technology preferences. When prompted appropriately, students provided insight into their technology habits (Kutrovatz, 2017), and their explanations related to their lived experiences with technology.

Questions five through nine established the participants' interactions with devices in online courses and connected to the CRQ and SQ1. Researchers address various tasks, including communication and distraction, occurring in online classes with different forms of technology (Reich et al., 2012), and these questions provided insight into the participants' perspectives on the influence of networked devices in online classes. Students also have unique habits using technology (Reich et al., 2012), and their explanations clarified participants' choices for completing online assignments.

Questions ten through thirteen focus on the CRQ and SQ2 and assisted in explaining the technology preferences of the participants. Smartphone and laptop presence continues to grow, resulting in daily usage and establishing constant networked interaction for students (Benselin & Ragsdell, 2016). The answers to these questions created data about students' established preferences and specific technology choices to complete assignments in online courses.

Questions fourteen through seventeen provided an opportunity for participants to explain any experiences with information overload and connected to the CRQ and SQ3. Technology

continues to grow throughout society, creating information overload experiences from the continuous connection to data (Bubb & Jones, 2020). Students' technology choices can expand or reduce the likelihood of experiencing information overload (Bawden & Robinson, 2008). The answers to these questions established participants' lived experiences with information overload from technology.

Individual Interview Data Analysis Plan (Data Analysis Plan 2)

Answers from the individual interviews were the second data set for analysis, and I utilized the modified Van Kaam method to analyze the data collected (Moustakas, 1994). I began the data analysis of the individual interviews by transcribing the answers provided by participants using the Microsoft Teams application and Otter Ai. The analysis continued with the horizonalization of the transcripts as I carefully reviewed the data and considered all information as of equal value (Moustakas, 1994). I then highlighted and coded the reoccurring terms for education, technology, and information overload experiences. Next, I coded the textural and structural development to add additional meaning and essence to this study (Moustakas, 1994). Then, I emailed the coded information, descriptions, and summaries to the participants. The email enabled member checking by participants and provided them with the opportunity to add themes not initially identified in the individual interviews and validate textural and structural descriptions to ensure the information reflected their views (Lincoln & Guba, 1985). I added the overall meanings, essence, and themes to a Microsoft Excel document to compare focus group and journal prompt responses for the purposes of triangulation.

Focus Groups (Data Collection Approach #3)

Focus groups include a variety of participants and are formed to provide open dialogue among study participants, and they served as the final data collection method for the study. A

group setting allows participants to provide information and expand on shared concepts during the interaction (Patton, 2014). Focus groups create open communication among participants to enhance themes and provide additional validity to individually selected themes for a phenomenon (Schwandt, 2015).

The focus groups lasted approximately 60 minutes and were hosted through Microsoft Teams. I hosted two focus groups with the goal of including at least six participants in each session and scheduled the focus groups within seven days of the individual interviews. I recorded the focus group sessions using the Microsoft Teams application on my computer, with my iPhone as a backup device. I also took notes on a Microsoft Word document of voice inflection and other subtle changes in demeanor. The focus group protocol in Appendix F and the focus group questions in Appendix I provided additional guidance for completing the process. I transcribed the focus group discussions utilizing the Microsoft Teams application and Otter Ai to ensure the accuracy of the information. I used my password-protected computer to save the recordings, notes, and transcripts to provide security for the data. The format of the focus groups created ideal interaction in a comfortable setting.

Focus Group Questions

1. Describe your experiences with technology in online classes. CRQ
2. What are the most successful or helpful ways technology has been implemented in your online courses? CRQ
3. What are the most frustrating activities or assignments to complete using technology in online courses? SQ1
4. What factors influence your decision of whether or not to use personal devices (such as a smartphone or tablet) to complete your online assignments? SQ1

5. Describe experiences with technology that make you feel overloaded with stimuli. What about those experiences makes you feel overloaded? SQ2
6. What are some techniques you use to manage your consumption of information? SQ2
7. Describe your online course activities that provide a break from using technology. SQ3
8. What other information would you like to share about your experiences with technology in online classes and information overload? SQ3

Questions one through three established information about participants' experiences with technology in online classes and relates to the CRQ. Students utilize technology based on their confidence in the tools (Florenthal, 2018), and the answers provided descriptions of their personalized use of technology. These questions also clarified individual experiences with networked devices in the online learning environment.

Question four connects to the CRQ and SQ1 and provided information about interactions with specific devices in a technologically advanced online course. The question allowed students to describe their use of devices and their feelings about the effectiveness of completing activities with chosen format because the presence of technology evokes different emotions for each student (Lian et al., 2018). The question presented additional descriptions to understand individual technology choices in the online learning environment.

Questions five and six added information for the CRQ and SQ2 and provided more data about the influence of information overload experiences and cognitive load on students. Danielsson et al. (2017) explain the need to prioritize tasks to avoid overload when using technology, including personal devices. Understanding participants' decisions provided insights regarding their cognitive load and helped identify information overload experiences.

Additionally, the answers described the candidates' technology habits and the connection to cognitive load and information overload experiences.

Questions seven and eight related to the CRQ and SQ3. Information overload experiences and activities to lessen the effects are described in the questions. Without the implementation of techniques to reduce information interaction, the potential for overstimulation from technology data exposure will continue to rise (Lian et al., 2018). Students' actions to minimize data exposure and the relevant experiences they share helps expand our understanding of information overload experiences in online courses.

Focus Group Data Analysis Plan (Data Analysis Plan 3)

Focus groups are the final data collection method for analysis and involved the modified Van Kaam method (Moustakas, 1994). I hosted and recorded the focus groups using the Microsoft Teams application and transcribed the responses using the application and Otter Ai. I carefully read the transcripts to ensured accuracy and applied bracketing to remove any of my influence (van Manen, 2016). Then, I used horizonalization to unbiasedly determine the relevant statements to the study (Moustakas, 1994). I coded the transcripts by highlighting the frequent mentions of terms associated with education, technology, and information overload experiences and added them to a Microsoft Excel document. Next, I identified the textural and structural descriptions to provide more details about the environment surrounding technology use (Moustakas, 1994). Then, I emailed the triangulated themes and textural and structural descriptions to the participants for member checking. This member check ensured that the meanings established in the transcripts reflected the intended message of the participants.

Data Synthesis

The triangulation of the journal prompts, individual interviews, and focus groups established the study's overall themes, meaning, and essence (Moustakas, 1994). Synthesizing themes ensured that participants' lived experiences were accurately represented in the research. This synthesis involved a line-by-line reading of the journal prompt responses, as well as individual interviews and focus group transcripts. Additionally, I used the Otter Ai software to assist in analyzing and transcribing the data collected. I then refined the data to identify themes and answer the research questions. Finally, I completed and submitted a written report of the findings, including the meaning and essence of the phenomenon. The study results provide future applications for students, teachers, administrators, and researchers within the online learning environment.

Trustworthiness

Effective research requires findings that are believable and trustworthy. Lincoln and Guba (1985) identify the need for credibility, transferability, dependability, and confirmability to establish trustworthiness in study results. This section describes the application and relevance of these characteristics in this study to demonstrate the trustworthiness of the study’s results.

Credibility

The credibility of research influences the acceptance of the data by consumers. Credibility establishes reputable and precise information (Bickman & Rog, 2009; Lincoln & Guba, 1985). The future use of studies requires belief in data accuracy, and the findings must provide a reliable interpretation of collected data (Shenton, 2004). This study used prolonged engagement, triangulation, and member-checking to ensure the trustworthiness of its findings.

Prolonged Engagement

I spent time with the participants to conduct journal prompts, individual interviews, and focus groups. Maintaining positive interaction before, during, and after the research created a productive relationship. Participants needed reassurance and reinforcement throughout data collection, analysis, and member checking. These positive interactions assisted in developing a comfortable connection with participants as they shared their lived experiences. Prolonged engagement establishes an effective dialogue with the participants and provides perspective only available with an extended relationship (Lincoln & Guba, 1985). The prolonged engagement with the participants also helped create thorough and meaningful explanations of their experiences.

Triangulation

This study used triangulation to boost the credibility of the data analysis and findings. According to Angen (2000), triangulation allows three varied perspectives to converge. I completed a line-by-line analysis of transcripts including highlighting the reoccurring terms of education, technology, and information overload experiences from the journal prompts, individual interviews, and focus groups to determine the themes and essence of the study (Moustakas, 1994). The commonly used expressions and descriptions in the responses and transcripts formed a triangulation of data, and the commonality within the data created a combined meaning (Lincoln & Guba, 1985). The triangulation of the data received in the journal prompts, individual interviews, and focus groups provided cohesive themes for the study.

Member Checking

Member checking allowed participants to verify the intentions of their responses. This method is crucial in providing accurate data in a study (Lincoln & Guba, 1985). It is essential that the participants review the journal prompt responses, individual interview transcripts, and

focus group transcripts because member checking helped eliminate disagreement in response interpretation (Armstrong & LeHew, 2011). I verified the journal prompt responses and emailed the transcripts for the individual interviews and focus groups to the participants after data collection is complete. This email allowed participants to complete member checking of their responses to establish the themes and essence of the study. Member checking allowed participants to eliminate misunderstandings in the interpretation of statements and add validity to the study.

Transferability

The transferability of this study establishes the opportunity for future applications in online education. Specified information, including clear and understandable language, provides an opportunity for subsequent research (Lincoln & Guba, 1985). Descriptions throughout the study are thick with details allowing future researchers to apply the findings (Creswell & Poth, 2018). Additionally, thorough definitions of the participants, setting, and reoccurring themes allows readers of this study to apply the information to their studies (Miles et al., 2020). The researcher completed the study with elements capable of replication; however, only readers can make the ultimate judgment of the study's transferability.

Dependability

This study required transparent, dependable, and replicable procedures to establish credible results. Dependability demonstrates the stability of the findings (Lincoln & Guba, 1985). I created transparency and dependability for the study with detailed descriptions of data collection procedures and analysis followed by the publication of results (Lincoln & Guba, 1985; Saldaña, 2021). Additionally, external audits verified the procedures and identified themes in the research and added dependability to the results by providing an overview of the strengths and

weaknesses of a study (Creswell & Guetterman, 2019). The audits involved the dissertation committee chairperson and committee member ensuring that the proper steps were implemented. The study's dependability and replicability required transparency throughout the completion of all steps.

Confirmability

The confirmability of this research involved the elimination of any undue influence from the researcher. An influential transcendental qualitative research study involves a neutral view of the participants' lived experiences and removing the researcher's influence on the results (Miles et al., 2020). I utilized audit trails, triangulation, and reflexivity to provide confirmability of this study's results (Lincoln & Guba, 1985).

Audit Trail

Audit trails created a list of the choices made during the research process. An audit trail is documentation of decisions and the processes utilized to choose courses of action in a study (Gall et al., 2007). I used a Microsoft Word document to log choices from available options and the resources used to make the decisions. This process retraced the steps of choosing the participants, setting, data collection formats, and analysis methods, including the options discussed with my dissertation chair and committee member. Audit trails allowed a deeper understanding of choices (Gall et al., 2007) and documented researchers' study decisions (Howe & Eisenhart, 1990).

Triangulation

Using triangulation during the data collection and analysis helped establish the credibility and confirmability of the study. The data accumulated from the journal prompts, individual interviews, and focus groups required triangulation to identify common and repeated themes. I

coded and compared data from the three collection processes to establish the common themes and develop thick descriptions of the participants' perceptions and experiences. These themes, perceptions, and experiences informed my description of the essence of the participants' experiences with the phenomenon (Moustakas, 1994). Triangulation established the themes, essence, and overall findings of this study by comparing the shared data.

Reflexivity

Reflexivity involved understanding my feelings about the data received from the journal prompts, individual interviews, and focus groups. I kept a personal journal throughout the completion of the data collection and analysis and the publication of the study's findings. The journal focused on my previous knowledge, the processes participants completed to share their experiences, and the best methods to publish the results in an understandable manner (Patton, 2014). I used a journal to enhance my understanding of the themes and ideas not initially considered while completing data analysis (Lincoln, 1995). Developing an awareness of my bias or unintentional feelings through reflexive journaling assisted in establishing the confirmability of the study.

Ethical Considerations

Ethical considerations were applied throughout every step of this study. No recruitment or research was conducted until I received IRB approval to ensure that the study meet all ethical considerations and requirements. After the site request was approved, I contacted the department of history chairperson to provide my information for the professors of history doctoral courses at Liefrig University. I then emailed each interested professor individually. The email provided an overview of the study. Professors posted the study information in the class announcement section on Canvas. The students expressing an interest in participating in the study were emailed the

consent forms. The consent included a statement detailing the voluntary nature of the study. Throughout the completion of the study, pseudonyms safeguarded the confidentiality of the data, and all data is saved on password-protected devices. The physical copies of documents remain in a locked filing cabinet in a secured location with only my access. I instructed the participants that the physical and electronic data from the study will be destroyed three years after completing the study. The consent forms, aliases, and data protection created confidentiality for the participants.

Another ethical consideration is that stakeholders need an opportunity to review the study results. Debriefing the data is an ethical practice in research (Lincoln & Guba, 1985). While I verified the veracity of the data collected before data analysis, before publication, I also had all participants check the study's findings and descriptions. I emailed them the study's overall findings and provided a two-week timeframe for each participant to provide feedback. Participants requesting more time to complete their review received an additional week. The review process created the opportunity to address any ethical concerns from the participants and ensure the results' credibility.

Risks and rewards existed in this study. A risk for participants was developing a lowered view of themselves when completing the journal prompts, individual interviews, and focus groups. Participants without clear answers to data collection methods can began to doubt their knowledge. Conversely, students received the reward of interaction through focus groups to provide more social connections in their online classes and learn about their feelings toward technology (Creswell & Guetterman, 2019). I was patient with participants and reassured them of their responses to overcome the risks and reinforce the rewards throughout the study. Additionally, each participant completing the journal prompts and individual interviews received

a $5 Amazon gift card and another $5 Amazon gift card for completing the focus groups as compensation.

Summary

This study used a transcendental phenomenological design. This approach provided the opportunity to create an advanced understanding of a phenomenon through the participants' lived experiences (Husserl, 1970). Data collection involving candidates' interactions with technology and information overload experiences utilized journal prompts, individual interviews, and focus groups. The triangulation of these methods contributed to the descriptions of the participants' experiences with the phenomenon (Miles et al., 2020). Additionally, initial coding and horizonalization were applied to the data analysis, and the textural and structural descriptions in the modified Van Kaam method added additional information to the study (Moustakas, 1994). Finally, synthesizing themes established through data collection and analysis and developing rich, thick descriptions of the essence of participants' perceptions and interactions with technology and information overload experiences provided a deeper understanding of their lived experiences.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this transcendental phenomenological study was to understand the technology-based learning and information overload experiences of online history doctoral candidates at Liefrig University. The technology-based learning and information overload experiences were generally defined as device usage while completing online classes and the potential of overstimulation from these activities (Ge et al., 2021). This chapter included participant descriptions, data, outlier data, and research question responses.

Participants

The participants in this study were history doctoral candidates in a non-profit university in the Southeastern region of the United States enrolled in an online program. Professors in the department of history posted my flyer in the announcement section of their online courses, and thirteen participants expressed an interest in participating in my study. Of the 13 potential participants, one candidate did not submit consent or complete any data collection methods. The remaining 12 participants submitted consent and completed each phase of the study, including journal prompts and individual interviews to establish their perceptions of technology and information overload while completing coursework online. Additionally, two focus groups accommodated the varied availability of participants and provided the opportunity for maximum attendance and participation. These data collection processes created a triangulation of information. A brief description is listed in Table 1 below.

Table 1

Candidate Participants

Candidate Participant	Current Occupation	Current Degree Enrollment	Content Area	Progress Level
Ronald	Student	Ph.D.	History	Coursework
Walter	Military	Ph.D.	History	Coursework
Anna	Professor	Ph.D.	History	Comp Courses
Linda	Teacher	Ph.D.	History	Coursework
Ester	Administrator	Ph.D.	History	Coursework
Jack	Professor	Ph.D.	History	Comp Courses
Rory	Military	Ph.D.	History	Dissertation
Evelyn	Private Industry	Ph.D.	History	Dissertation
Kalista	Teacher	Ph.D.	History	Coursework
Candice	Teacher	Ph.D.	History	Coursework
Claire	Teacher	Ph.D.	History	Coursework
Ruth	Private Industry	Ph.D.	History	Comp Courses

Results

The data collected in this study established perspectives of online learning for the participants. The results indicated varied experiences with technology and information overload. Participants identified themes of constant technology interaction, structured course design, information overload, and experiences with information overload. These themes, combined with

the subthemes, described the participants' experiences with technology and information overload in an online learning environment (see Table 2).

Table 2

Themes, Subthemes, and Key Coding Terms

Theme	Subtheme	Key Coding Terms
Constant Technology Interaction	Format and Content	Personal Tasks, School, Work New Formats, Different Topics
	Multiple Screens	3-4 Browsers Multiple Monitors
Structured Course Design	Planned Tasks	Systematic Approach Specific Timeframes
	Prioritized Sources	JSTOR School's Online Library
Information Overload	Accepted	Overwhelming Technology Requirements Data Saturation
	Strategies to Overcome	Familiar Formats Printing References
	Not Present	No Experiences Non-Issue
Experiences with Information Overload	Fatigue	Tired Eyes Frequently Fatigued
	Intentional Disengagement	Disinterest Escape Technology

Constant Technology Interaction

Participants described constant technology interaction repeatedly while explaining their lived experiences with technology and information overload in the individual interviews. They emphasized using computers or smartphones daily to complete assignments, check grades, and communicate. Additionally, all participants expressed the acceptance that when completing an online degree, there is a requirement for constant interaction with technology throughout the journal prompts, individual interviews, and focus groups. Anna explained in her individual interview, “With all the research required for my classes, there are always heavy reading loads." While completing her individual interview, Candice also expressed, “I have constant screen time throughout the day with school and work requirements,” but she believes the format provides a "vital tool" and a "necessity" to reach her goals.

Format and Content

One subtheme was that constant technology interaction in an online classroom is required to understand the format and content of online assignments. Throughout the journal prompts, all participants discussed the need to learn both format and content for assignments resulting in constant technology interaction. Linda described the influence of learning both format and content in her journal prompts, “I have to first learn the program before considering the content.” Additionally, Kalista expressed her frustration with new formats while completing the journal prompts, “I spend so much energy learning the technology, and then the content in my assignment suffers.” In the focus groups, Candice, Claire, and Ruth, who have a mix of online and in-person academic experiences, described the pressure to learn the technology format to complete requirements before focusing on the included content. Candice acknowledged the presence of "much information to digest" and the need to understand the format before focusing

on content. Claire and Ruth also expressed frustration with becoming familiar with new formats before considering content requirements.

Multiple Screens

Participants described varying numbers of screens contributed to constant technology interaction in their individual interviews. Most participants' individual interview responses included a description of the presence of two to four computer monitors, multiple tabs, and several devices when completing online coursework in their individual interviews. Anna actively used multiple screens, stating, "I am constantly clicking back and forth between my screens and tabs when working on assignments." Because of the need to interact with multiple sources simultaneously, Linda and Ester described using smartphones at times. However, both found the screen "too small" to effectively complete all assignments. Additionally, in her individual interview Kalista explained, "I think everyone must find a workspace configuration that works for you." Also, four of the participants stated that they often spend parts of the day with varied numbers of screens due to movement from one space to another throughout the completion of online work. Though most participants utilized multiple screens, Walter and Rory discussed the need for a "single screen" at times to focus on one resource at a time in the focus groups.

Structured Course Design

All participants stated that the structured design of their online courses at Liefrig University allowed effective use of technology to complete assignments. Ester, Jack, and Kalista, who all worked in education while completing their doctoral degrees, reported the ability to "prioritize" technology tasks and information interaction with the structured design of their online courses in the focus groups. Additionally, most participants in their individual interviews discussed how they could "plan multiple weeks" of technology requirements with the course

material posted several days before the official start date. Linda emphasized, in detail, her process of using technology at the beginning of a course, “I go through the syllabus and my calendar so I can foresee any schedule conflicts."

Planned Tasks

A common theme among the participants was the structured design of their online courses created the ability to plan technology tasks. According to all participants in their journal prompts, planning tasks helped reduce interaction with large amounts of information in short periods. Evelyn, a law school graduate, and current Ph.D. in history candidate, discussed planning assignments based on research requirements and the need to utilize different search engines. Evelyn further described the "necessity of technology" to plan activities when completing assignments in her individual interview. Several other participants in the focus groups also reported the value of first understanding the scope of a topic and then establishing a detailed plan to limit data interaction.

Prioritized Sources

Using technology to prioritize sources emerged as a benefit of the structured course design during every individual interview. Linda, Kalista, and Candice stated that completing assignments meant prioritizing the references posted in the online courses and accessing other verified databases. Jack reinforced this belief by describing the availability of the "online library and article databases" to complete research assignments. Jack specifically referenced sources available with structured course design stating, "Once I look at assignment directions, I immediately look in JSTOR, eBooks, ProQuest, and Project Muse for my assignment references." Participants repeatedly discussed their feeling that prioritizing reputable sources allowed them to complete research assignments efficiently and effectively.

Information Overload

The participants had varying experiences with information overload while taking online classes. However, after reading the explanation of the phenomenon in the journal prompts, all participants understand how information overload is possible. In some instances, participants did not feel information overload was a concern in their journal prompt responses. Alternatively, other participants described information overload as "easily a danger" of taking online classes. Annie stated, “I expected to be overloaded with information when I enrolled in graduate-level online classes.” Though varied experiences were shared, all participants acknowledged the presence of enough data in online classes to produce an information overload in their journal prompts, individual interviews, and focus groups.

Accepted

Some participants accepted information overload as a natural consequence of taking online classes in the individual interviews. This acceptance meant an information overload happened at some point when completing assignments. Participants discussed the overload created through online data interaction. In the focus groups, Evelyn, Rory, and Anna reported the presence of information overload as "almost a given" and "definitely a problem." Candice stated, “There is too much information to digest with all the reading and research requirements for many assignments.” Half of the participants accepted the presence of multiple negative experiences from information overload as a byproduct of online learning in the journal prompts, individual interviews, and focus groups.

Strategies to Overcome

Though the participants had varying experiences, all agreed in the individual interviews that strategies are available to avoid or minimize the effects of information overload.

Unanimously, participants reported that the ability to "prioritize" can, to some degree, reduce data consumption. Candice explained, “With the number of electronic texts, I only focus on the current week’s reading requirements.” Anna, Linda, and Rory also discussed the preference of "printing articles" or "using hard copy" textbooks to reduce information overload in the focus groups. Kalista, who reported experiences with information overload, stated in her individual interview, "I need to step away from the computer and take a break when I feel overwhelmed." Further, regardless of feelings about information overload, all participants described the benefits of technology breaks when completing online courses in the journal prompts, individual interviews, and focus groups.

Not Present

Half the participants reported no experiences with information overload in the individual interviews. Ester, Walter, Jack, and Ronald described "having not felt" or "no prior experiences" with information overload. Additionally, Ruth stated, "I think information overload is easily avoided with the techniques I use." The participants who did not experience information overload described their strategies to avoid it by prioritizing data to focus on for assignment, how many resources to use, and limiting their unnecessary interactions with stimuli. Specifically, Ester stated there is "no need to store large amounts of information."

Experiences with Information Overload

Participants described experiences with information overload in the journal prompt responses, individual interviews, and focus groups which resulted in the subthemes of fatigue and intentional disengagement. Specifically, participants noted that completing the weekly reading requirements created fatigue. Additionally, Kalista, Candice, Evelyn, and Rory expressed a sense of "burden" or "disinterest" with assignments requiring immense reading in the

focus groups. These experiences with information overload resulted in participants seeking opportunities to disengage from data. Candice explained in her individual interview, “After completing assignments requiring detailed research, I like to disengage completely and do something unrelated to school.”

Fatigue

The participants discussed how information overload created feelings of fatigue in the individual interviews. Linda explained, “The video discussion boards and blogs make me feel tired and overloaded with requirements.” Additionally, Rory reported, “I feel physical fatigue from the reading assignments." Participants in the focus groups unanimously felt fatigued while completing assigned reading. Kalista further stated that completing the reading assignments on her computer "easily created eye fatigue." Anna also expressed that "using her brain so hard" left her feeling "physically exhausted."

Intentional Disengagement

Participants provided different explanations of intentional disengagement resulting from information overload, including taking breaks from technology, engaging in physical activity, or reading a book unrelated to school in journal prompts, individual interviews, and focus groups. However, all participants expressed some activities that they did to disengage from online courses. Though Claire did not acknowledge experiencing information overload in her individual interview, she stated, "I like to take breaks from school by stepping away from the screen, stretching, drinking water, and eating.” Jack, Ester, and Linda described doing "something unrelated" to course requirements in the focus groups. Linda further explained that she felt the quality of her work increases with periods of intentional disengagement. Regardless of the

feelings or absence of information overload, all participants agreed that periods of intentional disengagement provided the opportunity to improve technology experiences in online courses.

Outlier Data and Findings

During the data analysis and synthesis process, unexpected findings surfaced. The first outlier established a preference for a physical library. Even with the vast amount of information online, one participant preferred to go to a library. The second outlier involved a participant who reported she only focused on the current week's assignment without working ahead in her courses. With the availability of multiple weeks' worth of lessons in online courses and based on the overall participant data collected for this study, a student focused on one week at a time is considered an outlier.

Physical Library

Most participants described a strong belief in the efficiency of online databases and search engines, but Walter reported a preference to go to a library. Walter stated, "I feel not having a physical library is a disadvantage." He preferred to utilize a university-supported physical location and believed a library would create the opportunity to print, look up hardcopy references, and study without distractions. He stated the lack of a physical library is a "drawback" to online courses. Though Walter's explanation was compelling, his preference for a physical library was not a shared belief by other participants and presented an outlier in the data.

Current Week Assignments

While other participants expressed the habit of working several weeks ahead to manage their weekly information consumption requirements, Kalista described her choice of focusing on only one week at a time. Kalista expressed, "There is no need to work ahead in my online courses; I take one module at a time." She did not feel that looking ahead in online courses

provided an advantage but instead increased fatigue and the possibility of information overload. Because the weekly requirements are sometimes "overwhelming," Kalista believed the approach allowed her to "prioritize" data interaction.

Research Question Responses

The goal of the central research question and three sub-questions was to learn about the history doctoral candidates' experiences with technology and information overload. Triangulated, reviewed, and analyzed data provided information to address the research questions. The data collected from journal prompts, individual interviews, and focus groups described candidates' varied interactions and experiences with technology and information overload while completing online courses.

Central Research Question

What are history doctoral candidates' experiences with technology and information overload in online courses? The experiences of history doctoral candidates with technology and information overload revealed the main theme of constant technology interaction and two subthemes related to the format and content of the technology and using multiple screens. All participants stated that they constantly interacted with technology, regardless of the progress on their degree completion. Evelyn described her technology interaction, "I have endless amounts of information at my fingertips that I enjoy using." Though participants unanimously cited the need to interact with both format and content, Ronald stated his "familiarity" with technology minimized the need to learn new formats. Most participants described using multiple screens to complete online courses, but only half believed this exposure to data created an information overload.

Sub-Question One

What are history doctoral candidates' experiences with technology in online courses? Analysis of the participant data collected revealed a main theme of structured course design and subthemes regarding planned tasks and prioritized sources which are directly relevant to their experiences with technology in online classes. A structured course design provided effective use of technology according to participants. Linda, Rory, Evelyn, and Kalista reported the structure of the Canvas online format allowed them to navigate effectively between assignments with a laptop or multiple screens. Additionally, Ronald explained, “Because of the course design, I can complete all requirements with my technology.” Claire also stated, “It is convenient that online courses are designed to allow access from my laptop or smartphone.” Participants unanimously agreed that the structure and format of online classes allowed them to complete requirements with their current technology.

Sub-Question Two

What are history doctoral candidates' experiences with cognitive load and information overload while taking online courses? Through the data analysis, one main theme directly focusing on the participants’ experiences with information overload was revealed. This theme also included three significant subthemes: accepted, strategies to overcome, and not present. Half of the participants acknowledged some presence of information overload, while the other six participants felt no influence from the phenomenon. Anna stated, “When I decided to start taking courses online, information overload was immediately prevalent in my life." The participants with information overload described the contributing factors of heavy reading loads and complicated assignments. Conversely, Ronald had "spent his life in technology," which he highlighted as a significant reason for his lack of information overload. Regardless of the

presence or absence of information overload, all participants agreed that taking breaks from the online content was essential.

Sub-Question Three

What are the symptoms of technology-related information overload do history doctoral candidates experience? One main theme regarding the participants' lived experiences with information overload was revealed in this study, and the subthemes of fatigue and intentional disengagement were also directly relevant to this sub-question. Half of the participants reported experiences with information overload while completing online courses. Kalista discussed the potential of fatigue and intentional disengagement due to experiencing information overload. Meanwhile, Claire sometimes felt mentally exhausted, stating, "The process of finding references for my assignments is overwhelming, and I feel a burden to find all the information I can." Physical and mental symptoms were present throughout the discussion of information overload with participants. Specifically, Evelyn explained, "When I have multiple assignments due, I feel paralyzed with information overload and cannot complete my work." Additionally, multiple participants included references to "tired eyes" and "disconnection" throughout the data collection process.

Summary

This study explored the lived experiences of online history doctoral candidates with technology and information overload. The triangulated data from journal prompts, individual interviews, and focus groups revealed four themes and nine subthemes. According to participants, online learning required constant technology interaction with the format and content, and they utilized the structured design of courses to plan tasks and prioritize sources. Half of the participants acknowledged the presence of information overload, while the other half

felt no effect. The participants with information overload felt fatigued. Regardless of experiences with the phenomenon, all the participants believed intentionally disengaging from data by taking regular breaks from technology while completing online courses was the most effective tool for reducing information overload.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this study was to understand the technology-based learning and information overload experiences of online history doctoral candidates at Liefrig University. As online learning continues to grow (Cullen et al., 2020), the possibility of information overload experiences from technology requires consideration (Hew & Tan, 2016). The research on technology-based learning and information overload experiences is expanding. Still, there is a gap in exploring the influence of online students' technology interaction and their lived experiences with information overload. This chapter will provide a discussion of the findings of the research study and implications for policy, practice, theory, and methodology. The chapter's content will also address the limitations and delimitations of the research while providing recommendations for future research.

Discussion

This study utilized a transcendental phenomenological approach (Moustakas, 1994) and applied the cognitive load theory (Sweller, 1988) while collecting and coding the data. A thorough analysis of the coded data revealed the main themes and subthemes of the study. This section provides a detailed discussion of the findings, theoretical connections, limitations, delimitations, and recommendations for future research.

Interpretation of Findings

The data analysis revealed four themes and nine subthemes for this study. This section discusses and summarizes the findings from the themes and subthemes. The themes established by the participants included constant technology interaction, structured course design, information overload, and experiences with information overload, and the subthemes also

provided specific details to enhance the themes. This section discusses and summarizes the findings from the themes and subthemes.

Summary of Thematic Findings

After triangulating the data from the journal prompts, individual interviews, and focus groups, the themes of constant technology interaction, structured course design, information overload, and experiences with information overload became clear. These themes created an understanding of participants' lived experiences with technology and information overload in online learning. The interpretative framework for the themes involved social constructivism (Vygotsky, 1978), focusing on the participant's interactions with the phenomenon.

Constant Technology Interaction. Throughout data collection, participants discussed their constant use of technology to complete educational, personal, and professional tasks. Research described varying amounts of time spent using technology in online courses (Alstete & Beutell, 2016; Keaton & Gilbert, 2020; Neuwirth, 2020). However, my study illustrated that candidates interact with devices continuously which may lead to increased levels of information overload. Participants used laptops, desktops, and smartphones to complete online assignments, personal correspondence, and professional requirements, which produced a constant connection to technology. Recent research has revealed similar findings regarding students' desire to use devices for all activities (Azi & Gunduz, 2020; Beckman et al., 2019). This constant technology interaction requires consideration to extend the understanding of the online learning habits of current students and the influence on information overload experiences.

Structured Course Design. In my study, I spoke to twelve doctoral candidates about their experiences with online learning and information overload, and the participants acknowledged the influence of the structured course design. Effective online learning requires an

efficient and user-friendly course design (An et al., 2016; Fisch, 2017; Sentz et al., 2019). All participants confirmed the ease of planning online tasks when the resources, assignments, and feedback were properly displayed. Students desired an organized and manageable online learning environment to control their interaction with data (Pressley, 2021; Sentz et al., 2019). Participants believed a clearly structured course design created an optimal online learning environment and reduced the possibility of information overload.

Information Overload. After receiving the explanation of cognitive load theory during the journal prompt phase of data collection, regardless of their age, some candidates acknowledged challenges with their cognitive load and information overload experiences from online courses. Technology use for everyday tasks, such as communication, social media, and education, increases the risk of information overload experiences (Bawden & Robinson, 2008; Lauri et al., 2020) and the participants described experiences with information overload when completing online assignments, communicating, and fulfilling job duties. Research shows that the rise in technology in all environments can create overstimulation (Savolainen, 2007; Schmitt et al., 2017), which candidates in my study confirmed. Half of the participants described various negative experiences with information overload, but all participants accepted the possibility of the phenomenon.

Experiences with Information Overload. The findings provided varied descriptions of information overload, and half of the participants described negative experiences. Research has established the possibility of information overload experiences creating a desire to disengage from data (Dolezelak, 2004; Jackson & Farzaneh, 2012). This study revealed the emergence of intentional disengagement among participants as an experience with information overload. When discussing information overload, participants described the need to disconnect from data

interactions. Candidates believed intentional disengagement reduced information overload and referenced scheduling breaks from school-related technology when completing online courses, directly reinforcing existing research (Buchele Harris & Chen, 2018; Dolezelak, 2004). All participants described the importance of intentional disengagement activities, including eating, drinking, exercising, or completing non-academic tasks in their experiences with information overload.

Implications for Policy or Practice

The participants' perspectives and experiences shared in this study provide implications for policy and practice. Liefrig University offers an extensive online course catalog, and with this assortment of technology-based learning options, policymakers, administrators, and professors can utilize the findings of my study to improve students' learning experiences by including tutorials for information overload experiences and technology formats. These tutorials can raise awareness of information overload experiences and eliminate the need for students to research the phenomenon. Additionally, the participants in the study identified reading and discussion boards as possible sources of information overload experiences, which can assist Liefrig University's understanding of students' online learning experiences. The current technology and information overload experiences described in this study create data for universities to consider for online courses.

Implications for Policy

This study's results provide implications for policies to help students identify information overload experiences. Because of the influence information overload has on online students, in-course training should be implemented on the phenomenon (Ackerman et al., 2014; Inaltekin, 2020; Maltby & Mackie, 2009). Many participants initially learned about the definition of

information overload experiences in the journal prompts at the beginning of this study. The awareness of information overload experiences continues to develop as technology rapidly advances in society (Dolezelak, 2004; Edmunds & Morris, 2000), and many students lack an understanding of the causes of their overstimulation (Lauri et al., 2020). Administrators of online higher education institutions implementing a policy requiring tutorials on information overload would benefit students in identifying these experiences and learning how to effectively manage information overload.

Additionally, university online department chairpersons establishing a policy requiring standardized technology tutorials across all graduate-level online courses would benefit students by ensuring they efficiently learn how to use the required in-course technology tools. Most participants discussed a lack of familiarity with various technology formats required for online assignments. Students use videos, websites, or classmates to understand new technology (Admiraal et al., 2020; Kalonde, 2017); however, these sources can also create frustration and confusion (Yildirim, 2017). Further, participants felt, at times, they spent more time learning about the new technology formats than the actual course content. Effective use of technology in courses requires students to become familiar and comfortable with the design (Erdem et al., 2018; Vahedi et al., 2019). Implementing a policy requiring standardized technology format tutorials in all graduate-level online courses by university online department chairpersons would assist students in focusing on content and possibly reduce experiences with information overload.

Implications for Practice

A significant implication for practice revealed in this study is that professors for graduate-level online courses may consider reducing reading requirements. Extended interaction

with immense amounts of data can burden cognitive load and reduce the ability to understand new information (Sweller, 1988). Most participants in this study described an inability to complete assigned reading at different points in their online doctoral journey. Extensive reading creates interaction with various amounts of secondary information (Alstete & Beutell, 2016); conversely, focused reading assignments may reduce data interaction and increase effective processing (Blok et al., 2002; Liu et al., 2020; Pindiprolu & Forbush, 2021). Many participants felt the reading requirements were unachievable and some of the material provided interaction with unnecessary information in many of their online courses. Professors for graduate-level online courses limiting required reading may lessen the possibility of information overload experiences among students.

Liefrig University may also consider reducing the discussion board replies in online doctoral-level courses to reduce the possibility of information overload. Online doctoral candidates face many challenges when completing coursework (Lim et al., 2019), and course requirements can increase unneeded information interaction for postgraduate candidates (Van der Linden et al., 2018). Reducing discussion board requirements could allow online doctoral candidates to focus on their postgraduate studies while lowering their data consumption. Though exchanging information among students in an online learning environment is essential, excessive interpersonal communication to meet course requirements can burden some students (Alsheri, 2017; Keaton & Gilbert, 2020). Ten participants in this study felt that discussion board replies were unnecessary and busywork in their online courses. As a result, Liefrig University may consider reducing discussion board requirements to maximize interaction with content and minimize the possibility of information overload experiences for online doctoral candidates.

Theoretical and Empirical Implications

This transcendental phenomenological study focused on online history doctoral candidates' experiences with technology and information overload. Throughout the study, both theoretical and empirical implications were evident. This section begins with a discussion of the theoretical influence of cognitive load theory (Sweller, 1988), followed by the empirical implications addressing the major themes identified in the related literature.

Theoretical Implications

The lived experiences of online history, doctoral candidates' experiences with technology and information overload involve the cognitive load theory, which describes the transfer of information from short-term to long-term memory (Sweller, 1988). Cognitive load theory explains the influence of the intrinsic, extraneous, and germane load needed to create a familiarity or schema within data to retain information (Sweller, 1988). Throughout the study, participants discussed the influence of the content of online courses and technology formats on information overload experiences. Complicated topics and complex formats burden students' cognitive load (Ayres & Paas, 2012; Fisch, 2017; Plass et al., 2010). This study extended cognitive load theory by applying the theory to current students' perspectives on the influence of the content of online courses and technology formats on their cognitive load and information overload experiences.

In cognitive load theory, retaining information begins with the intrinsic load, which refers to the depth of the topic and the details involved in the data (Plass et al., 2010). The candidates in this study confirmed challenges in retaining data from complicated subjects. Complex and lengthy assignments increase the intrinsic cognitive load (Haji et al., 2015; Paas et al., 2003), and, in the study, participants confirmed the burden complicated subjects presented to their intrinsic cognitive load, which created the possibility of information overload experiences.

The second consideration for cognitive load theory is the extraneous load. The format for delivering information determines extraneous load (Fisch, 2017; Sweller, 2011). Participants felt stress on their cognitive load when completing assignments with unfamiliar technology formats and overly complicated information. According to the research, the extraneous load can become overloaded when a challenging subject involves an unknown delivery source (Fisch, 2017; Plass et al., 2010). Participants discussed the stress of new technology formats and complex data on their extraneous load, which also resulted in information overload experiences.

The final component of cognitive load theory involves germane load, which consists of familiarity with data and formatting (Ayres & Paas, 2012; Sweller, 2011). Throughout the study, participants discussed their varied feelings of fatigue or being overwhelmed by complex assignments requiring unfamiliar technology. The presence of familiarity with the subject and presentation method lowers germane load (Fisch, 2017; Van Merrienboer & Sweller, 2010). However, some participants felt stress on their germane load and experienced information overload when complicated assignments involved new technology formats.

Empirical Implications

The findings in this study addressed the significant themes of technology in education, information overload with technology, causes of information overload, strategies to avoid information overload, and effects of information overload. The findings address the existing gap in the literature that relates to online students' experiences with technology and information overload. Technology interaction continues to grow in online courses with widespread use not only for assignments but also entertainment and personal tasks (Cheng et al., 2018; Qian & Li, 2017). Participants confirmed their constant use of technology to complete nearly all activities. The literature explained that students often interact and complete tasks using technology (Lian et

al., 2018); however, the study's results indicate a constant connection to their smartphones and laptops for many students. The experiences of online history doctoral candidates with technology reflect most of the existing literature on the topic. Still, the amount of time spent using network devices continues to expand based on the study's findings.

The empirical implications within this study support the presence of information overload experiences with technology in online courses by some participants. Within the online learning environment, information overload experiences continue to develop (Jackson & Farzaneh, 2012; Keaton & Gilbert, 2020). Participants discussed a variety of stimuli using technology while completing online courses. Research demonstrates that students constantly interact with Facebook, Instagram, Twitter, TikTok, and other social media platforms (Lian et al., 2018; Tatum et al., 2018). This imbalance of personal and academic tasks while using technology described in the existing literature reflects the descriptions provided by participants and creates the possibility of information overload.

The study's findings further confirm the causes of information overload experiences discussed in the literature. For example, the presence of multiple screens can result in overstimulation for students (Admiraal et al., 2020; Bubb & Jones, 2020). Most of the participants confirmed experiences with information overload from the presence of multiple tabs and varied numbers of screens while completing assignments. Research revealed interactions with unnecessary information from numerous screens can create information overload experiences for students (Dolezelak, 2004; Eppler & Mengis, 2004). In with this research, participants in this study described feeling overloaded from interacting with unrelated information on multiple screens.

This study's empirical implications include strategies to overcome information overload experiences. An organized online learning environment allows students to focus on recommended resources and minimize overload from unreliable information (Maltby & Mackie, 2009; Paddison & Mortimer, 2016). Participants described the benefits of a clearly structured course design to learn online and reduce information overload experiences. Additionally, participants utilized intentional disengagement to overcome information overload experiences. Planned breaks from technology allow students to limit feelings of overload from data (Buchele Harris & Chen, 2018; Higgins et al., 2017). Specifically, participants discussed the effectiveness of intentional disengagement, with most candidates taking planned technology breaks to overcome the possibility of information overload.

Participants in the study described fatigue as an effect of information overload experiences, which is also a theme evident throughout the literature (Dolezelak, 2004; Keaton & Gilbert, 2020; Vahedi et al., 2019). Though technology can be a helpful tool, fatigue is possible when tasks such as reading or research require multiple hours of screen exposure (Nicol et al., 2017; Reich et al., 2012). Participants described the feeling of fatigue from extended online interaction to complete reading and research assignments in their online courses. As described in research, information overload experiences can create physical effects, including fatigue, anxiety, and stress (Misra & Stokols, 2011; Valika et al., 2020). Data collected based on participants' experiences verified the theme of fatigue from information overload experiences established in the literature.

Limitations and Delimitations

Limitations are weaknesses within the research study that the researcher acknowledges (Creswell & Guetterman, 2019). The limitations of this study were smaller class sizes providing

a lower sample of participants, dependency upon the honesty among participants, and the participants' personal experiences and perspectives possibly affecting the transferability or generalization of the results. The smaller class sizes at Liefrig University were one of the limitations of my study because they provided a lower sample of participants. The online doctoral program for history candidates is relatively new at Liefrig University. Due to the recent addition of the program, class sizes are smaller, resulting in a condensed sample of participants available for my study. With this constraint on my sample pool, I could not be more selective to establish greater diversity in the gender, age, or ethnicity of participants. Therefore, my final sample included 33% male and 67% female participants, resulting in data weighted toward the female perspective and reducing the male point of view.

Another limitation specifically for qualitative research is the inability to verify truthful and honest interactions with a phenomenon (Saldaña, 2021). The data collection processes required participants to communicate their experiences with the phenomenon truthfully and honestly (Moustakas, 1994). With my role in the study as an instrument of data collection, I must accept the data provided by participants as honest and truthful without questioning the validity of the information, which could lead to limitations regarding the veracity and validity of the information shared regarding the participants' lived experiences.

An additional limitation of this study is all the data is the transferability and generalizability of the findings. Individualized experiences with a phenomenon create the essence of qualitative research (Moustakas, 1994). This reliance on personal experiences and views for data can minimize the transferability and generalizability of the results. Using only doctoral candidates could also create disinterest in the results for the students at other levels of

academia. The data might contain a general view for only doctoral candidates in fully online learning environments without an opportunity to transfer to other students.

Delimitations are chosen boundaries within a study (Patton, 2014), and the primary delimitations for my study included my decision to complete the data collection with an exact population within one higher education institution. I decided to focus on online history doctoral candidates at one university in the Southeastern region of the United States. I felt it was essential to have a baseline of interactions with technology and online assignments to provide data for my study, and because online post-graduate-level students have completed many tasks involving technology to reach their current level of study, I decided to focus my research on this specific population.

My reasoning and rationale for choosing just one university was to focus the data on the same online learning environment for all participants. This delimitation of a specific location eliminates secondary factors influencing the data, including varied course requirements and technology formats when including multiple sites. The inclusion of numerous universities would involve a variety of course designs and technology formats and tools. This delimitation reduced the participants' technology and information overload experiences to an exact population within one higher education institution.

Another delimitation for this study was the choice of transcendental phenomenological research instead of a hermeneutic methodology. The hermeneutic methodology includes the researchers' opinion, while transcendental phenomenological research focuses on eliminating any researcher's influence (Moustakas, 1994). While I have personal experience studying in an online format for my doctoral degree, I chose this method to ensure my research focused on the participants' lived experiences. This decision required me to remove my biases (Moustakas,

1994), and by using a transcendental phenomenological design, I relied on the meaning of the phenomenon developed by the participants. The hermeneutic methodology includes the researchers' opinion, while transcendental phenomenological research focuses on eliminating any researcher's influence (Moustakas, 1994). My reasoning and rationale for choosing a transcendental approach was to ensure the data within my study focused solely on the participants' lived experiences without my influence.

Recommendations for Future Research

The participants' data provided different experiences with technology and information overload in online learning, creating multiple recommendations for possible future research. In this study, half of the participants reported information overload; however, the sources of the information overload varied (Jackson & Farzaneh, 2012; Lauri et al., 2020; Nematzadeh et al., 2019). Future studies could focus on identifying the specific elements causing information overload experiences. This future research could include case studies to acknowledge shared behaviors from information overload experiences (Creswell & Guetterman, 2019). The participants could involve online high school, community college, or university students. The results could provide valuable information for administrators, teachers, professors, and other students to understand specific elements creating information overload experiences in online learning.

Another opportunity for future research could focus on determining the differences in information overload experiences when using eBooks and hard-copy textbooks. Many participants discussed fatigue or disinterest when completing the reading requirements for online learning. A quantitative design for this future research could involve a Likert scale to express the level of information overload based on the length of time, subject, and language levels for

eBooks and hard-copy textbooks. The participants could be online bachelor's and master's level university students, providing different perspectives than those of doctoral candidates. The generally significant amount of reading required in university-level classes would involve a viable sample of experiences with eBooks and hard-copy textbooks. This future research could provide valuable information for professors as they choose the amount of reading and the textbook formats for their courses.

Conclusion

The purpose of this transcendental phenomenological study was to understand the technology-based learning and information overload experiences of online history doctoral candidates in a Southeastern university in the United States. The coded, analyzed, and triangulated data provided the themes of constant technology interaction, structured course design, information overload, and experiences with information overload. The implications for policies identified by participant data involve a need for more students' education related to overload experiences and in-class tutorials regarding each of the various technology formats and tools required for online classes. The implication for practice also focused on reducing online students' reading and discussion board requirements.

The study expanded cognitive load theory to include the influence of current experiences with technology and information overload on students' ability to process information from short-term to long-term memory. The empirical implications established findings to assist in closing the gap in understanding technology in education and information overload experiences in online learning. Additionally, empirical implications exist for causes, strategies to overcome, and effects of information overload experiences. Also, the study has limitations of smaller classes from one university, producing a lower sample size. Another limitation to consider is the

transferability and generalizability of the results. The delimitations involve the choice of an exact population at one higher education institution and the transcendental phenomenological research method. Future studies could include using a varied population of participants and focusing on the specific stimuli causing information overload experiences.

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Appendix A

IRB Approval

May 2, 2023

Roger White
Alisha Castaneda

Re: IRB Exemption - IRB-FY22-23-1151 A QUALITATIVE PHENOMENOLOGICAL STUDY OF HISTORY DOCTORAL CANDIDATES' EXPERIENCES WITH TECHNOLOGY AND INFORMATION OVERLOAD

Dear Roger White, Alisha Castaneda,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(iii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any

modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

Appendix B

Consent

Title of the Project: A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload.
Principal Investigator: Roger White, Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be 18 years of age or older, enrolled in an online history doctoral course, and regularly interact with technology using a smartphone or laptop. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to understand the technology-based learning and information overload experiences for online history doctoral candidates.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Answer journal prompts that will take no more than 50 minutes.
2. Complete an individual audio-recorded and video-recorded interview in Microsoft Teams that will take no more than 45 mins.
3. Attend an audio-recorded and video-recorded focus group in Microsoft Teams that will take no more than 60 minutes.
4. Complete member checking by reviewing your interview transcript and the developed themes which will take no more than 30 minutes.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study. Benefits to society include learning about personalized feelings for the use of technology and an expanded connection to classmates in the focus groups.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher and the faculty chair will have access to the records.

- Participant responses will be kept confidential by replacing names with pseudonyms.
- Individual interviews will be conducted in a location where others will not easily overhear the conversation.
- Confidentiality cannot be guaranteed in focus group settings. While discouraged, other members of the focus group may share what was discussed with persons outside of the group.
- Data will be stored on a password-locked computer and in a locked file cabinet. After three years, all electronic records will be deleted, and all hardcopy records will be shredded.
- Recordings will be stored on a password-locked computer for three years after participants have reviewed and confirmed the accuracy of the transcripts and then deleted. Only the researcher will have access to these recordings.

How will you be compensated for being part of the study?

Participants will be compensated for participating in this study. After the individual interviews, I will provide each participant with a $5 Amazon gift card, followed by an additional $5 Amazon gift card after the focus groups for their completion of the study.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Roger White. You may ask any questions you have now.

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB.

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record and video-record me as part of my participation in this study. I understand I have the option to leave my camera on or shut it off during the recordings based on my individual preference.

_____

Printed Subject Name

_____

Signature & Date

Appendix C

Site Consent

Date: 1 May 2023

Department of History
Doctoral Studies
Liberty University

Dear Department of History, Doctoral Programs Administrators:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The title of my research project is A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload, and the purpose of my research is to understand the technology-based learning and information overload experiences for online history doctoral candidates at Liberty University.

I am writing to request your permission to contact professors in the department of history to ask them to post my study information on Canvas to invite their students to participate in my research study.

Participants will be asked to answer journal prompts, complete an audio-recorded and video-recorded individual interview, attend an audio-recorded and video-recorded focus group, and participate in member checking. Participants will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. A permission letter document is attached for your convenience.

Sincerely,

Roger White

SOE Doctoral Candidate

Date: 1 May 2023

Department of History
Doctoral Studies
Liberty University

Dear Roger White:

After a careful review of your research proposal titled A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload, we have decided to grant you permission to contact professors in the department of history for them to post your study information on Canvas to invite their students to participate in your study.

Check the following boxes, as applicable:

☐ We grant permission for Roger White to contact professors of history doctoral courses to ask them to post his study information on Canvas to invite history doctoral candidates to participate in his research study.

☐ We are requesting a copy of the results upon study completion and/or publication.

Sincerely,

Department of History, Doctoral Programs Administrators

Appendix D

Class Announcement

Research Participants Needed

A Qualitative Phenomenological Study of History Doctoral Candidates' Experiences with Technology and Information Overload

- Are you 18 years of age or older?
- Enrolled in an online history doctoral course?
- Regularly interact with technology using a smartphone and laptop?

If you answered **yes** to each of the questions listed above, you may be eligible to participate in a research study.

The purpose of this research study is to understand the technology-based learning and information overload experiences for online history doctoral candidates. Participants will be asked to answer journal prompts (50 minutes), complete an audio-recorded and video-recorded individual interview (45 minutes), attend an audio-recorded and video-recorded focus group (60 minutes), and assist in member checking.

Names and other identifying information will be requested as part of this study, but participant identities will not be disclosed.

If you would like to participate, contact the researcher at the phone number or email address provided below. A consent document will be emailed to you after contacting the researcher.

Participants will receive one $5 Amazon gift card for the journal prompts and interview and one $5 Amazon gift card for the focus group.

Please contact Roger White for more information

Liberty University IRB

Appendix E

Recruitment Email

Dear Doctoral Candidate:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to understand the technology-based learning and information overload experiences for online history doctoral candidates, and I am writing to invite eligible participants to join my study.

Participants must be 18 years of age or older, enrolled in an online history doctoral class, and regularly interact with technology using a smartphone or laptop. Participants, if willing, will be asked to answer journal prompts (50 minutes), complete an individual audio-recorded and video-recorded interview (45 minutes), attend an audio-recorded and video-recorded focus group (60 minutes), and assist in member checking (30 minutes). Names and other identifying information will be requested as part of this study, but the information will remain confidential.

To participate, please contact me for more information. A consent document is attached to this email. The consent document contains additional information about my research. If you choose to participate, you will need to sign the consent document and return it to me via email. After receiving the completed consent forms, I will send you the journal prompts to be completed and returned to me via email.

Participants will receive one $5 Amazon gift card after completing the journal prompts and interview and one $5 Amazon gift card after completing the focus group.

Sincerely,

Roger White

SOE Doctoral Candidate

Dear Doctoral Candidate:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. Last week, an email was sent to you inviting you to participate in a research study. This follow-up email is being sent to remind you to respond if you would like to participate and have not already done so. The deadline for participation is 15 June 2023.

Participants, if willing, will be asked to answer journal prompts (50 minutes), complete an audio-recorded and video-recorded individual interview (45 minutes), participate in an audio-recorded and video-recorded focus group (60 minutes), and assist in member checking (30 minutes). Names and other identifying information will be requested as part of this study, but the information will remain confidential.

To participate, please contact me for more information. A consent document is attached to this email. The consent document contains additional information about my research. If you choose to participate, you will need to sign the consent document and returned to me via email. After receiving the completed consent forms, I will send you the journal prompts to be completed and returned to me via email.

Participants will receive one $5 Amazon gift card after completing the journal prompts and interview and one $5 Amazon gift card after completing the focus group.

Sincerely,

Roger White

SOE Doctoral Candidate

Appendix F

Journal Prompts Protocol

Date:

Journal Prompts Facilitator:

Journal Prompts Participant:

Project description: A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload.

Questions:

1. Information overload is a growing concern, and completing online classes requires prolonged interaction with networked devices. This sustained exposure to technology presents the risk of disengagement due to data saturation (Bawden & Robinson, 2008). The data accumulated from interactions with both productive and unproductive stimuli can result in overload, decreasing interest in the information (Berghel, 1997). With this explanation in mind, how would you describe your experiences with information overload in your online classes?
2. What are some techniques you use to avoid information overload experiences as you complete your online classes?
3. Cognitive load theory focuses on the process of transferring information from short-term to long-term memory (Sweller, 2011). As exposure to more data occurs, the brain must choose the most important information to retain. In short cognitive load theory deals with how the brain prioritizes and retains information. How do you prioritize the information you interact with in your online classes?

4. As you are completing your online classes, what activities create an unnecessary burden on your cognitive load?

Journal prompts protocol format adapted from Creswell and Guetterman, 2019.

Appendix G

Individual Interview Protocol

Time of Interview:

Date:

Format:

Interviewer:

Interviewee:

Position of interviewee:

Project description: A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload.

Questions:

1. Would you, please, tell me about your interest in doctoral studies and why you are taking classes in the field of history?
2. Describe your use of technology for your online classes on an average day.
3. When given the option, would you prefer e-books or hard-copy textbooks in your online classes and why?
4. What are some online course assignments that require you to use technology?
5. How much time using networked devices is needed to complete your online learning requirements in an average day?
6. Describe your use of any devices (such as phones, tablets, and computers) throughout the average day.
7. How much time do you spend using your devices for online assignments in an average day?

8. What online learning tasks are possible without using technology?
9. What guidelines does your school or professor have for using devices in online courses?
10. What is the most significant benefit of using personal devices as an online doctoral candidate?
11. What is the biggest drawback of using personal devices in online coursework?
12. What are some tasks you prefer to use your smartphone to complete (even with the availability of a laptop)?
13. Information overload is an accumulation of data to such a level or degree that it becomes challenging to effectively process stimuli (Benselin & Ragsdell, 2016). With this definition in mind, describe your thoughts about the presence of information overload experiences in your online learning experiences.
14. When a new online class begins, how do you acclimate to the course content, such as assignment instructions, rubrics, and course resources, while avoiding information overload experiences?
15. Using multiple browsers on one device can be common in online learning. What are your experiences using multiple browsers or devices for your online classes?
16. When completing online classes, what are your experiences with fatigue or other physical effects from information overload?
17. What else would you like to add to our discussion of your experiences with technology or information overload in the online learning environment?

Thank participants and reaffirm their privacy and confidentiality for all the information.

Interview format protocol adapted from Creswell and Guetterman, 2019.

Appendix H

Focus Group Protocol

Time of Focus Group:

Date:

Format:

Focus Group Facilitator:

Focus Group Participants:

Position of participants:

Project description: A qualitative phenomenological study of history doctoral candidates' experiences with technology and information overload.

Questions:

1. Describe your experiences with technology in online classes.
2. What are the most successful or helpful ways technology has been implemented in your online courses?
3. What are the most frustrating activities or assignments to complete using technology in online courses?
4. What factors influence your decision of whether or not to use personal devices (such as a smartphone or tablet) to complete your online assignments?
5. Describe experiences with technology that make you feel overloaded with stimuli. What about those experiences makes you feel overloaded?
6. What are some techniques you use to manage your consumption of information?
7. Describe your online course activities that provide a break from using technology.

8. What other information would you like to share about your experiences with technology in online classes and information overload?

Thank participants and reaffirm their privacy and confidentiality for all the information.

Focus group protocol format adapted from Creswell and Guetterman, 2019

Appendix I

Journal Prompts

1. Information overload is a growing concern, and completing online classes requires prolonged interaction with networked devices. This sustained exposure to technology presents the risk of disengagement due to data saturation (Bawden & Robinson, 2008). The data accumulated from interactions with both productive and unproductive stimuli can result in overload, decreasing interest in the information (Berghel, 1997). With this explanation in mind, how would you describe your experiences with information overload in your online classes?
2. What are some techniques you use to avoid information overload experiences as you complete your online classes?
3. Cognitive load theory focuses on the process of transferring information from short-term to long-term memory (Sweller, 2011). As exposure to more data occurs, the brain must choose the most important information to retain. In short cognitive load theory deals with how the brain prioritizes and retains information. How do you prioritize the information you interact with in your online classes?
4. As you are completing your online classes, what activities create an unnecessary burden on your cognitive load?

Appendix J

Individual Interview Questions

1. Would you, please, tell me about your interest in doctoral studies and why you are taking classes in the field of history?
2. Describe your use of technology for your online classes on an average day.
3. When given the option, would you prefer e-books or hard-copy textbooks in your online classes and why?
4. What are some online course assignments that require you to use technology?
5. How much time using networked devices is needed to complete your online learning requirements in an average day?
6. Describe your use of any devices (such as phones, tablets, and computers) throughout the average day.
7. How much time do you spend using your devices for online assignments in an average day?
8. What online learning tasks are possible without using technology?
9. What guidelines does your school or professor have for using devices in online courses?
10. What is the most significant benefit of using personal devices as an online doctoral candidate?
11. What is the biggest drawback of using personal devices in online coursework?
12. What are some tasks you prefer to use your smartphone to complete (even with the availability of a laptop)?
13. Information overload is an accumulation of data to such a level or degree that it becomes challenging to effectively process stimuli (Benselin & Ragsdell, 2016). With this

definition in mind, describe your thoughts about the presence of information overload experiences in your online learning experiences.

14. When a new online class begins, how do you acclimate to the course content, such as assignment instructions, rubrics, and course resources, while avoiding information overload experiences?
15. Using multiple browsers on one device can be common in online learning. What are your experiences using multiple browsers or devices for your online classes?
16. When completing online classes, what are your experiences with fatigue or other physical effects from information overload?
17. What else would you like to add to our discussion of your experiences with technology or information overload in the online learning environment?

Appendix K

Focus Group Questions

1. Describe your experiences with technology in online classes.
2. What are the most successful or helpful ways technology has been implemented in your online courses?
3. What are the most frustrating activities or assignments to complete using technology in online courses?
4. What factors influence your decision of whether or not to use personal devices (such as a smartphone or tablet) to complete your online assignments?
5. Describe experiences with technology that make you feel overloaded with stimuli. What about those experiences makes you feel overloaded?
6. What are some techniques you use to manage your consumption of information?
7. Describe your online course activities that provide a break from using technology.
8. What other information would you like to share about your experiences with technology in online classes and information overload?