A study of adult learners' satisfaction and engagement in online courses using web 2.0 technologies and the impact on their digital literacy

LaMetrius Daniels
meechie1920@gmail.com

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A study of adult learners’ satisfaction and engagement in online courses using web 2.0 technologies and the impact on their digital literacy

By

LaMetrius Daniels

Approved by:

James Adams (Major Professor)
Pamela Scott-Bracey
Stephanie King
Wei-Chieh (Wayne) Yu
Chien Yu (Graduate Coordinator)
Teresa Jayroe (Dean, College of Education)

A Dissertation
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Instructional Systems & Workforce Development
in the Department of Instructional Systems and Workforce Development

Mississippi State, Mississippi

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This study examined the perceptions of satisfaction, engagement, comfort, and confidence level with Web 2.0 technologies as learning strategies in online courses, as well as differences based on gender, age, race, income, and a correlation among these factors and digital skills.

The researcher survey design was used for this study, and was sent to all adult learners enrolled in an undergraduate degree-completion or graduate program. The population of 2,100 adult learners was asked to participate in the study, and 134 adult learners completed it. Both descriptive and inferential statistics were conducted in order to address the research questions. The analysis consisted of one sample t tests and analysis of variance (ANOVA) in order to determine the level and differences in perception of Web 2.0 use and correlation.

One sample t test indicated that respondents agreed or strongly agreed that they were satisfied, engaged, comfortable, and confident with Web 2.0 technologies. There were no significant differences among participants based on gender, age, income, or race in their overall satisfaction. When looking at individual survey items, results indicated that a female's comfort level in virtual meetings in online courses was significantly lower than males. The findings also
showed that the Hispanics and other ethnic race groups' comfort level using social networking sites was significantly higher than that of the Caucasian and African American participants. However, the Caucasian groups' comfort level was significantly higher in social networking sites and instant messaging than that of African American groups. Moreover, both Caucasian and African American participants' confidence levels were significantly higher using Web 2.0 technologies at work than Hispanics'.

Additionally, the study checked for correlations among digital literacy, satisfaction, engagement, comfort, and confidence, and positive correlations were found. An increase in confidence and satisfaction was associated with an increase in engagement, and increases in satisfaction were associated with increases in comfort.

To summarize, most adult learners can learn and acquire digital literacy skills based on their satisfaction, engagement, comfort, and confidence in using Web 2.0 technologies in online learning. Digital literacy skills are needed for adult learners to participate in a digital and global society.
DEDICATION

I dedicate this dissertation to my family and close friends. Without your love and support, I would not be where I am today. A special thank you to my parents, Johnny and Delcenia Daniels, for inspiring me and your words of encouragement to give me the strength to complete this journey. Most importantly, I thank God for helping me persevere through this process and His divine love that reminded me never to give up.
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I want to thank my employer and Dr. Tom Middendorf for allowing me to conduct research and provide assistance when requested. Special thanks to Dr. Heidi Ventura and Dr. Lena Welch for their support, research books, and words of encouragement when I needed it the most.

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CHAPTER I
INTRODUCTION

According to a study published by The Learning House, Inc., colleges and universities have expanded the number of online programs they offer in recent years (Domenichella, 2016). Universities today face growing pressures to produce employable students and maintain their own relevance. These pressures have changed the way higher education operates, and have caused a shift from the traditions of face-to-face connection towards the new paradigms established by online learning.

As online learning continues to gain popularity as a tool in higher education, institutions will continue to attempt to use digital technologies to create an engaging learning experience that is effective and adaptable for adult learners. Digital technologies are electronic tools, systems, and applications that store or process data. Some common examples include social media, online games, multimedia applications, and mobile phones. Adult learners will need to know how to use these crucial tools (i.e. to achieve “digital literacy”) in order to apply information for meaningful learning and academic performance.

Digital literacy is defined as the ability to effectively use Web 2.0 technology (interchangeable with the term “digital technology”) to access and use information for various tasks. Web 2.0 technologies are twenty-first-century innovative tools that allow users to collaborate online using multiple applications that support audio, video, images, and mobile access. These tools can empower faculty to create compelling learning experiences for adult
learners (Pacansky-Brock & Ko, 2013), meet learners’ needs, and prepare them for the workforce.

**Background**

Discussions on the best response to this digital shift are ongoing among university administrators, faculty, and learners. The integration of Web 2.0 technologies, as a means to both promote digital inclusion and provide an engaging online learning experience for new learners, has shaped the development of new labels such as “digital native” and “digital immigrant.” Those considered to be digital natives were generally born during or after the 1980s, and they are comfortable in the digital age because they grew up using technology (Čut, 2017). Digital immigrants were born before the 1980s and are generally more fearful about using new technology (Čut, 2017).

The term used to describe this gap in understanding is the “digital divide.” The digital divide is impacting the way higher education provides a quality online learning experience to its students. While other industries have had to re-invent themselves when faced with challenges of this magnitude, the higher education industry remains largely unchanged, and it conducts itself in the same manner as it did 50 years ago (Wildavsky et al., 2011), or even a century ago (Christensen & Eyring, 2011). For many universities, external pressures, the risks involved in transforming themselves to remain relevant, and the push to mediate education through technology are all increasing because technology provides a more cost-effective way to reach a larger audience (Bucher & Gay, 2019).

The concept of the digital divide stems from the widespread proliferation of computers and access to the Internet. As more people gain access to computers, the digital divide has grown to encompass both technological literacy and the financial responsibility of running a computer.
In other words, the digital divide separates those who have the technical and financial ability to make full use of the technology available from those who do not.

As the importance of technology increases in the workplace and society, digital literacy is gaining recognition as the most valuable tool for lifelong learning (Lynch, 2017). Adult learners looking to compete in the 21st century workforce will continue to seek out postsecondary education (Chen, 2017) to improve their skills and digital literacy. Online learning continues to support and facilitate new and flexible educational opportunities for adult learning by using interactive Web 2.0 technologies that are engaging and effective in undergraduate and graduate education (Mery & Newby, 2014).

Higher education utilizes a variety of Web 2.0 technologies. This study will focus on the six most common categories in online learning:

1. Lecture and Video Capturing Applications. Lecture and video applications are a combination of audio, video, text, and graphics used for educational purposes. For example, video and lecture capture systems record the screen of your computer, a video of the presenter, a PowerPoint, a whiteboard, a document camera, or a lab experiment. Examples of lecture and video applications used to complete these tasks include Screencasting, YouTube, Panopto, Knovio, Vimeo, and VoiceThread, a cloud-based application used in online courses for discussions.

2. Social Networking Sites. A social network is a website that allows people to come together and share information, photos, and videos (Rouse, 2014). The most popular social networking sites are Facebook, Twitter, and Lynda.com (LinkedIn Learning).

3. Instant Messaging. Instant messaging, sometimes referred to as IM, is a real-time online communication tool that connects two or more people, usually on a mobile device,
computer, or laptop. Some common IM applications are GroupMe, Google, Yahoo Messenger, Teams, and Slack.

4. Picture or Video Sharing. There are various mobile applications and services used to share photos, videos, and messages with other people, the most common of which are Instagram, Snapchat, and Facebook.

5. Cloud Computing. Cloud computing is the delivery of on-demand computing services (such as applications, storage, and processing power), typically over the Internet and on a pay-as-you-go basis (Ranger, 2018). The cloud computing services used for this research are software as a service (SaaS) and platform as a service (PaaS). Some examples of SaaS are Google Apps, OneDrive, Dropbox, learning management systems, massive open online courses (MOOCs), and digital badges. An example of a PaaS is Amazon Web Services.

6. Virtual Meetings. Virtual meetings, sometimes referred to as virtual conferences, use technology to allow groups to collaborate through an Internet connection using audio and video. Examples of virtual meeting platforms are Zoom, Microsoft Teams, GoToMeeting, Collaborate, and Skype.

To summarize, incorporating Web 2.0 technologies in education will expose adult learners to modern technologies and help develop their digital literacy skills. James (2016) affirmed that adult learners in the 21st-century need digital literacy skills to succeed in higher education and the workplace. Without fundamental, effective models for implementing Web 2.0 technologies in online learning for adult students, colleges and universities will struggle.
Adult Learners and Higher Education

The National Center for Education Statistics reported that 8.1 million students enrolled in higher education in 2015, more than 40% of whom were classified as adult learners, meaning 25 years old or older (Arnett, 2018). Despite this growth, many colleges and universities still have not adopted sound strategies to teach and support this demographic (Fireng, 2016). Adult learners’ needs, experiences, knowledge, skills, and attitudes are different from those of traditional students. They require more flexible schedules and regular opportunities to engage in their institution’s culture in ways that do not require living on campus; university and college leaders are struggling to meet these needs. The National Center for Education Statistics (2012) defined adult learners as those who possess at least one of seven characteristics:

1. Delayed enrollment into postsecondary education,
2. Attends college part-time;
3. Works full-time;
4. Is financially independent for financial aid purposes;
5. Has dependents other than a spouse;
6. Is a single parent;
7. Does not have a high school diploma.

These criteria fit a wide swath of today's college students (Pelletier, 2010). The Learning House survey (Loike, 2017) found that the average age of online undergraduate students is 29 years old, and the average age of graduate students is 33. This reflects the popularity of online programs as a means to help adults meet their educational and career goals (Loike, 2017).

To prepare adult learners for online learning and the job market, higher education institutions must equip them with the skills to use technology personally and professionally to
connect globally and become valuable in the workforce. Workers without college degrees are at a particular risk of losing their jobs due to automation (Bell, 2019). There is an ongoing national conversation about the discrepancy between U.S. workers’ existing skills, and the skills required by U.S. businesses to remain globally competitive.

**Statement of the Problem**

In the United States, Web 2.0 technologies have become increasingly popular for use both at home and at work, and these tools are making their way into academia. With the increase in advanced technology and online services, adults are expected to know how to use and navigate the Internet to obtain health information and education, pay bills, and obtain other services to maintain their daily lives, and many find these expectations challenging, because they receive little or no training on how, or why, to use it. For this reason, and to keep up with the trends of a global society, higher education institutions must develop strategies to provide adult learners with the opportunity to acquire and improve digital literacy.

**Purpose of the Study**

This study aims examine adult learners' satisfaction, engagement, comfort, and confidence levels with Web 2.0 technologies, based on their gender, age, race, and income, and checks for correlations among digital literacy, satisfaction, engagement, comfort, and users’ confidence levels. This research will help guide and develop strategies to close the divide between digital native and digital immigrant learners, improve online course design and delivery, inform higher education policy, and establish best practices for using Web 2.0 technologies in online learning. Many studies have examined the correlation between online learning and
satisfaction and motivation, yet very few have addressed the need to create or improve digital literacy.

**Research Questions**

The study was designed to discover new information related to Web 2.0 technology in order to assess adult learners' digital literacy. It will address the following questions to determine if Web 2.0 technology is relevant to adult students' learning and digital literacy:

1. *Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, income, and race?*

This question addresses adult learners' perceptions of Web 2.0 technologies and their satisfaction with online courses based on various demographic variables. Student satisfaction is a key aspect in evaluating the effectiveness of online learning (Arbaugh & Benbunan-Fich, 2007; So & Brush, 2008). Kimbrell (2013) stated that certain factors affect student learning when using Web 2.0 technology, and could determine whether their usage was a positive or negative experience; most of the Kimbrell study participants had their course expectations met and were satisfied. Kim et al. (2011) showed that learning satisfaction was improved when distance education courses were varied and made use of several Web 2.0 technologies alongside quality instruction. They also suggested that instructors open asynchronous discussions, facilitate quality interactions, and provide useful resources (audio or video files). Kimbrell (2013) noted that, in order to support student’s different learning styles and encourage the usage of technology as a learning aid, instructors were faced with the challenge of incorporating the most effective and useful Web 2.0 technology tools into their course designs.

A growing body of research investigates the demographic characteristics of adult learners and their influence these learners’ adoption and diffusion of information technology (Alajmi,
Initially, high Web 2.0 usage rates were found among teens and young adults; however, a shift has occurred that demonstrates other age groups are starting to use these tools (Dooley et al., 2012). Shifting demographics and the increase in distance learning course options indicate that it may take time to rethink the traditional models of education delivery (Copper, 2017). The higher education population demographic has grown to encompass more than the traditional student. The typical student today no longer proceeds to college after graduating high school. Instead, adult learners' enrollment has increased substantially in recent years, and is projected to outpace that of traditional students over the next decade and beyond (Destiny Solutions, 2016). The growing demand for online education for adult students and changing student demographics justifies the need to provide practical, long-term teaching approaches.

In order to support the adoption of technology in higher education, researchers have widely studied gender as an independent or moderator variable (Adam, 2002; Wilson, 2004). Huang et al. (2013) found that social networking use skyrocketed from 65.3% in 2006 to 90% in 2011. They determined that while both males and females were anxious about using blogs, wikis, and "immersive virtual environments," females had higher anxiety levels than males, and did not use the Internet as often, even though they had the same level of access as the males (Huang et al., 2013). Early studies suggested that these differences influenced women’s usage of computer technology, resulting in gender-based disparities between women and men of the same ages and professions (Compaine et al., 2001). Shea and Bidjerano (2008) found that age could affect student satisfaction with online learning. Sharp (2017) suggested that universities should use Web 2.0 technologies to improve their courses and garner satisfaction and engagement among their students, especially among the growing population of older learners.
Mason (2016) studied the effect of income on students’ experienced satisfaction with Web 2.0 technologies. He noted that 69% of enrollees in graduate and undergraduate programs at a four-year institution with incomes less than $19,999 experienced satisfaction with courses that used Web 2.0 technologies; this proportion rose to 77.8% of those with incomes between $50,000 and $59,999, and dipped again to 67.2% of those with incomes at $60,000 (Mason, 2016).

Mason (2016) is also one of the few to have studied the influence of ethnicity on adult learners’ online learning satisfaction, reporting that African Americans/Blacks, Caucasians/Whites, and other groups all perceived that Web 2.0 technologies improved their course satisfaction. However, other research supports the influence of ethnicity on the digital gap. According to a Pew Research Center survey conducted in early 2019, Black and Hispanic adults are less likely than Whites to own traditional computers or have high-speed internet at home (Perrin & Turner, 2020).

The focus of this research is to determine whether demographic variables such as income, gender, age, and race affect satisfaction with courses that use digital technologies. The impact of course satisfaction may influence their comfort using Web 2.0 technologies, and their digital literacy in general.

2. *Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on their gender, age, income, and race?*

To better understand adult learners' satisfaction with online learning, it is important to examine the impact that Web 2.0 technology has on adult learners' engagement. Brunvand and Byrd (2011) argued that "innovative technological tools, programs, and software can be used to
promote student engagement, motivation, and ultimately enhance the quality of the learning experience for all adult students” (p. 28).

According to Pew, the most popular social media platforms in the United States are Facebook, YouTube, Twitter, Pinterest, Instagram, and LinkedIn. Today, around seven-in-ten Americans use social media to connect, engage with news content, share information, and find entertainment (Pew Research Center, 2019). Pew also reported that 90% of adults between the ages of 18 and 29 use at least one social media site, as do 82% of adults between the ages of 30 and 49, 69% of adults between the ages of 50 and 64, and 40% of adults 65 and older. The report further noted that 68% of adults earning less than $30,000 per year use at least one social media site, as do 70% of adults earning between $30,000 and $49,000, 83% of adults earning between $50,000 and $74,999, and 78% of adults earning income of $75,000 or more.

With fewer options for online access at their disposal, many lower income Americans rely on smartphones. As of early 2019, 26% of adults living in households earning less than $30,000 a year are "smartphone-dependent” internet users, meaning they own a smartphone but do not have broadband internet at home (Anderson & Kumar, 2019). However, even as the rise in social media usage and online access has helped narrow the digital divide over time, non-White students are not seeing the same gains as their White peers. Over the last decade, as the number of students taking at least one online course has increased, students of color are far less likely to take part. According to Wiley Education Services and Aslanian Market Research (2020), in 2020, 6% of African Americas were enrolled in an online course, as were 4% of Hispanics, and 79% of Whites. For persons from other backgrounds, 2% were enrolled in a fully online course (Magda et al., 2020). To understand and address this disparity and allow all
learners to participate in the online community, it is important to research the impact of ethnicity on engagement with Web 2.0 technologies.

Kumi-Yebaoh et al. (2019) conducted a qualitative research study on student engagement and Web 2.0 technology with 35 minority graduate students enrolled in an online program. Participants included 14 African Americans, 10 Asians, 6 Hispanics, and 5 Black Africans [from Africa]. There were 25 participants who were native English speakers and 10 who were non-native English speakers. A majority of participants stated that the lack of resources to support and teach diverse learners influenced their participation and engagement in-class activities; these factors also influenced their participation in collaborative group work, group projects, and co-construction of knowledge. Due to the increasing number of online learning students with different cultural backgrounds, recent studies have highlighted the possibility that miscommunication might occur during online engagement (Kumi-Yebaoh et al., 2019).

Few studies have considered the factors that predict Web 2.0 technologies' impact on the learning process and digital literacy. Therefore, more robust research is needed to confirm and build upon these limited but positive findings, clarify mixed results, and address gaps; further research could also clarify how different technologies influence emotional and cognitive indicators of engagement (Schindler et al., 2017).

3. Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies and are those differences based on gender, age, income, and/or race?

Research question three focuses on users’ comfort level with Web 2.0 technology. Four-year universities need to recognize that adult learners may approach technology in distinct ways, which has implications for their comfort, satisfaction, and engagement with technology. There is an implied understanding that learners need stronger digital literacy skills to effectively
participate in education, business, commerce, and other aspects of contemporary society (Ascione, 2017). In contemplating the future of work, and the experiences and traits that are and will be in demand, higher education institutions need to understand how digital literacy impacts learners’ work and personal lives.

The Pew Research Center conducted a study using cluster analysis on adults to identify their confidence in using computers, their use of digital technology tools for learning, and their familiarity with educational terms (Horrigan, 2016). Participants consisted of 2,752 adults, 18 years of age and older, living in all 50 U.S. states, and they were grouped based on similarities in their response to key questions. The analysis showed the spectrum of digital readiness, from relatively prepared to relatively hesitant. The study reported that 52% of adults were relatively hesitant to use digital tools; these were divided into three distinct groups labeled as The Unprepared, Traditional Learners, and The Reluctant. The Unprepared, 14% of participants, showed a low level of digital skills and limited trust in online information. Traditional Learners, 5% of participants, were observed to be active learners that were less engaged with digital tools because they had concerns about trusting online information. The Reluctant group consisted of 33% of participants, all of whom displayed high levels of digital skill, less knowledge of trends in educational technology, and less comfort when performing personal tasks.

A relatively more prepared section of participants was comprised of two groups, within which 48% of adults displayed an above-average likeliness to use Web 2.0 technology tools for learning (Horrigan, 2016). The first of these groups consisted of 31% of participants, classified as Cautious Clickers, who demonstrated confidence when navigating the Internet and used digital resources to enhance their learning, but were less likely to use the Internet for personal reasons; 17% of participants, classed as Digitally Ready, were active learners who used digital
learning tools confidently, were aware of trends in educational technology, and used technology to further personal learning (Horrigan, 2016).

Mason (2016) studied learners’ comfort level using Web 2.0 technologies while enrolled in online undergraduate and graduate programs. The participants demonstrated the most comfort with social networking applications and the least comfort with social bookmarking. Participants in this study were also concerned that they were not confident in their technical abilities and knowledge.

These previous studies demonstrate the need for further research to investigate adult learners' comfort level using Web 2.0 Technology and help improve their digital literacy.

4. Do differences exist among adult learners’ level of confidence with using Web 2.0 technologies, and are those differences based on gender, age, income, and/or race?

Research question four focuses on adult learners' confidence when using Web 2.0 technology, its impact on their digital literacy, and whether it varies based on their income, age, gender, or race. Over the last few years, growing concern about the digital divide has centered primarily around whether or not people have access to digital technologies. Today, these concerns also focus on the degree to which people succeed or struggle when they use technology to navigate their environments, solve problems, and make decisions (Horrigan, 2016). According to Anderson and Kumar (2019), internet usage, broadband availability, and smartphone usage have rapidly increased for all Americans, including those who are less financially well off. Although the digital divide has narrowed over time, lower-and higher-income Americans' digital lives remain different.

The U.S. Department of Education reported adults between the ages of 45 and 65 were less digitally literate than those aged 6 to 24 (Mamedova & Pawlowski, 2018). The percentage of
Black adults who are not digitally literate is about twice as high as the percentage of White adults, and the percentage of Hispanic adults who are not digitally literate is about three times as high. The report found that 52% of men and 48% of woman were not digitally literate, meaning that there are no substantial differences in digital literacy rates by gender (Mamedova & Pawlowski, 2018). A report from the Council of Economic Advisers (2015) noted that although the United States is a world leader in advanced internet services and technology, the benefits of these technologies do not reach all Americans and a digital divide remains; this divide is particularly prominent among older, less educated, and less affluent populations, especially in rural parts of the country.

5. What is the relationships between digital literacy, satisfaction, engagement, comfort, and confidence?

To be digitally literate, one must possess the necessary skills to use 21st-Century technology effectively and appropriately; one of these skills is the ability to apply critical thinking tactics when using Web 2.0 technologies. The American Library Association (ALA) defines digital literacy as the ability to use information and communication technologies to find, evaluate, create, and communicate, requiring both cognitive and technical skills (ALA, 2013).

With this ALA definition as a guiding source, it is important to understand adult learners’ perception of their ability to use Web 2.0 technologies, and it is also important to consider the impact that their perception has on their digital literacy. Digital literacy goes beyond knowing how to send a text message, post a message on social media, or enroll in an online course. Digital literacy in educational settings requires learners to create, collaborate, and share using Web 2.0 technologies, and do so responsibly. Digitally literate learners need to know how to consume digital content intelligently as well as engage with it. If the appropriate measures are taken to
ensure digital literacy, the benefits of engaging with Web 2.0 technologies outweigh the challenges and limitations.

O'Keeffe (2014) conducted a study on Baby Boomers, aged 55 or older, to gauge their digital literacy and understand their level of engagement using digital devices, and found that they had basic functional digital literacy. However, future research should address how Baby Boomers become aware of Web 2.0 technologies and learn to use them, to not only complete simple tasks but fully engage in the digital world.

Dieck (2018), by contrast, investigated how undergraduate students between the ages of 18 and 19 use Web 2.0 tools (such as social media, websites, and blogs) in their course curriculums. The results indicated that digital literacy, like the traditional notion of literacy, is associated with critical thinking and career advancement. The study suggested that further research into courses that incorporate Web 2.0 technologies for students aged 25 and above could provide greater insight into the disparate experiences of digital natives and digital immigrants, and explicate their relationships with these tools.

**Significance of the Study**

This study contributes to our understanding of adult learners' knowledge and perception of the Web 2.0 technologies they use. Due to advances in Web 2.0 technologies, colleges and universities are beginning to design online programs and courses that provide adult learners with the resources they need to become digitally literate. Digital literacy, beyond just providing personal and professional benefits, is fundamental to promoting digital inclusion in higher education and the workplace. Digital inclusion is an emerging trend that promotes one-on-one or personalized online learning that caters to students' individual life experiences. The widespread establishment of digital inclusion requires strategies and investments to reduce and eliminate
historical, institutional, and structural barriers to the access and use of technology (National Digital Inclusion Alliance, 2020). To achieve digital inclusion in a manner that meets the online learning needs of adult students, higher education administrators must prioritize key issues and invest in appropriate technology and strategies (Luminary Labs, 2019).

According to Rhinesmith, teaching adult learners how to perform specific tasks using Web 2.0 technologies results in greater student motivation and achievement (2016). Yet technology companies often ignore students and educators during the development process. A holistic, and pedagogically correct, development approach would engage with learners and educators before administrators. Additionally, administrators making technology purchasing decisions often suffer from a lack of available data and research (Luminary Labs, 2019), leading to software or platforms that are not adapted to the needs of adult learners. Stronger digital literacy skills are necessary for adults to participate in education, business, commerce, and other aspects of contemporary society (Alexander et al., 2017).

**Limitations**

This study used a survey method to obtain data, and time constraints made it difficult to follow up with participants who completed the questionnaire. Due to the lack of follow-up, participants may have had trouble understanding some questions. Follow up is a critical component of all research and is generally done to increase the overall effectiveness of the data. It is typically conducted during the research but it can also be done afterward (Salkind, 2011).

**Delimitations**

The delimitations of this study were related to the time frame, population, and sample size. Common limitations in research are the study's sample size and length (Gay et al., 2012).
This study was also delimited to data from one demographic location in the southeastern United States. Another delimitation was in confining the population to adults in online courses that use Web 2.0 technologies. The study did not include online courses with traditional learners to perform a comparison.

Terms and Definitions

1. **Adult Learners.** Higher education institutions tend to define “non-traditional students” or “adult learners” as students over 25 who are returning to college to complete an undergraduate degree or who are undertaking an undergraduate degree for the first time. Approximately 38% of college students in the US fall into this category (Smith, 2017).

2. **Adult Learners’ Engagement.** In higher education, student engagement is defined as the degree of attention, concern, interest, enthusiasm, and passion that students show when they are acquiring knowledge. These factors indicate the degree to which they are motivated to learn and proceed with their education (Student Engagement, 2016).

3. **Adult Learners’ Satisfaction.** Adult learners’ satisfaction can be described as a short-term attitude about their educational experiences, services, and facilities (Elliot & Healy, 2001). Sweeney and Ingram (2001) define student satisfaction as the experience of enjoyment and achievement in the learning environment. Many factors affect adult student satisfaction, such as the perception of faculty knowledge and performance, interaction, communication, their learning environment, and their university’s image and values (Wu et al., 2010).
4. **Andragogy.** Andragogy is the science of adult learning; it refers to any form of adult learning (Knowles, 1980; Kearsley, 2010). The andragogy theory encompasses a set of adult learning principles, which include learners’ self-concept, their motivation to learn, their readiness to learn, the role of learners' experiences, their desire to learn, and their learning orientation.

5. **Comfort Level.** Comfort level is the learner’s self-assessment of their ability to successfully use Web 2.0 technologies for learning.

6. **Confidence Level.** Confidence level is the learner’s self-assessment of their ability to find and consume digital content using computers and other digital tools, determine the trustworthiness of online information, understand trends in technological terms, and use Web 2.0 technologies in their daily life.

7. **Degree-Completion.** Degree completion programs are designed for adult learners who have started but not finished their bachelor's degree programs. They can be completed on campus or online, or in some combination of the two forms. Degree completion programs offer adult learners a faster and often less expensive means of completing an undergraduate degree. The student must hold a minimum number of education credits to apply to these programs (Trevecca Nazarene University, 2019).
8. **Digital Andragogy.** Blackley and Sheffield (2015) coined the concept "digital andragogy" and defined it based on 21st century learning skills, a profile of 21st-century learners, and the affordances of Web 2.0 technologies. It refers to the practice of educators to inform and support adult learners to choose and use accessible digital technologies, and all their affordances, to customize their learning and facilitate interactions with their peers and tutors.

9. **Digital Immigrant.** Digital immigrant is a term coined by Mark Prensky in 2001 to describe anyone who grew up before the digital age. Generally, digital immigrants are people who were born before 1980 (Hayes, 2019).

10. **Digital Inclusion.** Digital inclusion refers to the activities that are necessary to ensure that all individuals and communities, including the most disadvantaged, have access to information and communication technologies (ICTs). It requires five elements: (a) affordable and robust broadband internet service, (b) internet-enabled devices that meet the needs of the user, (c) access to digital literacy training, (d) quality technical support, and (e) applications and online content designed to enable and encourage self-sufficiency, participation, and collaboration (National Digital Inclusion Alliance, 2020).
11. **Digital Literacy.** Digital literacy means the critical knowledge, analysis, use, and evaluation of digital tools and texts. Digital literacy is not merely a collection of basic skills for using technology. Instead, digital literacy is a fundamental extension of literacy, for which access, analysis, evaluation, and reflection are required. Digital literacy skills are the iterative practices that promote understanding, growth, and learning (Hobbs et al., 2017).

12. **Digital Native.** Digital native describes the first generation of learners born after 1980 who grew up with digital technology. The term was coined by Mark Prensky in 2001 to describe the generation of people who grew up in an era of ubiquitous technology, including computers and the internet (Halton, 2019).

13. **Digital Technology.** Digital technologies are electronic tools, systems, and applications that store or process data. Some common examples include social media, online games, multimedia applications, and mobile devices.

14. **Learning Satisfaction.** Learning satisfaction is the emotional affordance (Calli et al., 2013) or subjective perception of the degree to which students’ learning experiences match their expectations (Lo, 2010).

15. **Online Course.** The Sloan Consortium, now called the Online Learning Consortium, coined this term. An online course is one in which at least 100% of the content is delivered online. All course activity is completed online; there are no required face-to-face sessions and no requirements for on-campus activity (Fuster, 2016).
16. **Operational Definition of Variables.** The primary constructs associated with this study were adult learners using Web 2.0 tools and the impact of these tools on adult learners' satisfaction, engagement, comfort, and confidence in online courses. The associated variables were age, gender, income and race.

17. **Private For-Profit University.** A college or university that is owned and operated by a private business or organization. A for-profit institution charges tuition but doesn't necessarily invest in the quality of the curriculum. Most of the funds are spent on recruiting and marketing (Gadek, n.d.).

18. **Private Non-Profit University.** A private university in which the owner does not receive financial benefits other than wages, rent, or other risk-related expenses. These include both self-governing not-for-profit schools and those affiliated with religious organizations (National Center for Education Statistics, 2017).

19. **Traditional Learner.** A traditional learner is an undergraduate student who is 24 years old or younger and enrolled in a higher education program.

20. **Web 2.0 Technology.** Web 2.0 allows learners to engage in collaboration, creativity, communication, community, and control through the cloud (Hicks and Graber, 2010).

**Organization of the Dissertation**

Chapter I established an introduction to adult learners and digital literacy in higher education, identified this study’s problem, purpose, research questions, and significance, and discussed limitations, delimitations, and relevant terms and definitions. Chapter II provides a
review of the existing literature about Web 2.0 technologies’ relationship to online learning, adult learners' satisfaction, engagement, comfort, and confidence using Web 2.0 technologies for online learning, and the digital literacy gap that impacts adult learners.

Chapter III includes a rationale for the research design and the quantitative method used in the study. Chapter IV presents and discusses the results, and Chapter V includes a summary, interpretations of the results, recommendations, and implications for practice and research.
CHAPTER II
LITERATURE REVIEW

Chapter I provided the overall introduction of the research topic. Chapter II analyzes both foundational and current research into adult learners' usage of Web 2.0 technology applications in higher learning; in doing so, the chapter pays specific attention to participants' satisfaction, engagement, comfort, confidence, and digital literacy. This chapter is divided into four areas. The first area reviews the various Web 2.0 technologies used in higher education. The second area focuses on adult learners' satisfaction with online learning. The third area investigates adult learners' engagement with Web 2.0 technology tools used for online learning. The final area examines adult learners’ skills and literacy in using digital technology.

Web 2.0 Technologies in Higher Education

There are hundreds of Web 2.0 technology tools integrated into online learning in higher education that offer creative interactive opportunities, and this number continues to increase (Karkoulia, 2016). Web 2.0 is far more interactive than Web 1.0, in that it allows for higher levels of participation and collaboration. Web 2.0 applications include multimedia applications and social networking sites, which allow instant messaging, picture sharing, video sharing, cloud computing, and virtual meetings to take place. Shinsky and Stevens (2011) suggested that Web 2.0 technologies, and all their related and evolving tools, reshape how we provide online education and enhance educators' ability to make online education a meaningful learning experience for adult learners. The adoption of Web 2.0 technologies in higher education can aid
in the development of high-level skills when used with pedagogical consideration. For example, Anastasiades and Kotsidis (2013) suggested that the usage of Web 2.0 technologies in educational spheres can develop critical thinking skills, meta-cognitive abilities, and problem-solving skills. The advancement of Web 2.0 technologies is reshaping higher education and has become an integral part of learning.

**Lecture and Video Applications**

Some of the most utilized Web 2.0 technology applications in online learning are lecture and presentation capturing videos. The most popular video application sites in education and online learning are YouTube, Vimeo, Panopto, and Knovio. Through these applications, students can view course materials, such as lectures or short videos, in an online learning environment. Research has shown that using instructional videos can increase user knowledge (Woodworth et al., 2014). However, there are many factors beyond self-efficacy that are involved in adopting and using videos to engage with online learners. If students do not have adequate digital video technology skills (i.e. they cannot make the video play), these online learning tools will not deliver the content, satisfy the users, or help improve their digital literacy skills.

Very few researchers have studied the impact that learners' satisfaction has on their digital literacy. Bickle and Rucker (2018) conducted a study of undergraduate students in an online course that used VoiceThread to determine whether the application improved student-to-student interactions. The results revealed that the use of VoiceThread technology in group assignments significantly influenced students' ability to learn, their feelings of community, and their ability to communicate. A different study with adult learners in a fully online graduate program examined the effect of using VoiceThread on their engagement. The results revealed a positive impact on adult learners' engagement, social presence, teaching presence, and cognitive
presence (Asroff, 2019). The study did not include background variables such as race, gender, income, or age, and did not examine their level of comfort with the technology. Asroff noted that it is important that higher education institutions recognize the need to use this tool in online learning to increase student engagement and build a connection to advance their knowledge.

**Social Networking Sites**

The comfort level of adult learners in using social networking sites can also impact learning. Social networking sites are Web 2.0 technologies that facilitate interaction, collaboration, and foster a sense of community (Bingham & Conner, 2010). Kellogg (2020) ranked the seven biggest social network sites in 2020 by active monthly users: Facebook (2.45 billion), Instagram (1 billion), Reddit (430 million), Snapchat (360 million), Twitter (330 million), Pinterest (322 million), and LinkedIn (310 million).

In today's increasingly digital world, social network sites play a meaningful role in higher education. Sergaren (2019) discussed how beneficial social networking sites can be to learning. A quantitative study by Montgomery (2016) explored a community college student's experience using social media and networking sites to determine their effect on learning, GPA, graduation, and demographic characteristics. The study reported that most students preferred Facebook and Instagram, with 47.1% using Facebook and 37.9% using Instagram, but only 32.2% of the participants report that social networking sites had a positive impact on their GPA. Also, Facebook is the most commonly used social network for older students (25 and above), who are less likely to use Instagram. White students were more likely to use social media than African American students. The study did not provide information on participants' satisfaction, gender differences, or comfort levels using social networking sites.
Since social networking sites continue to gain popularity in online learning, it seems only natural that digital video sharing has increased within educational settings. Video sharing technology continues to grow in popularity as an online medium (Purcell, 2013). This increase in the usage of video sharing technologies has made challenging topics more accessible and easier to understand because these technologies are engaging for learners.

**Instant Messaging**

Instant messaging, or IM, is a Web 2.0 application that allows users to exchange text messages in real-time. It enables users to know if their contacts, followers, or friends are online, and users can also share files and participate in voice and video chats. Statista (2019) ranked Facebook Messenger the most popular mobile messenger app in the United States, with 106.4 million users. Snapchat ranked second, with 45.98 million users. There are many other instant messaging applications, such as WhatsApp, GroupMe, Slack, Google Hangouts, and WeChat. It has become common to see people using mobile devices or smartphones to IM, since it is less expensive than broadband and computer access. According to Anderson and Kumar (2019), Blacks and Hispanics are less likely than Whites to own traditional computers but are most likely to have mobile devices such as smartphones. With fewer options for online access, many lower-income Americans rely on their smartphones. In 2019, 25% of adult households earning less than $30,000 a year could only access the Internet with a smartphone (Anderson & Kumar, 2019).

Since the rise in smartphone and mobile access, it is not surprising to see an increase in the use of IM for educational purposes. Communication among learners has shifted from face-to-face interaction and discussion to electronic engagement using mobile phones and text messaging. Higher education has expanded its communication channels from email to include text messaging, which provides information faster and more efficiently.
There are few studies on instant messaging in higher education. A study conducted by Assignon (2018) examined the impact of text messaging on students' academic performance. The study involved 50 first-year students enrolled in an online course, who were randomly assigned into two groups, control and experiment. Both groups were taught by the same instructor and received the same information; however, the experimental group used a text messaging application called Remind to exchange messages with the instructor. The results demonstrated no significant difference in achievement scores between the control and experiment groups. Assignon (2018) suggested that further research is needed to understand both learners' attitudes towards text messaging in online learning and the effect it has on their satisfaction and performance.

The study did not address demographic factors that could have impacted performance. As a step towards understanding Web 2.0 technologies such as instant messaging and establishing best practices, it is important to focus on learners' comfort level and satisfaction with these applications.

**Picture and Video Sharing**

Another form of Web 2.0 technology is picture or video sharing software, the most common of which are Instagram and Snapchat. According to the Pew Research Center, these applications are most popular among ages 18 to 24 (Perrin & Anderson, 2018). Statista (2019) reported that over 116 million people in the U.S. used these applications (45% were women and 31% were men); of these users, 75% were 18-24 years old, 57% were 25-30 years old, 47% were 30-49 years old, and 30% were 50 or older. Thirty-five percent of Instagram users make less than $30,000 per year, 39% make between $30,000 and $74,999, and 42% make more than $75,000.
Instagram is most popular with Hispanic adults (51%), followed by Black (40%), and White (33%) adults (Perrin & Anderson, 2018).

Compared to Instagram, Snapchat appeals more to younger users. According to Statista (2019), 41% of teens found Snapchat to be the most important software application. Snapchat has 210 million users, and the data usage of male and female users was the same (24%). The income demographic reported that 27% of Snapchat users' income was less than $30,000, 26% was between $30,000 and $74,999, and 22% was over $75,000.

Since Snapchat and Instagram are popular with younger demographics, colleges and universities are starting to use these applications to attract students and promote engagement in the classroom. Dinkins (2018) conducted a study that explored community college students' perception of the usage and impact of social media and social networking sites. The participants were all freshmen and sophomores within the age range that reports the most use of these applications. The results revealed that students 25 years and older differed from other age groups in that their most preferred websites were Facebook, YouTube, Instagram, and Snapchat.

Overall, 41.3% of participants agreed that social networking sites helped them academically by providing access to educational materials for assignments or projects, and 45.8% disagreed. This research concerned social media use in the classroom and not in an online course. This study demonstrates the need to investigate adult learners' perception of their satisfaction, engagement, comfort, and confidence in using technology.

Chan (2017) examined the social media engagement of 10 undergraduate students of color and its impact on their understanding of race and racial identity. Chan noted that students often considered the larger implications that their posts might have for their racial community, and that they were aware that their posts could be interpreted as representative of their racial
group. The study found that social media raise concerns for how individuals view racial identity. The researcher suggested that an additional study could provide more insight into how different races engage with and make meaning of social media.

**Cloud Computing**

As online education expands and university budgets decline, cloud computing services can enhance academic growth in a cost-effective manner (Zgodavova & Horvath, 2013). Exploring adult learners’ insights about the use of cloud computing can provide administrators with the information necessary to seamlessly adopt and leverage these technologies.

The most common cloud service resources are Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS; Lui, 2014). Many online learning applications are hosted using cloud services that allow educational institutions to subscribe to online software hosted by a cloud provider, such as Amazon Web Service.

Google Apps and Microsoft Office 365 are some well-known software packages provided by SaaS. Saas is beneficial to organizations in many ways; for example, updates are automated and involve no additional cost, usage is scalable, and the software is accessible from any location with an internet connection.

PaaS is a cloud computing resource that provides a platform and environment for developers to quickly build applications and services over the Internet (Gass et al., 2014). Windows Azure is an example of a database system that uses PaaS to access Microsoft Teams Video Conferencing, OneDrive, and other applications that are used for online learning.

IaaS provides access to computing resources in a virtualized environment. Kwang-Kyu (2013) noted that IaaS includes virtual machines and server storage from providers such as AT&T, Amazon Web Services, and Microsoft Azure. The service accommodates infrastructure
needs to configure various tools and complete specific tasks to allow global and local access on-demand.

Cloud computing services are transforming higher education, as its adoption increases to keep up with the changes in online learning. Dawson (2015) surveyed 217 higher education personnel who were decision makers at their institutions, revealing that negative security perceptions and a lack of knowledge had an unfavorable influence on universities' usage of cloud technologies. The study suggested that a systematic form of education about cloud technology is necessary to address negative security perceptions and advance cloud adoption at educational institutions. Alzahrani (2015) examined 29 female students at the College of Education at Al-Baha University, in Saudi Arabia, for their ability to use cloud computing to enhance their learning experience. The study participants registered for one of the cloud providers, such as Dropbox, Google Drive, OneDrive, and iCloud. These students' lack of experience affected their desire to learn via cloud computing.

The foregoing studies demonstrate that there is little to no research on adult learners usage of cloud computing services to utilize Web 2.0 technologies, and as a result there is limited data about these technologies’ impact on adult learners’ digital literacy.

**Virtual Meetings**

Web 2.0 technologies allow users to communicate or collaborate using video applications, both asynchronously and synchronously. With the development of advanced technology, there is an increase in synchronous communication using virtual or web conferencing tools. Virtual meetings, which have quickly become common in higher education, allow remote participants to access live meetings or events on their computers or mobile devices using video or audio options. There are several virtual meeting platforms, such as GoToMeeting,
Zoom, WebEx, and Microsoft Teams. As the number of meeting platforms continues to grow, and their services evolve, scholars should track their usage and efficacy in online learning environments.

Since the outbreak of COVID-19, workers and students have had to pivot to working remotely or online, which has increased the usage of virtual meeting platforms. In a recent study, Catalyst, a nonprofit organization that works to accelerate women into leadership roles, sent a survey to 1,100 U.S. working adults with full-time employment. The study was on the impact of COVID-19 on workplace inclusion. The study found that 45% of women business leaders said that it is difficult for women to speak up in virtual meetings, and one in five women said that they have felt ignored or overlooked by colleagues during video meetings (Chen, 2020).

Borel (2013) conducted a descriptive, quantitative study of 135 graduate students on their experience using an asynchronous virtual conference tool, Adobe Connect, in an online classroom. Participants who attended multiple virtual meetings had a higher sense of community and connectedness. The open response identified four themes, and the majority of the participants commented that the virtual meetings were helpful and allowed them to interact with their professor and establish a collaborative learning environment. The researcher suggested that future studies should include information such as gender, race, and level of comfort with using virtual conference tools to provide more insight on the usage of this Web 2.0 tool for online learning. The study reinforces the need for the current research on adult learners’ perceptions of satisfaction, engagement, comfort, and confidence in using technology in online learning based on demographics. Currently, little work addresses the impact of virtual meetings on higher education, and few studies investigate adult learners’ experiences with this technology.
Adult Learners’ Satisfaction with Web 2.0 Technologies

While there is existing research on the impact of adult learners’ satisfaction with Web 2.0 technologies on online learning, there is little research about the impact that these technologies have on learners’ digital literacy.

Learning satisfaction is a multi-faceted, complex subject and an increasingly prominent theme in education, especially in terms of educational evaluations that integrate a customer service approach (Markham & Postema, 2001). Researchers have considered various satisfaction models to determine student’s perception of and satisfaction with online learning. Sahin and Shelley (2008) incorporated the technology acceptance model to measure student satisfaction (p. 217). They wrote:

In designing, developing, and delivering distance education courses, students' needs and perceptions should be central. Indeed, without investigating what satisfies undergraduate students in distance education courses, it is difficult to meet their needs and improve their learning. (p. 217)

Though scholars have explored the relationship between adult learners’ educational satisfaction and their experiences with online learning, current research, such as this study, is needed to integrate these findings with the effect of new Web 2.0 technologies. Implementing Web 2.0 technologies in online learning to understand adult learners' satisfaction will provide insight into their level of comfort with different forms of digital technology. Bryant (2014) studied the experiences of 20 adult learners, aged 25 and older, with online learning and Web 2.0 technologies, in a semi-structured interview. She found that the participants expressed satisfaction with some of the benefits that Web 2.0 technologies provided, alongside the less structured nature of online classes, especially the ability to control the content and pace of their
learning. However, Bryant also reported that participants lacked the technical skills required to engage effectively with Web 2.0 technologies in a learning environment. Bryant's observation of the barriers associated with using Web 2.0 is significant because it can direct further studies on the issue of satisfaction with online learning and Web technologies—thus supporting the relevance of the present study.

Given that the adoption of Web 2.0 tools for learning is showing initial promise (Hew & Cheung, 2013), existing research should be extended to examine both learners' decision making processes in adopting Web 2.0 tools in an online classroom and their experiences adopting and using these tools (Cifuentes et al., 2011; Greenhow et al., 2009; Hew & Cheung; 2013; Lim et al., 2010; Pritchett et al., 2013).

Many studies have examined adult learners' perception of a particular technology used to complete a task, but not adult learners' general view of using Web 2.0 technology to supplement in-class learning (O'Connell & Dyment, 2014). When technology is employed to foster a productive learning environment, it can result in meaningful experiences which can contribute to a person's growth and development. Using qualitative analysis, a study conducted at a private university in Riyadh concluded that using an online discussion board had a positive impact on student's grades and satisfaction for a majority of the 60 participants (most were between the ages of 18-24; four were 26 or older; Al Jeraisy et al., 2015). While this study provided valuable insight into learner's performance and satisfaction using Web 2.0, it lacks comprehensiveness as it studied only one technology.

Adult learners' satisfaction in adopting Web 2.0 technologies varies based on their demographic and their comfort level. A quantitative study by Mason (2016) examined adult learners' reactions to Web 2.0 technologies based on age, gender, ethnicity, current income,
degree level, and the number of hours the technology was used per week. The study had a total of 128 participants, all 18 years old and older. Of the participants, 96 were Caucasian, 19 were African American, and 13 were of other ethnicities. Eighty-nine were females and 39 were males; their income levels varied from less than $20,000 to over $60,000. A total of 76.6% of the participants were in graduate degree programs, while the remainder were enrolled in undergraduate degree programs.

The results revealed that 60% of the 25–45 year olds, 70% of the females, 80% of the males, and 50% of all income ranges agreed or strongly agreed that Web 2.0 technologies were beneficial in the classroom for improving grades, increasing course satisfaction, and helping students learn more about select subjects. A majority of the students stated that Web 2.0 technologies would be easy to use in the classroom, while several adult learners questioned their ability to successfully use Web 2.0 technologies to supplement in-class learning (Mason, 2016).

The participants in this study ranked their comfort level using Web 2.0 technologies as either competent or proficient; the study included six out of the eight main social networking technologies, such as Twitter and Facebook, and the largest proportion of self-assessed competency was 85.1% (Mason, 2016). The other Web 2.0 technologies examined were blogs, wikis, social bookmarking, instant messaging, internet telephone, picture/video sharing, and cloud computing. Social bookmarking ranked the lowest, with 85.8% of the participants reporting no use and no plans to use any of the applications to supplement in-class learning; however, the participant ranking varied using different Web 2.0 technologies. They were most comfortable with social networking and least comfortable with social bookmarking. This study's outcomes demonstrate the significance of using Web 2.0 technologies as part of the learning process, especially for online learning courses. The influx of Web 2.0 technologies has had a
ripple effect on both education and the workforce (Adams, et al., 2017). These tools are quickly shifting away from providing static information to facilitating transactions towards providing performance support that is a more interactive, personable, and social experience (Reiser & Dempsey, 2012).

“Performance support” is a system that provides tools and other resources, such as printing and technology support, to help users navigate the online world. It provides the right amount of task guidance, support, and productivity benefits to the user, precisely when they need it (Rosenberg, 2013). In an exploration of job performance outcomes based on the usage of Web 2.0 technologies, Caruso (2018) included a collective view of the role that Web 2.0 technology plays in self-directed workplace learning. One of the most significant and relevant studies in the focus paper, conducted by Boileau (2011), tracked the effect of interactive technology on informal learning and performance in a social setting. The research setting for the study was a public company based out of Canada with operations and employees located worldwide. Of a sample of 30 employees, 25 participated in the study from two locations in different major U.S. Midwestern cities. In qualitative research, Boileau found that employees adopted interactive technology tools to enable social learning and collaboration on their own initiative, rather than waiting for them to become available through the company. Boileau also noted that learning organizations in all business sectors embraced social media to enable social learning. According to Boileau (2011), "Social media allows individuals and organizations to embrace the needs of changing workplace demographics and empowers people of all ages to learn in ways that are comfortable and convenient for them" (p. 151). With the help of Web 2.0 applications, social media has grown and created a user-generated web (Techopedia, 2011). This research fails to address digital literacy components explicitly, thus making this current study relevant. Future
studies that focus on adult learner’s experience with using Web 2.0 technology can contribute to a better understanding of the relationships between adult learners and performance outcomes.

In another quantitative study of 238 graduate students, 87.4% reported positive online experiences (Su, 2016). These participants identified themselves as highly self-directed learners. Several critical individual characteristics, including marital, employment, and student status, future enrollment planning, enrollment in online programs, and the number of online courses taken played a moderating role in online graduate students' learning. However, Su (2016) reported that no relationships were found between age, gender, race/ethnicity, and the previous online course experiences or learning perceptions of graduate students. Only 3.4% of the graduate students who responded to the survey reported non-completion of an online course. The author recommended replicating the study to include undergraduate and graduate learners for group comparisons, and noted that it would also be beneficial to examine specific demographic factors, such as student grades for online courses and their year in school, alongside correlations with online perceptions.

This current study will examine the challenge of integrating Web 2.0 technologies and online learning in a more comprehensive way. Each online course's goal should focus on student engagement, motivation, interaction, and satisfaction to increase knowledge on the subjects and develop digital skills (Schmid et al., 2014).

**Adult Learners’ Engagement with Web 2.0 Technologies**

Since adult learners have unique needs and experiences, their engagement with digital learning, a critical factor in their success, is associated with knowledge and persistence and applies to online courses (Kahu, 2013; Kuh, 2009; Tinto, 2006). Major (2015) described student engagement as a "student's willingness and desire to participate and be successful in a learning
process that leads them to higher-level thinking and long-term understanding” (p. 208). Adult learners' needs and expectations are different from traditional students, and higher education needs to evolve its approach to better foster student engagement for this demographic. In fact, Prensky argued that digital literacy is the most significant problem facing education today, and educators must change how they teach to engage their adult learners (Čut, 2017).

It is necessary to define student engagement as perceived by adult learners to understand how the concept applies in online learning. Kuh (2009), founder of the National Survey of Student Engagement (NSSE), offered this explanation of student engagement:

The engagement premise is straightforward and easily understood: the more students study a subject, the more they know about it. The more students practice and get feedback from faculty and staff members on their writing and collaborative problem solving, the deeper they come to understand what they are learning. The more adept they become at managing complexity, tolerating ambiguity, and working with people from different backgrounds or with different views. (p. 5)

A qualitative study conducted by Sharp (2017) examined online graduate students' engagement with Web 2.0 technologies, including webinars, Voice over Internet Protocol (VoIP), document management, and collaborative video tools. The research noted that some of the study participants shared that they were apprehensive about trying the new technology. However, as learners engaged with Web 2.0 tools, they developed confidence and new technological literacies, while forming connections with classmates and instructors and increasing student engagement and interaction. The students repeatedly expressed how important it was to communicate with classmates and how the Web 2.0 technologies enriched their overall experience within the course. Sharp also noted that it is necessary to consider students' first-hand
experiences in a master’s or non-traditional degree program, for which Web 2.0 technologies are particularly beneficial. The nature of these results may lead to fresh recommendations. Participant’s experiences could also provide insights into the support necessary for struggling adult learners. Additional research into learners’ engagement with Web 2.0 technologies could inform university officials of the need for more, or different technological solutions for instruction. In another qualitative study conducted by Humber (2018) on student engagement in online courses at a large public university, the participants were traditional undergraduate students that had some college experience taking an online course. The data analysis from this study led the researcher to identify three new concepts of student engagement in online learning:

1. **Individual perception** – Online students have an idea of what they view as engagement, based on previous academic experiences.

2. **Personal feeling** – The participants defined their engagement level according to how they felt about the course's activity or topic. The connection the learners had with an activity, instructor, or classmate was measured by how the encounter affected them on a personal level.

3. **Process of Engagement** – To engage in online coursework, the learner must determine their level of participation in assignments, assessments, and activities. The engagement level may vary, but the learner must complete this process.

The study indicated that participants appreciated the interaction they had with peers outside of the online course through social media and other mobile applications. The study suggested that since social media applications and Web 2.0 technologies are a relatively new
concept within the online environment, further research is needed in various academic programs that use these products to foster student engagement in online courses.

Hamane (2014) conducted an exploratory study of the various levels of engagement of traditional undergraduate learners enrolled in one online course, and the relation to student outcomes. Hamane discovered a strong relationship between students' perceived level of engagement, students' actual level of engagement, and students’ success in the discussion forum, and suggested that further research should explore the impact of demographic variables on student engagement. Significantly, the study did not explore adult learners' use of Web 2.0 technology to determine student engagement with their peers, instructor, or course activities, supporting the aims of the current work.

Adult Learners and Digital Literacy

Recent literature has noted the lack of academic attention paid to adult literacy (Ortlieb & Young, 2016), particularly concerning digital learning (Jacobs et al., 2014). Although access to technology has increased, the divide persists (Perrin & Duggan, 2015) between digital natives and digital immigrants. Though this divide is commonly situated between those born before and after 1980, some research suggests that the digital divide is not based on age alone (Lai and Hong, 2015; Thinyane, 2010). Digital literacy is not equally balanced among gender, race, income, and access use, and the ownership of digital tools is not gender neutral.

Digital divide can also flow from demographic variables such as gender, hurdles to access and affordability, and technological literacy. Bledsoe (2012) examined adult learners who use Web 2.0 technologies and found that demographic factors, facilitating conditions, academic major, and computer self-efficacy each had a significant impact among a sample of digital immigrant e-learners (Bledsoe, 2012). Female e-learners reported statistically higher Web 2.0
application use, revealing a significant and moderate correlation between these tools and computer self-efficacy (Bledsoe, 2012). There were no significant associations between Web 2.0 use and age or academic major. Bledsoe's research, though significant, does not consider income and race. Still, it can be the stepping-stone for further research on gendered usage of Web 2.0 on adult learners' digital literacy.

In the words of consultancy McKinsey & Company (2009), educational gaps in digital skills "impose on the United States the economic equivalent of a permanent national recession" (p. 17). As technology rapidly changes our economy, the number of people who are locked out of a job market dominated by the demand for computer skills increases (Chau, 2017). According to *Merging Work & Learning to Develop the Human Skills that Matter* by Deegan and Martin (2018), colleges and universities must adapt to teach the skills that students need to be prepared for the workplace.

Deegan, a co-author of the report and senior program manager at JFF, a nonprofit that studies innovation and job trends, stated that education has to go beyond kids and embrace anyone who needs to upgrade their skills. Higher education institutions should be more productive and adaptable, and that education needs to meet learners where they are, including adult learners who need to change their skill sets (Deegan & Martin, 2018). The development of a knowledge-based and technology-driven economy has prompted adults to explore additional education and training to enable them to participate effectively in society (Bryant, 2014). Many adult learners rank low when it comes to digital readiness and the desire to pursue online learning (Ascione, 2017). When organizations think about digital preparedness, it is usually in the context of whether their people have the training needed to use information technology and the digital literacy skills needed to identify trustworthy online sources (Yoeman, 2016). Thus,
digital learning is becoming increasingly prevalent in colleges and universities (Deegan & Martin, 2018).

Chau (2017) noted that while digital technology had changed our world for the better, the innovation that helps some citizens threatens to leave millions behind. Regier (2014) suggested that colleges and universities can assist these adult learners by supporting new methods and technology solutions that align closely with their life challenges, pace, and other unique attributes. Institutions must adopt new technology and explore new methods of teaching online if they are to improve the digital literacy of their students. Social and Educational Technologist Josie Fraser (Anyangwe, 2012) defined digital literacy using the following characteristics:

- It supports and helps develop traditional literacies.
- It is a life-long practice.
- It is about skills, competencies, and critical reflection on how these skills and competencies are applied.
- It is about social engagement.

The ability to access and use information, communications technology (ICT), and digital devices, generally known as computer literacy or digital skills, is an essential element of workplace skills. The Pew Research Center report on Digital Literacy (2011) explored the attitudes and behaviors of online users by examining their confidence in using computers, ability to get new technology to work, use of digital tools for learning, ability to determine the integrity of online information, and experience with contemporary education technology terms, and revealed that many adults suffer from digital unreadiness that negatively impacts their comfort when using digital tools for online learning (Ascione, 2017). However, to succeed in the 21st-century workplace, knowledge, and practical abilities in using computers are not enough (Jose,
Digital literacy makes an individual capable of living, learning, working, and participating in a digital society (JISC, 2014). The Pew Research Future of Jobs and Job Training report (Rainie and Anderson, 2017), identified five major emerging themes as higher education prepares adult learners for the digital age of work:

- **Theme 1**: The technology-training ecosystem will evolve, with a mix of innovation in all education formats.
- **Theme 2**: Learners must develop 21st-century skills, capabilities, and attributes.
- **Theme 3**: New credentialing systems will emerge as self-directed learning increases.
- **Theme 4**: Current technology training and learning systems will not meet 21st-century needs by 2026.
- **Theme 5**: Jobs? What jobs? Technological forces will thoroughly change work and the economic landscape.

The study further stated that participants 50 and older were less likely to recognize technology as a valuable tool for learning. Those in their 30s and 40s were confident using technology but not familiar with the online class structure (Horrigan, 2016). Pew Research (2016) also noted that only 17% of adult learners were confident in their digital skills; for those who were prepared, 40% stated that the majority of their learning occurred online. Analyzing adult learners’ level of confidence with technology tools will guide the development of online learning, especially since technology has become a fundamental aspect of 21st-Century life.

As the Pew Research Center's report *Lifelong Learning and Technology* (2016) noted, demographics and socio-economic variables play a factor in people’s willingness to be actively involved in personal or professional learning technology. Hilbert (2011) reported that women are more enthusiastic about Information and Communication Technology (ICT) than men, when
controlling for income, education levels, and employment. People with higher incomes and educational accomplishments are more inclined to use technology in learning, while minorities and those with fewer technological assets are less likely to do so (Horrigan, 2016).

According to a study conducted by the Pew Research Center in 2016, African Americans and Hispanics remain less likely than Whites to own traditional computers or have high-speed internet at home (Perrin & Turner, 2019). Roughly eight in ten whites (82%) reported owning a desktop or laptop computer, compared with 58% of African Americans and 57% of Hispanics. However, African American and Hispanics own mobile devices such as smartphones at similar levels as Whites. Mobile devices play a significant role in African American and Hispanic communities when it comes to their online access. Perrin and Turner also noted that there are considerable racial or ethnic differences in broadband adoption, with Whites more likely than African Americans or Hispanics to have a broadband connection at home. A report by Free Press noted that 28% of African Americans and Hispanics households with internet access are mobile-only, compared with only 18% of White families (Zara, 2016): this gap persists even when controlling for income. Only a quarter of low-income white families with internet access are mobile-only, but that number rises to 36% among low-income Hispanic households and 37% among low-income African Americans households. Free Press called these connectivity differences "troubling," because mobile-only households typically do not have access to the broad range of benefits available to consumers with home internet service (Turner, 2016). The report found that several personal and household characteristics are associated with home-internet adoption, including race and ethnicity, family income, and educational attainment.

The Pew Research Center and the Free Press studies both noted that people of color and lower-income people are far less likely to have internet access at home. According to a 10-year
study in Slovakia by Urbančíková et al. (2017), this disparity in digital prosperity is about socio-economic, demographic, and regional factors of digital literacy. The research determined that socio-demographics factors such as age, income, education, and household type have the most impact on a variety of digital skills (computer usage, the Internet, and digital communication) and their effectiveness over time. Two other categories, hardware and software, represent skills that are less necessary for general digital literacy. These finding have clear implications for higher education, employee training, and working with disadvantaged social groups.

In summary, the number of minorities, low-income, and adult learners enrolling in higher education continues to rise. As the online learning format, with online classes, digital books, and Web 2.0 technologies, continues to increase in popularity, higher education’s online learning materials need to reflect a pedagogical environment centered around communication, technology, and adult learners' unique learning needs.

Chapter Summary

This literature review illustrates that higher education institutions can significantly benefit from integrating Web 2.0 technologies into their online learning curriculum to improve digital literacy. Digital literacy skills are necessary for adult learners to fully participate in our digital society (Digital Promise, 2017). In a digital society, access to information and, therefore, to knowledge seems to be more readily available. Strong digital literacy skills allow us to work more efficiently in finding, using, summarizing, evaluating, creating, and communicating this information.

For many years, concerns about "digital divides" centered on whether people had access to digital technologies, but many of these fears now focus on the degree to which people succeed when they try to use them, to navigate their environments, solve problems, and
make decisions (Horrigan, 2016). This relates to more than just using the computer; it involves understanding how digital technologies work and how they can be used to interact with society (Loureiro et al., 2012).

The technologies discussed above provide only a glimpse into the online resources available today and their applications for higher education. As the amount and types of technologies have changed, so have the behaviors and beliefs of those who use them, creating a generation of students who bring different skills and preferences into the classroom (Kennedy et al., 2010).

The research discussed in this literature review provides direct support for the rationale and design of this study. This research can fill the gaps in the existing research, which lacks a quantitative examination of the impact of Web 2.0 technologies on adult learners' engagement and satisfaction with online learning. While past research supports the importance of technological tools (Urbančíková et al., 2017), more work is needed to determine whether the usage of specific or combined Web 2.0 technologies leads to greater increases in connectivity, engagement, motivation, interaction, satisfaction (Sharp, 2017), and digital literacy.

To close the digital divide, digital literacy must be considered alongside important social-demographic factors such as age, income, gender, and ethnicity (Urbančíková et al., 2017). The transformative impact that digital technology has had on education and new federal policies to improve digital literacy indicates a need for more research (Turner, 2017).

Chapter III introduces the research methodology applied to this quantitative study.
CHAPTER III
RESEARCH METHOD

Introduction

The purpose of this chapter is to discuss the survey research methodology and approach used for this study, describing the research design and methodology, study participants, survey instruments, data collection procedures, and data analysis. The researcher used a self-report survey to examine adult learners’ use of Web 2.0 technologies and gauge their satisfaction, engagement, comfort level, and confidence based on their race, gender, age, and income. The study also examined the relationship between adult learners’ digital literacy and their satisfaction, engagement, comfort, and confidence.

Research Design and General Method

This study employed a survey research methodology that used descriptive and inferential statistics, one-sample t tests, analyses of variance (ANOVAs), and Pearson correlations. A survey research method is used to report the respondent's attitudes, opinions, feelings, and behaviors (Creswell, 2017). The researcher used a web-based survey questionnaire that included a Likert scale and a dichotomous scale (yes versus no) to address the research questions. Web-based surveys provide many advantages to researchers, including low cost, a quick return rate, and sufficient time for the respondents to provide thoughtful responses (Fowler, 2014).

The results of this study revealed how adult learners perceive the use of Web 2.0 technologies and recorded their satisfaction, engagement, comfort, confidence level in online
learning, and their overall digital literacy. It also evaluated whether there were differences in participants’ digital literacy based on their gender, age, income, or race. The Web 2.0 and Digital Technologies in Higher Education survey can be found in Appendix B.

The statistical analysis began with a frequency test which showed the number and percentages of each level's responses regarding the perception of adult learners' satisfaction, engagement, comfort, and confidence level using Web 2.0 technologies in online learning. One-sample t tests were used to assess adult learners’ overall feelings of satisfaction, engagement, comfort, and confidence. The hypothesis tested that the overall mean response was different from “2,” where “2” represented “disagree” for satisfaction and engagement item, “difficult” for comfort items, “not so confident” for confidence items, and “not too well” for digital skills items. ANOVAs were used to test for any significant mean differences in satisfaction, engagement, comfort level, and confidence level among participants of different genders, ages, incomes, and races. Additionally, Pearson correlations were conducted to measure the associations among digital literacy, satisfaction, engagement, comfort, and confidence.

The rationale for this study was that the manifestation of new technologies has engendered a digital divide of adult literacy skills (Antonio & Tuffley, 2015; Jesnek, 2012; Pendell et al., 2013; Radovanović, Hogan, & Lalić, 2015). A recent Pew Research Center report showed that the rates at which adult learners adopted technology to enhance their education varied depending on their socioeconomic status, race and ethnicity, and their access to home broadband and smartphones (Horrigan, 2016).

**Research Questions and Hypotheses**

The study focused on the following research questions and corresponding hypotheses:
1. Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, income, and race?

H01: There are no statistically significant differences in their satisfaction with using Web 2.0 technologies based on gender, age, income, and race.

H11: There are statistically significant differences in their satisfaction with using Web 2.0 technologies based on gender, age, income, and race.

2. Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race?

H02: There are no statistically significant differences among adult learners in their engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race.

H12: There are statistically significant differences among adult learners in their engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race.

3. Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race?

H03: There are no statistically significant differences among adult learners in their level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race.

H13: There are statistically significant differences among adult learners in their level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race.
4. Do differences exist among adult learners’ level of confidence with using Web 2.0 technologies based on gender, age, income, and race?

H04: There are no statistically significant differences among adult learners in their level of confidence with using Web 2.0 technologies based on gender, age, income, and race.

H14: There are statistically significant differences among adult learners in their level of confidence with using Web 2.0 technologies based on gender, age, income, and race.

5. What is the relationship between digital literacy, satisfaction, engagement, comfort, and confidence?

H05: There are no statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.

H15: There are statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.

Research Site

The site for this study was a non-profit private 4-year university, one of eight liberal arts colleges located in the Southeast region of the United States. The institution participating in the study was chosen because of convenience and access to the participants.

Participants

The population of interest for this study was all adult learners in an undergraduate degree completion or graduate degree program enrolled in online courses during the Spring 2020 term. The American Council on Education (ACE) defines adult learners as students over the age of 25; these are also referred to as non-traditional students (ACE, 2013). The researcher sent an email
invitation to complete the study to the entire population of 2,100 adult learners, and 134 participants responded to and completed the survey.

**Instruments**

The researcher used two modified survey instruments employed in studies conducted by Hartshorne and Ajjan (2009) and the Pew Research Center (2016) as a guiding framework. The survey that Hartshorne and Ajjan (2009) originally conducted was used to examine students’ satisfaction, engagement, and comfort with Web 2.0 technologies. The study was open to all students at a large university in the southeastern United States. Dr. Richard Hartshorne granted the researcher permission to use and modify the survey via email on October 31, 2017. Hartshorne and Ajjan (2009) used construct validity to design their survey based on literature reviews of the Decomposed Theory of Planned Behavior and other previous studies. Researchers can achieve construct validity by developing a test instrument modeled after previously used test instruments in the content area, or an in-depth literature review (Cohen, Manion, & Morrison, 2013). Hartshorne and Ajjan (2009) used Cronbach's alpha to determine internal reliability. Their instrument had values ranging from .80 to .97 for satisfaction and engagement.

The Pew Research Center originally developed the second survey, which was titled the Digital Divide Gap. It was administered by Princeton Data Source and developed under the direction of Princeton Survey Research Associates International (Horrigan, 2016).

This survey evaluated adult learners’ confidence with using Web 2.0 and digital technology in their personal life, career, and academic pursuits. Dr. John Horrigan granted the researcher permission to use and modify the survey via email on October 29, 2018. The second survey instrument explored adult learners’ attitudes and behavior towards, preparedness for, and comfort with using digital tools for learning. The results of this report are based on a Pew
Research Center survey which examined the responses of 2,752 adults residing in the District of Columbia in the United States; the Pew Research Center developed and conducted this study between October 13 and November 15, 2015 (Horrigan, 2016). The margins of error were reported, and statistical tests of significance were adjusted to measure the survey's design effect and analyze how much efficiency was missed from the weighting procedures (Horrigan, 2016). In addition to sampling error, Horrigan (2016) suggested that question wording and practical difficulties in conducting surveys can introduce error or bias into opinion polls' findings. Pew Research Center has administered several survey studies to assess respondent cooperation's effects on the validity of the results. These experiments compared responses from a standard survey, conducted with commonly utilized polling procedures over a 5-day field period, with a study conducted over a much more extended period that employed more rigorous techniques aimed at obtaining a higher response rate and interviewing more challenging-to-reach respondents (Pew Research Center, n.d.).

Before administering the survey (see Appendix B), the following modifications were made to the surveys. The survey was designed in five sections that included questions about the following:

1. Section I. Demographic data,
2. Section II. Satisfaction when using Web 2.0 technologies
3. Section III. Engagement when using Web 2.0 technologies.
4. Section IV. Comfort-level when using Web 2.0 technologies
5. Section V. Confidence-level when using Web 2.0 technologies, and
6. Section VI. Digital technology skills.
Section I of the survey included four categorical demographic items that asked for gender, age, race, and income. All survey questions were designed to maintain the confidentiality and privacy of the participants. The researcher obtained these demographic questions from the Hatshorne and Ajjan (2009) survey questionnaire.

Section II of the survey consisted of four questions about participants' perception of their satisfaction using a four-point Likert-type scale; this included response options (strongly disagree to agree strongly) designed to examine factors that influenced student’s intentions to use Web 2.0 technologies in their courses.

Section III of the survey consisted of three questions about engagement with Web 2.0 technologies in online courses using a four-point Likert-type scale; this scale included response options (strongly disagree to agree strongly) designed to examine factors that influenced student’s engagement with these tools in their courses. The survey did not include neutral or not applicable as optional responses. Providing respondents with neutral or no opinion options allowed them to avoid answering the question in a meaningful way (Fowler, 2014). The survey items focused on areas of actual usage, behavioral intention, attitude, ease of use, perceived usefulness, perceived behavioral control, engagement, superior influence, compatibility, facilitating conditions, and self-efficacy (Ajjan & Hartshorne, 2009).

Section IV included six questions about participation and comfort when using Web 2.0 technologies in online courses; it used a 4-point Likert-type scale and included response options (very difficult to very easy) designed to determine participants’ comfort with Web 2.0 technologies. Section V consisted of five questions about participants’ confidence when using Web 2.0. The instrument included a yes and no question to determine whether participants had access to a cell phone and if it is a smartphone. The instrument also included a 4-point Likert-
type scale, which consisted of response options (very confident to not at all confident) related to participants' confidence when using Web 2.0 and digital technology skills.

Section VI of the survey consisted of three questions about participants’ digital technology skills. The instrument included a 4-point Likert-type scale, which consisted of response options (very well to not too well) designed to gauge participants' confidence when using Web 2.0 and digital technology skills.

**Pilot Study**

The researcher conducted a pilot study with 10 adult learners in degree-completion and graduate programs enrolled in online courses in fall 2019 to determine the survey items' validity. The survey was digitally created through SurveyMonkey, and the link was emailed to the participants. Pilot studies are usually conducted on small samples, such as 10 to 100 (Patten & Newhart, 2017). A researcher might try out a new instrument or revised questionnaire to determine if there are ambiguous questions, questions that participants refuse to answer, and so on (Patten & Newhart, 2017). The researcher modified the survey in this study by removing certain items to improve reliability. Based on the results, instruments can be modified for more definitive future studies with larger samples (Patten & Newhart, 2017). The researcher used the combined survey to conduct the pilot study (see Appendix B).

Researchers can validate an instrument’s content by determining whether the survey covers all relevant material; for this study, the researcher used content validity. The survey questions were given to a panel of expert analysts in the fields of digital literacy and instructional design technology research; these experts then determined whether the survey items were useful.
or relevant to the study. Their responses were statistically analyzed, and the survey was modified to improve rational validity.

The researcher conducted a Cronbach test for alpha reliability on each of the scales. According to Ritter (2010), Cronbach's alpha was developed based on the necessity to evaluate items scored in multiple answer categories. To determine internal reliability, the researcher must correlate an individual item's score with the total score (Salkind, 2011). Cronbach's alpha, a measure of internal consistency, is often used in testing internal reliability (Garson, 2013; Gay et al., 2012; Salkind, 2011). Reliability analysis was carried out on the observed survey scale comprised of four items for adult learner's satisfaction, three items for engagement, six items for comfort level, and three items for confidence level. Cronbach's alpha showed the questionnaire reached acceptable reliability for satisfaction, $\alpha = 0.81$; engagement $\alpha = 0.92$; comfort $\alpha = 0.88$; and confidence $\alpha = 0.84$.

**Data Collection**

An application to conduct this study was sent to the Office of Institutional Research and to the Institutional Research Board at the private university participating in the study. Once the application was approved, a request to conduct research was sent to Mississippi State University's Institutional Research Board (see Appendix C).

The researcher used SurveyMonkey to create the Web 2.0 and Digital Technologies in Higher Education survey (see Appendix B), and to invite participants to complete the survey using SurveyMonkey (Appendix A). Web-based surveys provide many advantages to the researcher; these surveys are low cost, they have a quick rate of return, and they allow participants enough time to provide thoughtful answers (Fowler, 2014). Also, participants are guaranteed anonymity. The researcher turned on the Anonymous Response option on the survey
settings to exclude email, first name, last name, and IP address. The participating university’s Information Technology Service Department provided email addresses for the participants.

To ensure a high response rate, an official senior administrator sent the email invitation to participants and added the users' email accounts to the survey tool. All communication and email correspondence were conducted through university accounts. The survey settings sent participants an invitation to complete the 25-question Likert-scale survey, along with an estimated time frame for completion. A follow-up email was sent to the participants who had not responded or completed the questions after five days. A final reminder email was sent to the participants ten days after the initial invitation, with high importance. The researcher collected data in the Fall 2019 semester from a small pilot group of students and again in Spring 2020 from the students enrolled in that semester for the actual study. This study's target population was all adult learners enrolled in an online course in one of the undergraduate degree-completion or graduate degree programs.

Data Analysis

After data was collected, it was transferred from SurveyMonkey and downloaded directly into the Statistical Package for Social Sciences (SPSS) Statistics 27 for analysis. The data was sorted based on each participant's demographic information and their responses to the survey in SPSS.

The dependent variables of satisfaction, engagement, comfort level, confidence, and digital skills were created by taking the mean responses of the corresponding items. The reliability of these scales was tested by measuring Cronbach's alpha. A general accepted rule is that $\alpha$ of 0.6-0.7 indicates an acceptable level of reliability, and that 0.8 or greater indicates a very good level (Serbetat & Sedlar, 2016). After removing certain items, the reliability of each
scale improved. After removing one item from satisfaction and one item from digital skills, satisfaction and digital skills demonstrated acceptable reliability (.810 and .633 respectively), and engagement (.926), comfort (.879), and confidence (.837) scales showed a very good level of reliability. Table 1 depicts this information.

Table 1

*Cronbach’s Alpha Reliability Scales*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Original number of items</th>
<th>Final number of items</th>
<th>Cronbach’s Alpha Original - Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>5</td>
<td>4</td>
<td>.589 - .810</td>
</tr>
<tr>
<td>Engagement</td>
<td>3</td>
<td>3</td>
<td>.926</td>
</tr>
<tr>
<td>Comfort</td>
<td>6</td>
<td>6</td>
<td>.879</td>
</tr>
<tr>
<td>Confidence</td>
<td>3</td>
<td>3</td>
<td>.837</td>
</tr>
<tr>
<td>Digital Skills</td>
<td>4</td>
<td>3</td>
<td>.345 - .633</td>
</tr>
</tbody>
</table>

The data were cleaned by checking for missing data (Field, 2013). If a value was missing, the entire case was removed from the analysis (listwise deletion). In listwise deletion, a case is dropped from an analysis because it has a missing value in at least one of the specified variables. The analysis is only run on cases which have a complete set of data (Field, 2013). Descriptive statistics of the data for the predictor and dependent variables were reported. Summaries of frequency and percentages were obtained for categorical variables, while the measure of central tendencies of means and standard deviations and minimum and maximum values was conducted for continuous study variables.

One-sample *t* tests were used to compare adult learners’ overall feelings of satisfaction, engagement, comfort, and confidence to a hypothesized mean representing a negative perception. The hypothesis tested that the overall mean response was different from “2,” where “2” represented “disagree” for satisfaction and engagement items, “difficult” for comfort items, “not
so confident” for confidence items, and “not too well” for digital skills items. Factorial ANOVAs were used to test for any significant mean differences in satisfaction (RQ1), engagement (RQ2), comfort (RQ3), and confidence (RQ4) among participants with differences in gender, age, income, or race. A factorial ANOVA is an ANOVA test with more than one independent variable, or “factor.” The overall effects of the factors’ gender, age, income, and race were assessed by using ANOVA. Additionally, Pearson correlations were conducted in order to measure the associations between digital literacy, satisfaction, engagement, comfort, and confidence (RQ5). Prior to conducting the statistical tests, assumptions were tested, including, for ANOVA, absence of outliers, normality, and equality of variance; for Pearson correlations, the assumptions included absence of outliers, normality, and linearity. Outliers were assessed by examining standardized values and deeming any values outside -3/+3 standard deviations as outliers. Kurtosis and skewness statistics were generated to assess normality. Acceptable normality was established if the values of skewness and kurtosis index were below 3 and 10 respectively (Kline, 2011). Equality of variances was tested by conducting Levene’s tests of homogeneity. A non-significant result indicated no violation of the assumption. Finally, linearity was assessed by examining scatter plots.

**Chapter Summary**

This chapter aimed to outline the research methods utilized to answer the research questions. Additionally, the chapter provided a discussion of the research design, study participants, instruments, data collection procedures, and data analysis. This study contributes to existing literature about adult learners’ usage of Web 2.0 technologies and the resulting impact on their digital literacy. Chapter IV presents the findings and results that emerged from this investigation.
CHAPTER IV
RESEARCH RESULTS

This chapter presents the results that were computed to address the problem of the study and respond to the research questions examining adult learners' perceptions of using Web 2.0 technologies regarding their satisfaction, engagement, comfort, and confidence level, and the impact on their digital literacy. This study also looked at the differences between gender, race, income, and age for these four factors, and the correlation with digital literacy. The following research questions and hypotheses were developed to address the problem of the study:

1. Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, income, and race?

   H01: There are no statistically significant differences in their satisfaction with using Web 2.0 technologies based on gender, age, income, and race.

   H11: There are statistically significant differences in their satisfaction with using Web 2.0 technologies based on gender, age, income, and race.

2. Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race?

   H02: There are no statistically significant differences among adult learners in their engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race.
H12: There are statistically significant differences among adult learners in their engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race.

3. Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race?

H03: There are no statistically significant differences among adult learners in their level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race.

H13: There are statistically significant differences among adult learners in their level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race.

4. Do differences exist among adult learners’ level of confidence with using Web 2.0 technologies based on gender, age, income, and race?

H04: There are no statistically significant differences among adult learners in their level of confidence with using Web 2.0 technologies based on gender, age, income, and race.

H14: There are statistically significant differences among adult learners in their level of confidence with using Web 2.0 technologies based on gender, age, income, and race.

5. What is the relationship between digital literacy, satisfaction, engagement, comfort, and confidence?

H05: There are no statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.

H15: There are statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.
Demographic Data

The following tables provide the results of the analysis. Table 2 shows the frequency count for the selected demographic variables. Out of 134 participants, 18.7% of the adult learners were 24-35 years old, 26.1% were 36-44, 35.8% 45-54, and 19.4% were 55 and older. The participants' genders in this study were 72.4% female and 27.6% male. The most common ethnic group was White/Caucasian (56.7%), and the least common was Hispanic/Latino (3.0%). The majority of the participants' incomes were over $60,000 (39.6%), and the least amount was $20,000 (4.5%). All the adult learners enrolled in degree completion or graduate programs in Spring 2020 were asked to participate in this study. A total of 134 volunteered to participate, and the data from those respondents were used.

Table 2

Demographic Characteristics of Study Participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>97</td>
<td>72.4</td>
</tr>
<tr>
<td>Male</td>
<td>37</td>
<td>27.6</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-35</td>
<td>25</td>
<td>18.7</td>
</tr>
<tr>
<td>36-44</td>
<td>25</td>
<td>26.1</td>
</tr>
<tr>
<td>45-54</td>
<td>48</td>
<td>35.8</td>
</tr>
<tr>
<td>55+</td>
<td>26</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>76</td>
<td>56.7</td>
</tr>
<tr>
<td>Black</td>
<td>49</td>
<td>36.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4</td>
<td>3.0</td>
</tr>
<tr>
<td>Another race</td>
<td>5</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 19K</td>
<td>8</td>
<td>6.0</td>
</tr>
<tr>
<td>20K – 29K</td>
<td>6</td>
<td>4.5</td>
</tr>
<tr>
<td>30K – 39K</td>
<td>14</td>
<td>10.4</td>
</tr>
<tr>
<td>40K – 49K</td>
<td>26</td>
<td>19.4</td>
</tr>
<tr>
<td>50K – 59K</td>
<td>27</td>
<td>20.1</td>
</tr>
<tr>
<td>60K +</td>
<td>59</td>
<td>39.1</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>
Descriptive Statistics of Study Variables

Tables 3 through 7 provide descriptive statistics of items that comprise satisfaction, engagement, comfort, confidence, and digital skills. They were measured on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) for satisfaction and engagement items, 1 (very difficult) to 4 (very easy) for comfort, 1 (not at all confident) to 4 (very confident) for confidence levels, and 1 (not well at all) to 4 (very well) for digital skills.

Table 3

Satisfaction Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies is useful in my online learning courses</td>
<td>1.00</td>
<td>4.00</td>
<td>3.31</td>
<td>.56</td>
</tr>
<tr>
<td>I feel that using Web 2.0 was easy to incorporate in my learning</td>
<td>1.00</td>
<td>4.00</td>
<td>3.13</td>
<td>.58</td>
</tr>
<tr>
<td>I feel that using Web 2.0 improve my satisfaction with using</td>
<td>1.00</td>
<td>4.00</td>
<td>3.16</td>
<td>.60</td>
</tr>
<tr>
<td>technology in my online learning course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel that using Web 2.0 will improve my grades</td>
<td>1.00</td>
<td>4.00</td>
<td>2.77</td>
<td>.70</td>
</tr>
</tbody>
</table>

Table 4

Engagement Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my peers</td>
<td>1.00</td>
<td>4.00</td>
<td>3.18</td>
<td>.57</td>
</tr>
<tr>
<td>in online courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my</td>
<td>1.00</td>
<td>4.00</td>
<td>3.22</td>
<td>.61</td>
</tr>
<tr>
<td>professor in online courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web 2.0 technologies helped with engaging with the content in online</td>
<td>1.00</td>
<td>4.00</td>
<td>3.25</td>
<td>.54</td>
</tr>
<tr>
<td>courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comfort Items</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>How easy or difficult was it to use a Lecture or Presentation video capture (Panopto, Knovio, Youtube, etc.) in your online course?</td>
<td>2.00</td>
<td>4.00</td>
<td>3.09</td>
<td>.61</td>
</tr>
<tr>
<td>How easy or difficult was it to use a Social Networking (Facebook, Twitter, LinkedIn) in your online course?</td>
<td>1.00</td>
<td>4.00</td>
<td>3.40</td>
<td>.63</td>
</tr>
<tr>
<td>How easy or difficult was it to use Instant Messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</td>
<td>1.00</td>
<td>4.00</td>
<td>3.26</td>
<td>.65</td>
</tr>
<tr>
<td>How easy or difficult was it to use Picture sharing/Video sharing (Instagram, Snapchat) in your online course?</td>
<td>1.00</td>
<td>4.00</td>
<td>3.22</td>
<td>.70</td>
</tr>
<tr>
<td>How easy or difficult was it to use Cloud Computing (Google Drive, OneDrive, iCloud) in your online course?</td>
<td>1.00</td>
<td>4.00</td>
<td>3.25</td>
<td>.62</td>
</tr>
<tr>
<td>How easy or difficult was it to use Virtual Meeting (Zoom, Blackboard Collaborate, Skype, etc.)</td>
<td>2.00</td>
<td>4.00</td>
<td>3.25</td>
<td>.62</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Confidence Items</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Overall, how confident do you feel using computers, smartphones, or other electronic devices to complete the things you need to do online?</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies in online courses?</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies at work?</td>
</tr>
</tbody>
</table>
Table 7

Digital Skills Items

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I get a new electronic device, I usually need someone to</td>
<td>1.00</td>
<td>4.00</td>
<td>1.91</td>
<td>.99</td>
</tr>
<tr>
<td>set it up or show me how to use it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am more productive because of all my electronic information</td>
<td>1.00</td>
<td>4.00</td>
<td>3.25</td>
<td>.86</td>
</tr>
<tr>
<td>devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I find it difficult to know whether the information I use online</td>
<td>1.00</td>
<td>4.00</td>
<td>2.27</td>
<td>.95</td>
</tr>
<tr>
<td>is trustworthy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 show the frequencies of participants to a cell phone and smartphone usage, using a yes or no response.

Table 8

Cell Phone Usage

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a cell phone?</td>
<td>2 (1.5%)</td>
<td>132 (98.5%)</td>
</tr>
<tr>
<td>Is it a Smart Phone?</td>
<td>2 (1.5%)</td>
<td>132 (98.5%)</td>
</tr>
</tbody>
</table>

Table 9 shows the results of a one-sample t-test to determine if the mean response significantly differed from a “2” response – that is, differed from disagree, difficult, not so confident, or not too well. The results of the one-sample t-tests were that, for all satisfaction and engagement items, participants stated that they were more than satisfied or engaged (p < .001). Regarding the comfort items, participants responded that they were comfortable (p < .001). All responses in the confidence items were significantly different from “2,” indicating that participants were confident. Lastly, regarding digital ability, two of the three items were significantly different from 2, indicating that the participants possessed good digital ability.
Table 9

One-Sample Test Comparing Participants’ Perceptions to Hypothesized Negative Perceptions

<table>
<thead>
<tr>
<th>Perception</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies is useful in my online learning courses</td>
<td>26.75</td>
<td>.000</td>
</tr>
<tr>
<td>I feel that using Web 2.0 was easy to incorporate in my learning</td>
<td>22.46</td>
<td>.000</td>
</tr>
<tr>
<td>I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course</td>
<td>22.34</td>
<td>.000</td>
</tr>
<tr>
<td>I feel that using Web 2.0 will improve my grades</td>
<td>12.64</td>
<td>.000</td>
</tr>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my peers in online courses</td>
<td>23.81</td>
<td>.000</td>
</tr>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my professor in online courses</td>
<td>23.26</td>
<td>.000</td>
</tr>
<tr>
<td>Web 2.0 technologies helped with engaging with the content in online courses</td>
<td>26.67</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use a Lecture or Presentation video capture (Panopto, Knovio, Youtube, etc.) in your online course?</td>
<td>20.79</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use a Social Networking (Facebook, Twitter, LinkedIn) in your online course?</td>
<td>25.82</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use Instant Messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</td>
<td>22.52</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use Picture sharing/Video sharing (Instagram, Snapchat) in your online course?</td>
<td>20.22</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use Cloud Computing (Google Drive, OneDrive, iCloud) in your online course?</td>
<td>23.32</td>
<td>.000</td>
</tr>
<tr>
<td>How easy or difficult was it to use Virtual Meeting (Zoom, Blackboard Collaborate, Skype, etc.)</td>
<td>23.32</td>
<td>.000</td>
</tr>
<tr>
<td>Overall, how confident do you feel using computers, smartphones, or other electronic devices to complete the things you need to do online? Do you feel very confident, somewhat confident, only a little confident, or not at all confident?</td>
<td>34.53</td>
<td>.000</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies in online courses?</td>
<td>27.26</td>
<td>.000</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies at work?</td>
<td>23.58</td>
<td>.000</td>
</tr>
<tr>
<td>When I get a new electronic device, I usually need someone to set it up or show me how to use it</td>
<td>-1.04</td>
<td>.298</td>
</tr>
<tr>
<td>I am more productive because of all my electronic information devices</td>
<td>16.96</td>
<td>.000</td>
</tr>
<tr>
<td>I find it difficult to know whether the information I use online is trustworthy</td>
<td>3.27</td>
<td>.001</td>
</tr>
</tbody>
</table>
The remainder of this chapter will present the statistical analyses and results for each research question. The chapter will conclude with a summary of the findings.

**Research Question 1**

Analysis of variance was conducted in order to address this first research question and hypothesis:

1. Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, race, and income?

**H01:** There are no statistically significant differences in their satisfaction of using Web 2.0 technologies based on gender, age, race, and income.

**H11:** There are statistically significant differences in their satisfaction of using Web 2.0 technologies based on gender, age, race, and income.

The mean of each item that comprised satisfaction served to measure overall satisfaction in conducting the ANOVA. The factors gender, age, race, and income were entered into SPSS’s GLM univariate procedure. Skewness and kurtosis index were used to identify the normality of the data. The results suggested the deviation of data from normality was not severe as the value of skewness and kurtosis index were below 3 and 10 respectively (Kline, 2011). Additionally, there were no extreme outliers of concern. There was homogeneity of variance as indicated by a non-significant Levene’s test \( p = .656 \). Results of the ANOVA were non-significant for gender, \( F(1, 121) = .659, p = .418 \); age, \( F(3, 121) = .334, p = .801 \); ethnicity, \( F(3, 121) = .679, p = .567 \); and income, \( F(5, 121) = .445, p = .445 \). Table 10 depicts this information.
Table 10

Tests of Between Subjects Effects (RQ1)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2.293</td>
<td>12</td>
<td>.191</td>
<td>.718</td>
<td>.731</td>
</tr>
<tr>
<td>Intercept</td>
<td>244.244</td>
<td>1</td>
<td>244.244</td>
<td>918.072</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>.175</td>
<td>1</td>
<td>.175</td>
<td>.659</td>
<td>.418</td>
</tr>
<tr>
<td>Age</td>
<td>.266</td>
<td>3</td>
<td>.089</td>
<td>.334</td>
<td>.801</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.542</td>
<td>3</td>
<td>.181</td>
<td>.679</td>
<td>.567</td>
</tr>
<tr>
<td>Income</td>
<td>1.277</td>
<td>5</td>
<td>.255</td>
<td>.960</td>
<td>.445</td>
</tr>
<tr>
<td>Error</td>
<td>32.191</td>
<td>121</td>
<td>.266</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1305.333</td>
<td>134</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>34.484</td>
<td>133</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Question 2

Analysis of variance was conducted in order to address this second research question and hypothesis:

2. Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race?

$H_02$: There are no statistically significant differences among adult learners in their engagement of using Web 2.0 technologies in online courses based on gender, age, income, and race.

$H_{12}$: There are statistically significant differences among adult learners in their engagement of using Web 2.0 technologies in online courses based on gender, age, income, and race.

The mean of each item that comprised engagement served to measure overall engagement in conducting the ANOVA. The factors gender, age, race, and income were entered into SPSS’s GLM univariate procedure. Skewness and kurtosis index were used to identify the normality of
the data. The results suggested the deviation of data from normality was not severe as the value of skewness and kurtosis index were below 3 and 10 respectively (Kline, 2011), with no extreme outliers of concern. There was homogeneity of variance as indicated by a non-significant Levene’s test ($p = .172$). Results of the ANOVA were non-significant for gender, $F(1, 121) = .293, p = .589$; age, $F(3, 121) = .509, p = .677$; ethnicity, $F(3, 121) = .206, p = .892$; and income, $F(5, 121) = .982, p = .432$. Table 11 depicts this information.

Table 11

Tests of Between Subject Effects (RQ2)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2.194</td>
<td>12</td>
<td>.183</td>
<td>.613</td>
<td>.828</td>
</tr>
<tr>
<td>Intercept</td>
<td>264.333</td>
<td>1</td>
<td>264.333</td>
<td>886.340</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>.087</td>
<td>1</td>
<td>.087</td>
<td>.293</td>
<td>.589</td>
</tr>
<tr>
<td>Age</td>
<td>.455</td>
<td>3</td>
<td>.152</td>
<td>.509</td>
<td>.677</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.185</td>
<td>3</td>
<td>.062</td>
<td>.206</td>
<td>.892</td>
</tr>
<tr>
<td>Income</td>
<td>1.464</td>
<td>5</td>
<td>.293</td>
<td>.982</td>
<td>.432</td>
</tr>
<tr>
<td>Error</td>
<td>36.086</td>
<td>121</td>
<td>.298</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1424.556</td>
<td>134</td>
<td>.298</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>38.279</td>
<td>133</td>
<td>.298</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Research Question 3**

Analysis of variance was conducted in order to address this third research question and hypothesis:

3. *Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race?*

$H_{03}$: There are no *statistically significant differences among adult learners in their comfort level of using Web 2.0 technologies, and are their differences based on income, age, gender, and race.*
H13: There are statistically significant differences among adult learners in their comfort level of using Web 2.0 technologies, and are their differences based on income, age, gender, and race.

The mean of each item that comprised comfort level served to measure overall comfort level in conducting the ANOVA. The factors gender, age, race, and income were entered into SPSS’s GLM univariate procedure. Skewness and kurtosis index were used to identify the normality of the data. The results suggested the deviation of data from normality was not severe as the value of skewness and kurtosis index were below 3 and 10 respectively (Kline, 2011). Additionally, there were no extreme outliers of concern. There was homogeneity of variance as indicated by a non-significant Levene’s test ($p = .497$). Results of the ANOVA were non-significant for gender, $F(1, 121) = .927, p = .338$; age, $F(3, 121) = 1.481, p = .223$; ethnicity, $F(3, 121) = 1.377, p = .253$; and income, $F(5, 121) = 1.601, p = .165$. Table 12 depicts this information.

Table 12

Tests of Between Subjects Effects (RQ3)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>4.580</td>
<td>12</td>
<td>.382</td>
<td>1.589</td>
<td>.103</td>
</tr>
<tr>
<td>Intercept</td>
<td>257.039</td>
<td>1</td>
<td>257.039</td>
<td>1069.990</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>.223</td>
<td>1</td>
<td>.223</td>
<td>.927</td>
<td>.338</td>
</tr>
<tr>
<td>Age</td>
<td>1.068</td>
<td>3</td>
<td>.356</td>
<td>1.481</td>
<td>.223</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.992</td>
<td>3</td>
<td>.331</td>
<td>1.377</td>
<td>.253</td>
</tr>
<tr>
<td>Income</td>
<td>1.923</td>
<td>5</td>
<td>.385</td>
<td>1.601</td>
<td>.165</td>
</tr>
<tr>
<td>Error</td>
<td>29.067</td>
<td>121</td>
<td>.240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1443.611</td>
<td>134</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>33.648</td>
<td>133</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research Question 4

Analysis of variance was conducted in order to address this fourth research question and hypothesis:

4. Do differences exist among adult learners’ level of confidence level with using Web 2.0 technologies based on income, age, gender, and race?

H04: There are no statistically significant differences among adult learners in their confidence level of using Web 2.0 technologies based on income, age, gender, and race.

H14: There are statistically significant differences among adult learners in their confidence level of using Web 2.0 technologies based on income, age, gender, and race.

The mean of each item that comprised confidence served to measure overall confidence in conducting the ANOVA. The factors gender, age, race, and income were entered into SPSS’s GLM univariate procedure. Skewness and kurtosis index were used to identify the normality of the data. The results suggested the deviation of data from normality was not severe as the value of skewness and kurtosis index were below 3 and 10 respectively (Kline, 2011). Additionally, there were no extreme outliers that were of concern. There was homogeneity of variance as indicated by a non-significant Levene’s test ($p = .564$). Results of the ANOVA were non-significant for gender, $F(1, 121) = 2.535, p = .114$; age, $F(3, 121) = .009, p = .999$; ethnicity, $F(3, 121) = 2.305, p = .080$; and income, $F(5, 121) = 1.002, p = .420$. Table 13 depicts this information.
Table 13

Tests of Between Subjects Effects (RQ4)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>9.120</td>
<td>12</td>
<td>.760</td>
<td>1.111</td>
<td>.358</td>
</tr>
<tr>
<td>Intercept</td>
<td>105.111</td>
<td>1</td>
<td>105.111</td>
<td>153.594</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>1.735</td>
<td>1</td>
<td>1.735</td>
<td>2.535</td>
<td>.114</td>
</tr>
<tr>
<td>Age</td>
<td>.019</td>
<td>3</td>
<td>.006</td>
<td>.009</td>
<td>.999</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>4.731</td>
<td>3</td>
<td>1.577</td>
<td>2.305</td>
<td>.080</td>
</tr>
<tr>
<td>Income</td>
<td>3.427</td>
<td>5</td>
<td>.685</td>
<td>1.002</td>
<td>.420</td>
</tr>
<tr>
<td>Error</td>
<td>82.805</td>
<td>121</td>
<td>.684</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>677.000</td>
<td>134</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>91.925</td>
<td>133</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Question 5

Pearson correlations were calculated in order to answer this fifth research question and hypothesis:

5. What is the relationship between digital literacy, satisfaction, engagement, comfort, and confidence?

**H05:** There are no statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.

**H15:** There are statistically significant relationships between digital literacy, satisfaction, engagement, comfort, and confidence.

There were no outliers, and data were approximately normally distributed as assessed by standardized residual and skewness and kurtosis values. There were significant positive correlations between confidence and engagement ($r = .229, p = .008$), satisfaction and engagement ($r = .787, p < .001$), and satisfaction and comfort ($r = .309, p < .001$). Increases in confidence were associated with increases in engagement. In addition, increases in satisfaction
were associated with increases in engagement. Lastly, increases in satisfaction were associated with increases in comfort. This is depicted in Table 14.

Table 14

**Pearson Correlations (RQ5)**

<table>
<thead>
<tr>
<th></th>
<th>Confidence</th>
<th>Satisfaction</th>
<th>Engagement</th>
<th>Comfort</th>
<th>Digital Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td>$r$</td>
<td>$r$</td>
<td>$r$</td>
<td>$r$</td>
<td>$r$</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>.136</td>
<td>.229</td>
<td>.138</td>
<td>-.117</td>
</tr>
<tr>
<td></td>
<td>$N$</td>
<td>$N$</td>
<td>$N$</td>
<td>$N$</td>
<td>$N$</td>
</tr>
<tr>
<td></td>
<td>134</td>
<td>134</td>
<td>134</td>
<td>134</td>
<td>134</td>
</tr>
</tbody>
</table>

The results of research questions 1 through 4 found no significant differences in confidence, satisfaction, engagement, and comfort among different levels of gender, age, income, and different races. However, the analysis was conducted again at the individual item level, which is presented in the next section.

**Item Level Analysis**

**Research Question 1**

*Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, income, and race?*

Respondents were asked to reflect on their satisfaction in using Web 2.0 technologies in online learning. Participants responded using a 4-point Likert scale. In this series of questions,
respondents could choose from the following option: (1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree. The Likert-scale responses were converted in SPSS to numerical values from “1” to “4” with “1” representing Strongly Disagree and “4” representing Strongly Agree.

A separate t-test was conducted to examine the differences between the independent variable gender within adult learners' perceptions of Web 2.0 technologies and satisfaction in online learning. The independent variables consisted of females and males. A one-way ANOVA was used to examine the interaction with the three independent variables, age, race, and income. The first independent variable consisted of four categories: 24 to 35, 36 to 44, 45 to 54, and 55 and older. The second independent variable consisted of four categories: Caucasian/White, African American/Black, Hispanic/Latin, and other races. The third independent variable consisted of six categories: Less than $19,999, $20,000-$29,000, $30,000-$39,000, $40,000-$49,000, $50,000-$59,000, and $60,000 and over.

Overall, Table 15 shows the frequencies of responses to the questions related to satisfaction. Overall, respondents had a positive perception of using Web 2.0 technologies in online learning. A total of 96.3% of the participants agreed or strongly agreed that these tools were useful in their online learning courses. A total of 93.2% agreed or strongly agreed they felt using Web 2.0 was easy to incorporate in learning, 93.3% agreed or strongly agreed that Web 2.0 technologies improve their satisfaction with using technology in online learning, and 68.6% felt Web 2.0 technologies would improve their grades.
Table 15

*Overall Participants’ Perceptions of Satisfaction With Using Web 2.0 Technologies in Online Courses*

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies are useful in my online learning courses</td>
<td>0.7%</td>
<td>3.0%</td>
<td>61%</td>
<td>35.1%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 was easy to incorporate in my learning</td>
<td>2.2%</td>
<td>4.5%</td>
<td>71.6%</td>
<td>21.6%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course</td>
<td>2.2%</td>
<td>4.5%</td>
<td>67.9%</td>
<td>25.4%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 will improve my grades</td>
<td>3.7%</td>
<td>27.6%</td>
<td>56.7%</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

**Gender**

The t-test revealed no significant differences in satisfaction based on gender. There was not a significant difference in females’ \((M=3.33, \text{SD}=0.51)\) and males’ \((M=3.24, \text{SD}=0.68)\) perception that Web 2.0 technologies were useful in their learning; \(t(132) = .80, p = 0.43\). There was no significant difference in females’ \((M=3.19, \text{SD}=0.44)\) and males’ \((M=2.97, \text{SD}=0.83)\) perception that these applications were easy to incorporate in their learning; \(t(132) = 1.91 p = 0.06\), nor in females’ \((M=3.21, \text{SD}=0.47)\) and males’ \((M=3.04, \text{SD}=0.84)\) perception that Web 2.0 technologies improve their satisfaction with using technology in their online courses; \(t(132) = 1.31, p = 0.19\). Finally, the results showed no significant difference in females’ \((M=2.75, \text{SD}=0.68)\) and males’ \((M=2.8, \text{SD}=0.78)\) perception that using these technologies would improve their grades; \(t(132) = -0.43, p = 0.67\).
Table 16 shows participants’ responses to a set of questions designed to examine the differences of adult learners’ satisfaction with using web 2.0 technologies based on gender. The survey used a 4-point Likert-type scale to assess participants’ satisfaction: strongly disagree (SD), disagree (D), agree (A), strongly agree (SA). The respondent group was comprised of 97 females and 37 males. Based on gender, 98% of females and 91.9% of males agreed or strongly agreed that Web 2.0 technologies were useful in online learning. A total of 92.8% of the females and 94.6% of males agreed or strongly agreed that these tools were easy to incorporate in their online learning courses. A total of 96.9% of females and 83.8% males agreed or strongly agreed that Web 2.0 technologies improve their satisfaction with using technology in online learning, and 68% and 70% agreed or strongly agreed that they would improve their grades.

Table 16

Participants’ Differences in Satisfaction With Using Web 2.0 Technologies in Online Courses, Sorted by Gender

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Females (n=97)</th>
<th></th>
<th></th>
<th></th>
<th>Males (n=37)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>Web 2.0 technologies are useful in my online learning courses</td>
<td>0.0%</td>
<td>2.1%</td>
<td>62.9%</td>
<td>35.1%</td>
<td>2.7%</td>
<td>5.4%</td>
<td>56.8%</td>
<td>35.1%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 was easy to incorporate in my learning</td>
<td>3.2%</td>
<td>4.1%</td>
<td>70.1%</td>
<td>22.7%</td>
<td>0.0%</td>
<td>5.4%</td>
<td>75.7%</td>
<td>18.9%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course</td>
<td>0.0%</td>
<td>3.1%</td>
<td>73.2%</td>
<td>23.7%</td>
<td>8.1%</td>
<td>8.1%</td>
<td>54.1%</td>
<td>29.7%</td>
</tr>
<tr>
<td>I feel that using Web 2.0 will improve my grades</td>
<td>3.1%</td>
<td>28.9%</td>
<td>57.7%</td>
<td>10.3%</td>
<td>5.4%</td>
<td>24.3%</td>
<td>54.1%</td>
<td>16.2%</td>
</tr>
</tbody>
</table>
Overall, satisfaction with Web 2.0 in online learning was similar for female and male participants.

Age

A one-way ANOVA was conducted to determine if there were differences in the perception of using Web 2.0 technologies on adult learners' and satisfaction in online learning according to age, designated as groups consisting of 24 to 35, 36 to 44, 45 to 54, and 55 and older. There was not a significant difference on the perception of Web 2.0 technologies being useful in online learning at the $p>.05$ level for the four conditions [$F(3, 130) = .796, p = .498$]; or in the perception of the ease to incorporate these technologies in online courses at the $p>.05$ level for the four conditions [$F(3, 130) = .292, p = .831$]. The results found no significant difference in the perception of using Web 2.0 technologies on satisfaction in online courses at the $p>.05$ level for the four conditions [$F(3, 130) = .711, p = .547$], or in the perception that using Web 2.0 technologies would improve their grades, at the $p>.05$ level for the four conditions [$F(3, 130) = .111, p = .954$].

Table 17 describes participants differences in satisfaction of using Web 2.0 technologies in online learning based on age, using a four-point Likert-type scale: strongly disagree (SD), disagree (D), agree (A), and strongly agree (A). The results revealed that participants ages 24 to 35 (96%), 36 to 44 (97.1%), 45 to 54 (95.9%), and 55 and older (96.1%) agreed or strongly agreed that Web 2.0 technologies were useful in online learning. The majority, over 80%, of all ages 24 to 35 (100%), 36 to 44 (97.1%), 45 to 54 (91.7%), and 55 and older (84.6%) agreed or strongly agreed that the technologies were easy to incorporate in their online learning courses. Participants ages 24 to 35 (88%), 36 to 44 (97.1%), 45 to 54 (93.7%), and 55 and older (92.3%) reported that Web 2.0 technologies improved their satisfaction with online learning, while 80%
of participant ages 55 and older reported that these tools improved their grades. Among those remaining, 24 to 35 (60%), 36 to 44 (65.7%), 45 to 54 (68.8%) agreed or strongly agreed that Web 2.0 technologies improved their grades.

Table 17

*Participants’ Differences in Satisfaction With Using Web 2.0 Technologies in Online Courses, Sorted by Age*

<table>
<thead>
<tr>
<th>Ages</th>
<th>Web 2.0 technologies are useful in my online learning courses</th>
<th>I feel that using Web 2.0 was easy to incorporate in my learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-35</td>
<td>SD 4.0% D 0.0% A 56.0% SA 40.0%</td>
<td>SD 0.0% D 0.0% A 84% SA 16%</td>
</tr>
<tr>
<td></td>
<td>(n=25)</td>
<td></td>
</tr>
<tr>
<td>36-44</td>
<td>0.0% D 2.9% A 60.0% SA 37.1%</td>
<td>0.0% D 2.9% A 77.1% SA 20.0%</td>
</tr>
<tr>
<td></td>
<td>(n=35)</td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>0.0% D 4.2% A 56.3% SA 39.6%</td>
<td>2.1% D 6.3% A 68.8% SA 22.9%</td>
</tr>
<tr>
<td></td>
<td>(n=48)</td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>0.0% D 3.8% A 76.9% SA 19.2%</td>
<td>7.7% D 7.7% A 57.7% SA 26.9%</td>
</tr>
<tr>
<td></td>
<td>(n=26)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ages</th>
<th>I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course</th>
<th>I feel that using Web 2.0 will improve my grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-35</td>
<td>SD 4.0% D 8.0% A 56.0% SA 32.0%</td>
<td>SD 0.0% D 40.0% A 40.0% SA 20.0%</td>
</tr>
<tr>
<td></td>
<td>(n=25)</td>
<td></td>
</tr>
<tr>
<td>36-44</td>
<td>2.9% D 0.0% A 77.1% SA 20.0%</td>
<td>2.9% D 31.4% A 57.1% SA 8.6%</td>
</tr>
<tr>
<td></td>
<td>(n=35)</td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>2.1% D 4.2% A 60.4% SA 33.3%</td>
<td>6.3% D 25.0% A 54.2% SA 14.6%</td>
</tr>
<tr>
<td></td>
<td>(n=48)</td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>0.0% D 7.7% A 80.8% SA 11.5%</td>
<td>3.8% D 15.4% A 76.9% SA 3.8%</td>
</tr>
<tr>
<td></td>
<td>(n=26)</td>
<td></td>
</tr>
</tbody>
</table>
Income

Next, a one-way ANOVA was conducted to compare satisfaction based on income, and there were no significant differences. There was not a significant difference on the perception of using Web 2.0 technologies and communicating the consequences in online courses at the $p > .05$ level [$F(5, 128) = 1.50, p = .193$] or in the perception of the ease to incorporate Web 2.0 technologies in online courses at the $p > .05$ level for the six conditions [$F(5, 128) = 1.50, p = .192$]. The results found no significant difference in the perception of using these tools on satisfaction at the $p > .05$ level s [$F(5, 128) = 1.18, p = .324$], nor at the $p > .05$ level for the six conditions [$F(5, 128) = .609, p = .693$].

Table 18 shows participants’ differing satisfaction with using Web 2.0 technologies in online learning based on income using a four-point Likert-type scale: strongly disagree (SD), disagree (D), agree (A), and strongly agree (SA). Among participants with income less than $19,999 and $20,000-$29,000, 100% agreed or strongly agreed that these tools are useful in their online courses. Over 90% of participants that reported income $30,000-$39,000 (92.9%), $40,000-$49,000 (92.3%), $50,000-$59,000 (96.3%), and $60,000 and over (98.1%) found them useful. Participants with income less than $19,999 and $50,000-$59,000 reported that 100% agreed or strongly agreed that Web 2.0 technologies were easy to incorporate in online learning. The participants with income of $20,000-$29,000 (83.3%), $30,000-$39,000 (71.4%), $40,000-$49,000 (92.3%), and $60,000 and over (96.2%) agreed or strongly agreed that they were easy to incorporate, and those with an income less than $19,999 and $30,000-$39,000 agreed or strongly agreed at 100%. Similarly, 90% of participants with incomes of $20,000-$29,000 (91.1%), $40,000-$49,000 (95.9%), $50,000-$59,000 (96.2%), and (94.3%) $60,000 and over agreed or strongly agreed that Web 2.0 improved their satisfaction with technology in online
learning. Participants with an income of $30,000-$39,000 (85.7%) agreed or strongly agreed that Web 2.0 technologies improved their grades. Those earning less than $19,999 (75%), $20,000-$29,000 (66.6%), $40,000-$49,000 (69.2%), $50,000-$59,000 (66.7%), and $60,000 and over (64.1%) agreed or strongly agreed with this statement.

Table 18

Participants’ Differences in Satisfaction With Using Web 2.0 Technologies in Online Courses,

Sorted by Income

<table>
<thead>
<tr>
<th>Income</th>
<th>Web 2.0 technologies are useful in my online learning courses</th>
<th>I feel that using Web 2.0 was easy to incorporate in my learning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td>D</td>
</tr>
<tr>
<td>&gt;19,000</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>(n=8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29,000</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>(n=6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39,000</td>
<td>0.0%</td>
<td>7.1%</td>
</tr>
<tr>
<td>(n=14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49,000</td>
<td>3.8%</td>
<td>3.8%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59,000</td>
<td>0.0%</td>
<td>3.7%</td>
</tr>
<tr>
<td>(n=27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60,000</td>
<td>0.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>&lt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n=53)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 18 (continued)

<table>
<thead>
<tr>
<th>Income</th>
<th>I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course</th>
<th>I feel that using Web 2.0 will improve my grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD  D  A  SA</td>
<td>SD  D  A  SA</td>
</tr>
<tr>
<td>&gt;19,000</td>
<td>0.0% 0.0% 50.0% 50.0%</td>
<td>0.0% 25.0% 50% 25%</td>
</tr>
<tr>
<td>(n=8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29,000</td>
<td>0.0% 2.9% 60.0% 37.1%</td>
<td>0.0% 33.3% 33.3% 33.3%</td>
</tr>
<tr>
<td>(n=6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39,000</td>
<td>0.0% 0.0% 78.6% 21.4%</td>
<td>0.0% 14.3% 78.6% 7.1%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49,000</td>
<td>0.0% 4.2% 56.3% 39.6%</td>
<td>0.0% 30.8% 61.5% 7.7%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59,000</td>
<td>0.0% 3.8% 76.9% 19.2%</td>
<td>7.4% 25.9% 59.3% 7.4%</td>
</tr>
<tr>
<td>(n=27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60,000 &lt;</td>
<td>1.9% 3.8% 66.0% 28.3%</td>
<td>5.7% 30.2% 50.9% 13.2%</td>
</tr>
<tr>
<td>(n=53)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Race**

Finally, a one-way ANOVA was conducted to compare the perception of using Web 2.0 technologies regarding adult learners' satisfaction in online learning on the condition of race, across four categories: Caucasian/White, African American/Black, Hispanic/Latin, and other races. There was not a significant difference on the perception of using Web 2.0 technologies to incorporate Web 2.0 technologies in online courses at the $p > .05$ level for the four conditions [$F(3, 130) = 0.91, p = .965$]. Additionally, the results showed no significant difference in the perception of using Web 2.0 technologies on satisfaction in online courses at the $p > .05$ level for the four conditions [$F(3, 130) = 1.07, p = .363$], or at the $p > .05$ level for the four conditions [$F(3, 130) = .361, p = .781$].
Table 19 describes participants differences’ in satisfaction on using Web 2.0 technologies in online learning based on race, using a four-point Likert-type scale: strongly disagree (SD), disagree (D), agree (A), and strongly agree (SA). A total of 94.7% of the White and 98% of the Black participants agreed or strongly agreed that using Web 2.0 technologies was useful in their online learning courses and easy to incorporate. The (93.4%) White and (95.9%) Black participants agreed or strongly agreed that using Web 2.0 Technologies was easy to incorporate in their learning. The Hispanic and Other race participants reported 100% agreed or strongly agreed with this statement. The majority of (89.5%) White and (98%) Black agreed or strongly agreed that using Web 2.0 improved their satisfaction with using technology in their online learning course. The Hispanic and Other race participants agreed or strongly agreed that the tools improved their satisfaction at 100%. A majority of the (64.4%) White and (73.5%) Black participants agreed or strongly agreed that Web 2.0 technologies improved their grades. The Hispanic participants reported that 100% agreed or strongly agreed with this statement. However, only 60% of the Other race agreed or strongly agreed in this case.
Participants’ Differences in Satisfaction With Using Web 2.0 Technologies in Online Courses, Sorted by Race

<table>
<thead>
<tr>
<th>Race</th>
<th>Web 2.0 technologies are useful in my online learning courses</th>
<th>I feel that using Web 2.0 was easy to incorporate in my learning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td>D</td>
</tr>
<tr>
<td>White (n=76)</td>
<td>1.3%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Black (n=49)</td>
<td>0.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Hispanic (n=4)</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other (n=5)</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

I feel that using Web 2.0 improve my satisfaction with using technology in my online learning course

<table>
<thead>
<tr>
<th>Race</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n=76)</td>
<td>2.6%</td>
<td>7.9%</td>
<td>65.8%</td>
<td>23.7%</td>
<td>2.6%</td>
<td>32.9%</td>
<td>52.6%</td>
<td>11.8%</td>
</tr>
<tr>
<td>Black (n=49)</td>
<td>2.0%</td>
<td>0.0%</td>
<td>69.4%</td>
<td>28.6%</td>
<td>6.1%</td>
<td>20.4%</td>
<td>59.2%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Hispanic (n=4)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>50.0%</td>
<td>50.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other (n=5)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>40.0%</td>
<td>60.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Research Question 2

Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race?

Respondents were asked to think about their engagement in using Web 2.0 technologies in online learning. Participants responded using a 4-point Likert scale. In this series of questions,
respondents could choose from the following options: strongly disagree (SD), disagree (D), agree (A), and strongly agree (SA).

Overall, Table 20 shows the results of the respondents' overall perceptions of using Web 2.0 technologies and engagement in an online course. Respondents overall had a positive perception of engagement: 92.5% of the participants agreed or strongly agreed that these applications were useful for engaging with their peers in online learning courses, 91.8% agreed or strongly agreed that they helped to engage with their professor, and 96.3% agreed or strongly agreed that using Web 2.0 helped them engage with online course content.

Table 20

**Overall Participants’ Perception on Engagement With Using Web 2.0 Technologies in Online Courses**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my peers in online courses</td>
<td>0.7%</td>
<td>6.7%</td>
<td>66.4%</td>
<td>26.1%</td>
</tr>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my professor in online courses</td>
<td>0.7%</td>
<td>7.5%</td>
<td>61.2%</td>
<td>30.6%</td>
</tr>
<tr>
<td>Web 2.0 technologies helped with engaging with the content in online courses</td>
<td>0.7%</td>
<td>3.0%</td>
<td>66.4%</td>
<td>29.9%</td>
</tr>
</tbody>
</table>

**Gender**

The t-test provided the results of respondents’ differences of engagement in an online course based on gender, showing no significance difference between female and male in this dimension, nor on peer engagement $t(132) = 0.88, p = 0.38$, despite females ($M = 3.21, SD=0.52$) attaining higher scores than males ($M=3.11, SD=0.70$). There was not a significant difference between females ($M = 3.22, SD=0.57$) and males ($M=3.19, SD=0.70$) on their
perception of Web 2.0 technologies keeping them engaged with their professor in online courses at the conditions; \( t(132) = 0.32, p = 0.75 \). There were no significant differences in females (\( M = 3.26, SD=0.51 \)) and males (\( M=3.24, SD=0.64 \)) on the perception of engagement with their content in online courses at the condition; \( t(132) = 0.29, p = 0.89 \).

Table 21 shows participant differences on engagement with these technologies based on gender using a four-point Likert-type scale: strongly disagree (SD), disagree (D), agree (A), and strongly agree (SA). A total of 94.9% of females and 86.5% of males agreed or strongly agreed that using Web 2.0 technologies online helped with peer engagement. The majority of (92.8%) females and (89.2%) males perceived using Web 2.0 technologies as useful in their engagement with their professor, and with online learning content (females, 96.9%; males 94.6%).

Table 21

*Participants’ Differences on Engagement With Using Web 2.0 Technologies in Online Courses, Sorted by Gender*

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Females (( n=97 ))</th>
<th>Males (( n=37 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my peers in online courses</td>
<td>SD 0.0% D 5.2% A 69.1% SA 25.8% SD 10.8% D 59.5% A 27.0%</td>
<td></td>
</tr>
<tr>
<td>Web 2.0 technologies are useful to keeping me engaged with my professor in online courses</td>
<td>SD 0.0% D 7.2% A 62.9% SA 29.9% SD 8.1% D 56.8% A 32.4%</td>
<td></td>
</tr>
<tr>
<td>Web 2.0 technologies helped with engaging with the content in online courses</td>
<td>SD 0.0% D 3.1% A 68.0% SA 28.9% SD 2.7% D 62.2% A 32.4%</td>
<td></td>
</tr>
</tbody>
</table>
Age

A one-way ANOVA was conducted to compare the perception of using Web 2.0 technologies on adult learners' engagement in online learning on the condition of ages, grouped as 24 to 35, 36 to 44, 45 to 54, and 55 and older. Age did not predict differences on peer engagement under these conditions: p>.05 level for the four conditions \[ F(3, 130) = 0.408, p = .748 \]; or professor engagement at the p>.05 level for the four conditions \[ F(3, 130) = .712, p = .547 \]. The results found no significant difference in the perception of using Web 2.0 technologies on engagement with the online content courses at the p>.05 level for the four conditions \[ F(3, 130) = .758, p = .520 \].

Table 22 provides these results based on age. The majority of each group, (88%) 24-35, (97.1%) 36-44, (93.8%) 45-54, and (88.4%) 55 and older, agreed or strongly agreed that Web 2.0 technologies were useful with peer engagement. Participants ages (88%) 24-35, (97.1%) 36-44, (93.8%) 45-54, and (88.4%) 55 and older agreed or strongly agreed that these technologies were useful in their engagement with their professor. The participants between the ages of (88%) 24-35, (97.1%) 36-44, (93.8%) 45-54, and (88.4%) 55 and older agreed or strongly agreed that they helped with engaging with content in the online learning courses.
Table 22

Participants’ Differences on Engagement With Using Web 2.0 Technologies in Online Courses, Sorted by Age

<table>
<thead>
<tr>
<th>Ages</th>
<th>Web 2.0 technologies are useful to keeping me engaged with my peers in online courses</th>
<th>Web 2.0 technologies are useful to keeping me engaged with my professor in online courses</th>
<th>Web 2.0 technologies helped with engaging with the content in online courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td>D</td>
<td>A</td>
</tr>
<tr>
<td>24-35</td>
<td>0.0%</td>
<td>12.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>(n=25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36-44</td>
<td>0.0%</td>
<td>2.9%</td>
<td>71.4%</td>
</tr>
<tr>
<td>(n=35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>2.1%</td>
<td>4.2%</td>
<td>64.6%</td>
</tr>
<tr>
<td>(n=48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>0.0%</td>
<td>11.5%</td>
<td>69.2%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Income

Lastly, a one-way ANOVA was conducted to compare the perception of using Web 2.0 technologies on adult learners’ engagement in online learning on the condition of income, consisting of six categories: less than $19,999, $20,000-$29,000, $30,000-$39,000, $40,000-$49,000, $50,000-$59,000, and $60,000. No significant difference emerged among perceptions of peer engagement in online courses at the \( p > .05 \) level for the six conditions \( [F(5, 128) = 1.31, p = .262] \); or engagement with the professor at the \( p > .05 \) level for the six conditions \( [F(5, 128) = .777, p = .568] \). The results indicated no significant difference in the perception of using Web 2.0 technologies on engagement with the content of online courses at the \( p > .05 \) level for the six conditions \( [F(5, 128) = .985, p = .429] \).

Table 23 provides the results of the engagement analysis based on income. Participants that reported income between <$19,000 and $20,000-$29,000 agreed or strongly agreed that Web 2.0 technologies kept them engaged with their peers at 100%. Participants with income of (92.8%) $30-39,000, (84.6%) $40-49,000, (85.2%) $50-59,000 and (94.4%) $60,000 all agreed
or *strongly agreed* that these applications kept them engaged with their peers; those reporting between (87.5%) <$19,000, (92.8%) $30-39,000, (92.3%) $40-49,000, (92.6%) $50-59,000 and (94.4%) $60,000 *agreed or strongly agreed* that Web 2.0 technologies helped with professor engagement. A total of 100% of participants with income of $20,000-29,000 *agreed or strongly agreed* that Web 2.0 technologies helped with professor engagement. A total of 100% of participants with income <$19,000 and $20,000-29,000 *agreed or strongly agreed* that the tools kept them engaged with content, as did those with income of (92.8%) $30-39,000, (96.1%) $40-49,000, (96.3%) $50-59,000 and (96.2%) $60,000.

Table 23

*Participants’ Differences on Engagement With Using Web 2.0 Technologies in Online Courses, Sorted by Income*

<table>
<thead>
<tr>
<th>Income</th>
<th>Web 2.0 technologies are useful to keeping me engaged with my peers in online courses</th>
<th>Web 2.0 technologies are useful to keeping me engaged with my professor in online courses</th>
<th>Web 2.0 technologies helped with engaging with the content in online courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;19,000</td>
<td>SD 0.0%</td>
<td>D 0.0%</td>
<td>A 62.5%</td>
</tr>
<tr>
<td>(n=8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29,000</td>
<td>SD 0.0%</td>
<td>D 0.0%</td>
<td>A 50.0%</td>
</tr>
<tr>
<td>(n=6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39,000</td>
<td>SD 0.0%</td>
<td>D 7.1%</td>
<td>A 71.4%</td>
</tr>
<tr>
<td>(n=14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49,000</td>
<td>SD 0.0%</td>
<td>D 15.4%</td>
<td>A 69.2%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59,000</td>
<td>SD 3.7%</td>
<td>D 3.7%</td>
<td>A 70.4%</td>
</tr>
<tr>
<td>(n=27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60,000 &lt;</td>
<td>SD 0.0%</td>
<td>D 5.7%</td>
<td>A 64.2%</td>
</tr>
<tr>
<td>(n=53)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Race**

Next, a one-way ANOVA was conducted to compare perceptions of engagement with these technologies among adult learners on the condition of race, consisting of four categories:
Caucasian/White, African American/Black, Hispanic/Latin, and other races. No significant difference appeared related to peer engagement among these at the $p > .05$ level for the four conditions [$F(3, 130) = .634, p = .594$], related to professor engagement at the $p > .05$ level for the four conditions [$F(3, 130) = 0.249, p = .862$], or related to content engagement at the $p > .05$ level for the four conditions [$F(3, 130) = .257, p = .856$].

Table 24 shows participants responses to a set of questions designed to examine the differences of adult learners’ engagement with Web 2.0 technologies based on race. Among Hispanic and Other races, 100% agreed or strongly agreed that these tools were useful in their engagement with their peers and professors in online courses. The results also revealed that (89.5%) White and (95.9%) Black races agreed or strongly that Web 2.0 technologies were useful in this circumstance. Overall, (96.1%) White, (95.9%) Black, (100%) Hispanic, and (100%) Other races agreed or strongly agreed that they were helpful in their engagement with the content.

Table 24

Participants’ Differences on Engagement With Using Web 2.0 Technologies in Online Courses, Sorted by Race

<table>
<thead>
<tr>
<th>Race</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
<th>SD</th>
<th>D</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0%</td>
<td>10.5%</td>
<td>57.9%</td>
<td>31.6%</td>
<td>0.0%</td>
<td>10.5%</td>
<td>55.3%</td>
<td>34.2%</td>
</tr>
<tr>
<td>(n=76)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>2.0%</td>
<td>2.0%</td>
<td>79.6%</td>
<td>16.3%</td>
<td>2.0%</td>
<td>4.1%</td>
<td>65.3%</td>
<td>28.6%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>66.7%</td>
<td>33.3%</td>
</tr>
<tr>
<td>(n=49)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.0%</td>
<td>0.0%</td>
<td>75.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>75.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>7.1%</td>
<td>71.4%</td>
<td>21.4%</td>
</tr>
<tr>
<td>(n=4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.0%</td>
<td>0.0%</td>
<td>60.0%</td>
<td>40.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.8%</td>
<td>69.2%</td>
<td>26.9%</td>
</tr>
<tr>
<td>(n=5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

87
Research Question 3

Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race? Respondents were asked to think about their comfort level in using Web 2.0 technologies in online learning. Participants responded using a 4-point Likert scale. In this series of questions, respondents could choose from the following option: very difficult (VD), difficult (D), easy (E), and very easy (VE).

Table 25 shows the results of the frequencies test. Respondents overall had a positive perception of their comfort level using these tools: 85.8% of the participants felt it was easy or very easy using a lecture or presentation video in online courses, 95.5% felt it was easy or very easy to use social networking sites, 93.3% felt it was easy or very easy to use instant messaging, 90.3% felt it was easy or very easy to use a picture or video sharing applications, 91.8% of the participants found it easy or very easy to use cloud computing in online courses, and 90.3% felt it was easy or very easy to use virtual meeting applications in online learning.
Table 25

*Overall Participants’ Perception in Comfort Levels With Using Web 2.0 Technologies in Online Courses*

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Very Difficult</th>
<th>Difficult</th>
<th>Easy</th>
<th>Very Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was it easy or difficult to use a lecture or presentation video capture (Panopto, Knovio, YouTube, etc.) in your online course?</td>
<td>0.0%</td>
<td>14.2%</td>
<td>62.7%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Was it easy or difficult to use social networking (Facebook, Twitter, LinkedIn) in your online course?</td>
<td>1.5%</td>
<td>3.0%</td>
<td>50.0%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Was easy or difficult to use instant messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</td>
<td>2.2%</td>
<td>4.5%</td>
<td>58.2%</td>
<td>35.1%</td>
</tr>
<tr>
<td>Was easy or difficult to use picture/video sharing (Instagram, Snapchat) in your online course?</td>
<td>3.0%</td>
<td>6.7%</td>
<td>55.2%</td>
<td>35.1%</td>
</tr>
<tr>
<td>Was easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</td>
<td>0.7%</td>
<td>7.5%</td>
<td>58.2%</td>
<td>33.6%</td>
</tr>
<tr>
<td>Was easy or difficult to use virtual meeting (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</td>
<td>0.0%</td>
<td>9.7%</td>
<td>56.0%</td>
<td>34.3%</td>
</tr>
</tbody>
</table>

**Gender**

The t-test results found that females’ ($M=3.32, SD=0.57$) comfort in virtual meeting applications in online learning was significantly higher compared to males [$M=3.05, SD=0.71$; at the condition $t(132)=2.26, p=0.03$]. All the other variables regarding comfort level in using Web 2.0 technologies in online learning were not significantly different between males and females. There was not a significant difference between females’ ($M=3.08, SD=0.61$) and males’ ($M=3.11, SD=0.61$) comfort levels when using lecture or presentation video applications in online learning [at the condition $t(132)=-.22, p=0.83$]. There was not a significant difference in females’ ($M=3.42, SD=0.63$) and males’ ($M=3.3, SD=0.62$) comfort levels in using social networking in online learning [at the condition $t(132)=0.81, p=0.42$]. There was not a
significant difference in females’ ($M=3.30, SD=0.65$) and males’ ($M=3.16, SD=0.65$) comfort levels in using instant messaging applications in online learning [at the condition $t(132) = 1.09, p = 0.28$]. There was not a significant difference in females’ ($M=3.27, SD=0.67$) and males’ ($M=3.11, SD=0.77$) comfort levels in using video- and picture-sharing applications in online learning [at the condition $t(132) = 1.18, p = 0.24$]. There was also not a significant difference in females’ ($M=3.24, SD=0.63$) and males’ ($M=3.24, SD=0.60$) comfort levels in using cloud computing services in online learning [at the condition $t(132) = 0.04, p = 0.97$].

Table 26 provides the results of the respondents’ differences in comfort levels when using Web 2.0 technologies based on gender. The results revealed that females (85.6%) and males (86.5%) found that it was easy or very easy to use lecture or presentation videos in an online course. When it comes to comfort levels on social networking sites such as Facebook, Twitter, and LinkedIn, both females (95.1%) and males (97.3%) found that it was easy or very easy to use them in their online courses. A total of 93.2% of females and 92.3% of males felt that it was easy or very easy to use instant messaging in their online courses. A majority of females (91.7%) and males (91.9%) reported that it was easy or very easy to use picture/video sharing and cloud computing in online courses. Overall, 94.27% of females felt that it was easy or very easy to use virtual meeting applications in online learning compared to 78.4% of males. However, 5.7% of females felt that it was difficult to use virtual meeting applications in online learning, verses 21.6% of males.
Table 26

Participants’ Differences in Comfort Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Gender

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Females (n=97)</th>
<th>Males (n=37)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was it easy or difficult to use a lecture or presentation video capture</td>
<td>0.0% 14.4% 62.9% 22.7% 0.0%</td>
<td>13.5% 62.2% 24.3%</td>
</tr>
<tr>
<td>video capture (Panopto, Knovio, YouTube, etc.) in your online course?</td>
<td>1.0% 4.1% 46.6% 48.5% 2.7%</td>
<td>0.0% 59.5% 37.8%</td>
</tr>
<tr>
<td>Was it easy or difficult to use social networking (Facebook, Twitter, LinkedIn) in your online course?</td>
<td>2.1% 4.1% 55.7% 38.1% 2.7%</td>
<td>5.4% 64.9% 27.4%</td>
</tr>
<tr>
<td>Was it easy or difficult to use instant messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</td>
<td>2.1% 6.2% 54.6% 37.1% 5.4%</td>
<td>8.1% 56.8% 29.7%</td>
</tr>
<tr>
<td>Was it easy or difficult to use picture/video sharing (Instagram, Snapchat) in your online course?</td>
<td>1.0% 7.2% 57.7% 34.0% 0.0%</td>
<td>8.1% 59.5% 32.4%</td>
</tr>
<tr>
<td>Was it easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</td>
<td>0.0% 5.2% 57.1% 37.1% 0.0%</td>
<td>21.6% 51.4% 27.0%</td>
</tr>
<tr>
<td>Was it easy or difficult to use virtual meeting (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</td>
<td>0.0% 5.2% 57.1% 37.1% 0.0%</td>
<td>21.6% 51.4% 27.0%</td>
</tr>
</tbody>
</table>

Age

A one-way ANOVA was conducted to examine differences in comfort level when using Web 2.0 technologies in online learning on the condition of ages, including the age groups 24 to 35, 36 to 44, 45 to 54, and 55 and older. There was not a significant difference in comfort levels when using lecture or video presentation applications in online courses at the p>.05 level for the
four conditions \( F(3, 130) = .715, p = .545 \) or in comfort levels when using social networking sites in online courses of the at the \( p > .05 \) level for the four conditions \( F(3, 130) = .568, p = .637 \). The results found that there was not a significant difference in comfort levels when using instant messaging in online courses at the \( p > .05 \) level for the four conditions \( F(3, 130) = .191, p = .903 \). The results found that there was not a significant difference in comfort levels with picture and video sharing in online courses at the \( p > .05 \) level for the four conditions \( F(3, 130) = 1.00, p = .393 \). The results found that there was not a significant difference in comfort levels when using cloud computing at the \( p > .05 \) level for the four conditions \( F(3, 130) = 1.27, p = .287 \). There was no difference in comfort levels of using virtual meeting applications at the \( p > .05 \) level for the four conditions \( F(3, 130) = 1.50, p = .218 \).

Table 27 provides the results of the respondents’ differences in comfort levels when using Web 2.0 technologies based on age. The data results demonstrated that participants aged 24–35 (80%), 36–44 (85.7%), 45–54 (91.7%), and 55 years old or older (80.8%) felt it was easy or very easy to use lecture or presentation video capture applications such as Panopto, YouTube, and so on. Participants that were 24–35 (92%), 36–44 (94.3%), 45–54 (97.9%), and 55 years old or older (96.2%) felt that it was easy or very easy to use social networking sites such as Facebook, LinkedIn, or Twitter. The participants aged 24–35 (92%), 36–44 (94.3%), 45–54 (93.8%), and 55 years old or older (92.3%) felt it was easy or very easy to use instant messaging in online courses. The results showed that participants aged 24–35 (88%), 36–44 (91.4%), 45–54 (93.8%), and 55 and older (84.6%) reported that it was easy to very easy to use picture- and video-sharing applications. The report reveals that 84% of 24–35 participants felt comfortable using cloud computing in their online course. Of participants aged 36–44 (94.3%), 45–54 (93.8%), and 55 and older (92.3%), over 90% were comfortable using cloud computing.
Participants aged 24–35 (96%), 36–44 (91.4%), 45–54 (91.7%), and 55 and older (80.8%) perceived that it was easy or very easy to use virtual meeting applications in online courses.

Table 27

Participants’ Differences in Comfort Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Age

<table>
<thead>
<tr>
<th>Ages</th>
<th>Was it easy or difficult to use a lecture or presentation video capture (Panopto, Knovio, YouTube, etc.) in your online course?</th>
<th>Was it easy or difficult to use a social networking (Facebook, Twitter, LinkedIn) in your online course?</th>
<th>Was it easy or difficult to use virtual meeting (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</th>
</tr>
</thead>
<tbody>
<tr>
<td>24–35</td>
<td>0.0% 20.0% 64.0% 16.0%</td>
<td>0.0% 8.0% 40.0% 52.0%</td>
<td>4.0% 4.0% 60.0% 32.0%</td>
</tr>
<tr>
<td>(n=25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36–44</td>
<td>0.0% 14.3% 60.0% 25.7%</td>
<td>2.9% 2.9% 48.6% 45.7%</td>
<td>2.9% 2.9% 60.0% 34.3%</td>
</tr>
<tr>
<td>(n=35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45–54</td>
<td>0.0% 8.3% 66.7% 25.0%</td>
<td>2.1% 0.0% 47.9% 50.0%</td>
<td>2.1% 4.2% 54.2% 39.6%</td>
</tr>
<tr>
<td>(n=48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>0.0% 19.2% 57.7% 23.1%</td>
<td>0.0% 3.8% 65.4% 30.8%</td>
<td>0.0% 7.7% 615% 30.8%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ages</th>
<th>Was it easy or difficult to use picture/video sharing (Instagram, Snapchat) in your online course?</th>
<th>Was it easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</th>
<th>Was it easy or difficult to use virtual meeting (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</th>
</tr>
</thead>
<tbody>
<tr>
<td>24–35</td>
<td>4.0% 8.0% 64.0% 24.0%</td>
<td>0.0% 16.0% 60.0% 24.0%</td>
<td>0.0% 4.0% 72.0% 24.0%</td>
</tr>
<tr>
<td>(n=25)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36–44</td>
<td>5.7% 2.9% 57.1% 34.3%</td>
<td>0.0% 5.7% 54.3% 40.0%</td>
<td>0.0% 8.6% 51.4% 40.0%</td>
</tr>
<tr>
<td>(n=35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45–54</td>
<td>2.1% 4.2% 50.0% 43.8%</td>
<td>2.1% 4.2% 54.2% 39.6%</td>
<td>0.0% 8.3% 50.0% 41.7%</td>
</tr>
<tr>
<td>(n=48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>0.0% 15.4% 53.8% 30.8%</td>
<td>0.0% 7.7% 69.2% 23.1%</td>
<td>0.0% 19.2% 57.7% 23.1%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Income

Next, a one-way ANOVA was conducted to examine comfort level on the condition of income, consisting of six categories standardized above. There was not a significant difference in comfort level with lecture presentation applications in online courses at the p > .05 level for the six conditions [F(5, 128) = 1.21, p = .306], or with social networking sites at the p > .05 level for the six conditions [F(5, 128) = 2.82, p = .04]. Comfort level did not significantly vary by income.
with instant messaging at the $p > .05$ level for the six conditions \( F(5, 128) = 2.34, p = .05 \), nor with picture and video sharing \( F(5, 128) = 1.27, p = .277 \), nor with cloud computing at the $p > .05$ level for the four conditions \( F(5, 128) = .989, p = .427 \), nor with virtual meeting applications at the $p > .05$ level \( F(5, 128) = 1.23, p = .296 \).

Table 2 provides the results of the respondents’ differences in comfort level using Web 2.0 technologies, based on income. Participants with an income of less than $19,000 reported 100% felt comfortable with using lecture or presentation videos applications. Among participants with income of (83.3%) $20-29,000, (85.7%) $30-39,000, (92.3%) $40-49,000, (81.5%) $50-59,000, and (83%) $60,000, over 80% reported it was easy or very easy to use lecture or presentation video application in online courses. Participants in the $20-29,000 and $40-49,000 ranges reported that 100% found it easy or very easy to use a social networking site in online learning. Those in ranges (87.5%) <$19,000, (83.8%) $30-39,000, (92.6%) $50-59,000, and (96%) $60,000 felt it was easy or very easy using social networking sites. A majority of the participants with an income of $20-29,000 felt 100% comfortable using instant messaging in online courses. The ranges of (87.5%) <$19,000, (92.8%) $30-39,000, (81.5%), (96.1%) $40-49,000, (85.2%) $50-59,000, and (96.3%) $60,000 and above felt it was easy or very easy to use instant messaging. Participants with an income of (91.5%) <$19,000, (83.3%) $20-29,000, (92.9%) $30-39,000, $40-49,000, (81.5%) $50-59,000, and (94.3%) $60,000 felt it was easy or very easy to use picture and video sharing applications in online courses; 100% of participants in the <$19,000 and $20-29,000 ranges found it easy or very easy to use cloud computing. Participants with an income under $19,000 felt that it was easy or very easy to use virtual meeting applications, at 100%, while the other ranges (66.6%) $20-29,000, (85.7%) $30-39,000,
(92.3%) $40-49,000, (92.6%) $50-59,000, and (90.6%) $60,000 and above found them easy or very easy to use.

Table 28

**Participants’ Differences in Comfort Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Income**

<table>
<thead>
<tr>
<th>Income</th>
<th>Was it easy or difficult to use a lecture or presentation video capture (Panopto, Knovio, YouTube, etc.) in your online course?</th>
<th>Was it easy or difficult to use a social networking (Facebook, Twitter, LinkedIn) in your online course?</th>
<th>Was it easy or difficult to use instant messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</th>
<th>Was it easy or difficult to use picture/video sharing (Instagram, Snapchat) in your online course?</th>
<th>Was it easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</th>
<th>Was it easy or difficult to use virtual meeting (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;19,000 (n=8)</td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
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<td><img src="image" alt="Table Row" /></td>
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<tr>
<td>20–29,000 (n=6)</td>
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<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
</tr>
<tr>
<td>30–39,000 (n=14)</td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
</tr>
<tr>
<td>40–49,000 (n=26)</td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
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<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
</tr>
<tr>
<td>50–59,000 (n=27)</td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
</tr>
<tr>
<td>60,000 &lt; (n=53)</td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
<td><img src="image" alt="Table Row" /></td>
</tr>
</tbody>
</table>

95
Race

To wrap up research question 3, a one-way ANOVA was conducted to examine comfort level with Web 2.0 technologies on the condition of race, consisting of four categories: Caucasian/White, African American/Black, Hispanic/Latin, and other races. There was not a significant difference in comfort level with lecture presentation applications at the p>.05 level for the four conditions \([F (3, 130) = .288, p = .834]\). However, there were significant differences in comfort based on race when using social networking sites, at the p<.05 level for the four conditions \([F(3, 130) = 2.82, p = .04]\), and when using instant messaging at the p<.05 level for the four conditions \([F(3, 130) = 4.40, p = .01]\). A Tukey post hoc test revealed that the Caucasian/White group comfort level was statistically significantly higher than the African American/Black group (p=0.025) in using social networking sites (p=0.025), and statistically significantly higher in using instant messaging in online courses (p=.004). These differences did not hold up when picture and video sharing \([F(3, 130) = 1.87, p = .137]\), using cloud computing at the p>.05 level for the four conditions \([F (3, 130) = .637, p = .593]\), or using virtual meeting applications at the p>.05 level for the four conditions \([F (3, 130) = .593, p = .621]\). There was no statistically significant difference between any of the groups.

Table 29 provides the results of the respondents’ differing comfort levels with these technologies based on race. The results revealed that 100% of the Hispanic and Other races reported that it was easy or very easy to use all listed technologies. A majority of the (82.9%) White and (87.7%) Black participants expressed that it was easy or very easy to use lecture or presentation video; (97.4%) White and (91.9%) Black participants also reported comfort with social networking sites. A total of 94.8% of White and 89% of Black participants expressed that instant messaging was easy or very easy to use, and (93.4%) White and (83.6%) Black
participants felt it was easy or very easy to use picture and video sharing applications. The majority of all races were also comfortable with cloud computing, including 89.5% White, 95.9% Black, and 80% other, as well as virtual meetings; (86.5%) of White and (94%) of the Black group felt it was easy or very easy to use.

Table 29

Participants’ Differences in Comfort Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Race

<table>
<thead>
<tr>
<th>Race</th>
<th>Was it easy or difficult to use a lecture or presentation video capture (Panopto, Knovio, YouTube, etc.) in your online course?</th>
<th>Was it easy or difficult to use a social networking (Facebook, Twitter, LinkedIn) in your online course?</th>
<th>Was it easy or difficult to use instant messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</th>
<th>Was it easy or difficult to use picture sharing/video sharing (Instagram, Snapchat) in your online course?</th>
<th>Was it easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</th>
<th>Was it easy or difficult to use virtual meetings (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n=76)</td>
<td>0.0%</td>
<td>17.1%</td>
<td>52.6%</td>
<td>30.3%</td>
<td>0.0%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Black (n=49)</td>
<td>0.0%</td>
<td>12.2%</td>
<td>71.4%</td>
<td>16.3%</td>
<td>4.1%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Hispanic (n=4)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other (n=5)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>Was it easy or difficult to use picture sharing/video sharing (Instagram, Snapchat) in your online course?</th>
<th>Was it easy or difficult to use cloud computing (Google Drive, OneDrive, iCloud) in your online course?</th>
<th>Was it easy or difficult to use virtual meetings (Zoom, Blackboard Collaborate, Skype, etc.) in your online course?</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n=76)</td>
<td>1.3%</td>
<td>5.3%</td>
<td>51.3%</td>
</tr>
<tr>
<td>Black (n=49)</td>
<td>6.1%</td>
<td>10.2%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Hispanic (n=4)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Other (n=5)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>80.0%</td>
</tr>
</tbody>
</table>

Research Question 4

Do differences exist among adult learners’ level of confidence with using Web 2.0 technologies based on gender, age, income, and race? Respondents were asked to reflect on their
confident level in using Web 2.0 technologies. Participants responded using a 4-point Likert scale, and yes or no items. In this series of questions, respondents could choose from the following options: not confident at all (NC), not so confident (NSC), somewhat confident (SC), very confident (VC).

Table 30 shows the frequencies of response. A total of 98% of the participants felt somewhat confident or very confident in using a computer, smartphone, or other electronic devices to complete personal online tasks, and 97.0% felt somewhat confident or very confident in using Web 2.0 technologies in an online course. Also, a total of 91.8% of the participants felt somewhat confident or very confident in using these technologies at work.

Table 30

Overall Participants’ Perception in Confidence Levels With Using Web 2.0 Technologies in Online Courses

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Not at all confident</th>
<th>Not so confident</th>
<th>Somewhat confident</th>
<th>Very confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, how confident do you feel using computers, smartphones, or other electronic devices to do the things you need to do online?</td>
<td>1.5%</td>
<td>1.5%</td>
<td>21.6%</td>
<td>75.4%</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies in online courses?</td>
<td>3.0%</td>
<td>0.0%</td>
<td>36.6%</td>
<td>60.4%</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies at work?</td>
<td>3.0%</td>
<td>0.0%</td>
<td>36.6%</td>
<td>60.4%</td>
</tr>
</tbody>
</table>
Gender

The t-test results found no significant differences in confidence level based on gender. No significant difference in confidence was found in using a computer, smartphones, or other electronic devices to complete tasks \((t(132) = -0.258, p = 0.797)\), using Web 2.0 technologies in online courses \((t(132) = -0.837, p = 0.404)\), or using these tools at work \((t(132) = 0.697 p = 0.48)\).

Table 31 shows these responses on confidence and gender. The data illustrates that 96.9% of females and 97.3% of males felt *somewhat confident* or *very confident* using a computer, smartphone, or other electronic devices. Similarly, a total of 96.9% of females and 97.3% of males felt somewhat *confident* or *very confident* using Web 2.0 technologies in their online courses. A majority (94.6% of females and 83% of males) reported they were confident with using these technologies at work.

Table 31

*Participants’ Differences in Confidence Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Gender*

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Females ((n=97))</th>
<th>Males ((n=37))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, how confident do you feel using computers, smartphones, or other electronic devices to do the things you need to do online?</td>
<td>2.1% 1.0% 21.6% 75.31% 0.0% 2.7% 21.6% 75.7%</td>
<td>3.1% 0.0% 39.2% 57.7% 2.7% 0.0% 29.7% 67.6%</td>
</tr>
<tr>
<td>Overall, how confident do you feel using Web 2.0 technologies in online courses?</td>
<td>2.1% 3.1% 40.2% 54.6% 2.7% 13.5% 27.0% 56.8%</td>
<td></td>
</tr>
</tbody>
</table>
Age

A one-way ANOVA was conducted to examine differences in confidence level when using Web 2.0 technologies on the condition of ages, according to the standardized groupings above. The confidence level did not differ significantly when using computers, smartphones, or other electronic devices to complete tasks at the p>.05 level for the four conditions [\(F(3, 130) = 2.51, p = .061\)]; or using Web 2.0 technologies in online courses at the p>.05 level for the four conditions [\(F(3, 130) = .366, p = .778\)]. The results found no significant difference in confidence levels using these technologies at work at the p>.05 level for the four conditions [\(F (3, 130) = 1.23, p = .279\)].

Table 32 shows participants’ responses to a set of questions designed to examine these relationships. The results revealed that the 36-44 and 45-54 groups expressed that they were somewhat confident or very confident using computers, smartphones, or other electronic devices, at 100%. The participants aged (96%) 24-35 and (88.4%) 55 and older were confident using computers, smartphones, and other electronic devices. Those aged 36-44 and 45-54 reported feeling somewhat confident or very confident with using Web 2.0 technologies in online courses, at 100%; The (96%) 24-35 and (88.4%) 55 and older groups were right behind in this category. A majority of the participants aged (84%) 24-35, (100%) 36-44, (97.9%) 45-54, (76.9%) 55 and older reported confidence using these technologies at work.
Table 32

Participants’ Differences in Confidence Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Age

<table>
<thead>
<tr>
<th>Ages</th>
<th>NC</th>
<th>NSC</th>
<th>SC</th>
<th>VC</th>
<th>NC</th>
<th>NSC</th>
<th>SC</th>
<th>VC</th>
<th>NC</th>
<th>NSC</th>
<th>SC</th>
<th>VC</th>
</tr>
</thead>
<tbody>
<tr>
<td>24–35</td>
<td>4.0%</td>
<td>0.0%</td>
<td>20.0%</td>
<td>76.0%</td>
<td>8.0%</td>
<td>0.0%</td>
<td>28.0%</td>
<td>64.0%</td>
<td>8.0%</td>
<td>8.0%</td>
<td>20.0%</td>
<td>64.0%</td>
</tr>
<tr>
<td>(n=25)</td>
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<td></td>
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</tr>
<tr>
<td>36–44</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.7%</td>
<td>74.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>42.9%</td>
<td>57.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>42.9%</td>
<td>57.1%</td>
</tr>
<tr>
<td>(n=35)</td>
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<td></td>
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</tr>
<tr>
<td>45–54</td>
<td>0.0%</td>
<td>0.0%</td>
<td>16.7%</td>
<td>83.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>39.6%</td>
<td>60.4%</td>
<td>0.0%</td>
<td>2.1%</td>
<td>45.8%</td>
<td>52.1%</td>
</tr>
<tr>
<td>(n=48)</td>
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<td></td>
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</tr>
<tr>
<td>55+</td>
<td>3.8%</td>
<td>7.7%</td>
<td>26.9%</td>
<td>61.5%</td>
<td>7.7%</td>
<td>0.0%</td>
<td>30.8%</td>
<td>61.5%</td>
<td>3.8%</td>
<td>19.2%</td>
<td>26.9%</td>
<td>50.0%</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
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</tbody>
</table>

Income

Finally, a one-way ANOVA was conducted to examine the confidence level of using Web 2.0 technologies on the condition based on income consisting of six categories: less than $19,999, $20,000-$29,000, $30,000-$39,000, $40,000-$49,000, $50,000-$59,000, and $60,000. There was not a significant difference in the confidence level of using computer, smartphones, or other electronic devices to complete things they need to do online at the p>.05 level for the six conditions \( F (5, 128) = .612, p = .691 \), or in the income in confidence level using Web 2.0 technologies in online courses at the p>.05 level for the six conditions \( F(5, 128) = .708, p = .619 \). The results found no significant difference in confidence level when using these technologies at work at the p>.05 level for the four conditions \( F (5, 128) = 1.53, p = .183 \).

Table 33 shows the participant differences to the questions related to confidence level based on income. Participants with an income of less than $19,000 and $20-29,000, and $50-59,000 expressed a 100% confidence at using computers, smartphones, or other electronic devices.
 devices. The participants with income of (92.8%) $30-39,000, (96.2%) $40-49,000, and (98.1) $60,00 and above were somewhat confident or very confident with using computers, smartphones, and other electronic to do online work. The majority of the participants with an income of less than $19,000, $30-39,000, $40-49,000, and $60,00 and above reported at 85%-99% confidence in using Web 2.0 technologies in online courses. A 100% confidence rate was reported for participants with an income of $20-29,000 and $50-59,000. The majority of participants with an income of less than (87.5%) $19,000, (83.4%) $20-29,000, (78.6%) $30-39,000 (88.5%) $40-49,000, (96.3%) $50-59,000, and (96.2%) $60,00 and above felt confident with using Web 2.0 technologies at work.

Table 33

Participants’ Differences in Confidence Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Income

<table>
<thead>
<tr>
<th>Income</th>
<th>Overall, how confident do you feel using computers, smartphones, or other electronic devices to do the things you need to do online?</th>
<th>Overall, how confident do you feel using Web 2.0 technologies in online courses?</th>
<th>Overall, how confident do you feel using Web 2.0 technologies at work?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;19,000 (n=8)</td>
<td>NC 0.0% NSC 0.0% SC 25.0% VC 75.0%</td>
<td>NC 12.5% NSC 0.0% SC 37.5% VC 50.0%</td>
<td>NC 12.5% NSC 0.0% SC 25.0% VC 62.5%</td>
</tr>
<tr>
<td>20–29,000 (n=6)</td>
<td>NC 0.0% NSC 0.0% SC 16.7% VC 83.3%</td>
<td>NC 0.0% NSC 0.0% SC 33.3% VC 66.7%</td>
<td>NC 0.0% NSC 0.0% SC 16.7% VC 66.7%</td>
</tr>
<tr>
<td>30–39,000 (n=14)</td>
<td>NC 0.0% NSC 7.1% SC 7.1% VC 85.7%</td>
<td>NC 0.0% NSC 7.1% SC 35.7% VC 57.1%</td>
<td>NC 0.0% NSC 21.4% SC 35.7% VC 42.9%</td>
</tr>
<tr>
<td>40–49,000 (n=26)</td>
<td>NC 0.0% NSC 3.8% SC 38.5% VC 57.7%</td>
<td>NC 3.8% NSC 0.0% SC 38.5% VC 57.7%</td>
<td>NC 3.8% NSC 7.7% SC 46.2% VC 42.3%</td>
</tr>
<tr>
<td>50–59,000 (n=27)</td>
<td>NC 0.0% NSC 0.0% SC 22.2% VC 77.8%</td>
<td>NC 0.0% NSC 0.0% SC 48.1% VC 51.9%</td>
<td>NC 0.0% NSC 3.7% SC 55.6% VC 40.7%</td>
</tr>
<tr>
<td>60,000 &lt; (n=53)</td>
<td>NC 1.9% NSC 0.0% SC 18.9% VC 79.2%</td>
<td>NC 1.9% NSC 0.0% SC 30.2% VC 67.9%</td>
<td>NC 1.9% NSC 1.9% SC 26.4% VC 69.8%</td>
</tr>
</tbody>
</table>

Race

Finally, a one-way ANOVA was conducted to examine level of confidence when using Web 2.0 technologies on the condition of race, consisting of four categories: Caucasian/White,
African American/Black, Hispanic/Latin, and other races. Results showed no significant
difference in confidence level when using computers, smartphones, or other electronic devices to
complete tasks, at the p>.05 level for the four conditions \[ F (3, 130) = .480, p = .697 \], or when
using Web 2.0 technologies in an online course at the p>.05 level for the four conditions \[ F (3, 130) = 1.80, p = .150 \].

However, as shown in Table 5, there were significant differences in confidence level by
race when discussing these technologies in the workplace, at the p<.05 level for the four
conditions \[ F(3, 130) = 2.60, p = .05 \]. The Tukey post hoc test revealed that the
Caucasian/White group confidence level with work technologies was statistically significantly
higher than the Hispanic/Latin group \( p = .041 \), and that of the African American/Black group
outpaced the Latin/Hispanic group \( p = .036 \) at a statistically significant rate as well.

Table 34 shows response frequencies related to confidence based on race. The majority of the
(97.4%) White and (96%) Black participants and all of the Hispanic and other races felt
\textit{somewhat confident} and \textit{very confident} with using computers, smartphones, and other
electronics. A majority of the (97%) White, (97%) Black, (75%) Hispanic, and (100%) Other
races reported they all felt \textit{somewhat confident} or \textit{very confident} with using Web 2.0
technologies in online courses. A total of 93.4% of the White and 93.8% of the Black
participants reported they were \textit{somewhat confident} or \textit{very confident} using them at work: 50%
of the Hispanic and 80% of other races were \textit{somewhat confident} or \textit{very confident} using them.
Table 34

Participants’ Differences in Confidence Levels With Using Web 2.0 Technologies in Online Courses, Sorted by Race

| Race         | NC | NSC | SC | VC | NC | NSC | SC | VC | NC | NSC | SC | VC |
|--------------|----|-----|----|----|----|-----|----|----|----|-----|----|----|----|
| White (n=76) | 1.3% | 1.3% | 25.0% | 72.0% | 0.0% | 2.6% | 39.5% | 57.9% | 1.3% | 5.3% | 39.5% | 53.9% |
| Black (n=49) | 2.0% | 2.0% | 18.4% | 77.6% | 2.0% | 0.0% | 36.7% | 61.2% | 2.0% | 4.1% | 36.7% | 57.1% |
| Hispanic (n=4) | 0.0% | 0.0% | 25.0% | 75.0% | 25.0% | 0.0% | 25.0% | 50.0% | 25.0% | 25.0% | 25.0% | 25.0% |
| Other (n=5) | 0.0% | 0.0% | 0.0% | 100% | 0.0% | 0.0% | 0.0% | 100% | 0.0% | 20.0% | 0.0% | 80.0% |

Chapter Summary

The results of the statistical analysis for each research question were presented in this chapter. The responses to each item indicated overall positive perception on satisfaction, confidence level, engagement, comfort, and digital skills when using Web 2.0 technologies in online courses. Overall, measures of these levels did not differ significantly based on demographic characteristics. However, there were some significant findings based on item level. Females had a slightly higher comfort level in using web conference or virtual application compared to males. The data also showed the Caucasian group’s comfort level with social networking and instant messaging was higher than that of the African American group. Finally, Caucasians’ and African Americans’ confidence levels in using Web 2.0 technologies at work were higher than that of the Hispanic groups. Because the research focused on adult learners’ perceptions of satisfaction, engagement, comfort, and confidence in using Web 2.0 technologies, the differences are justifiable and expected.
CHAPTER V
SUMMARY, INTERPRETATION, RECOMMENDATIONS, IMPLICATIONS, AND CONCLUSIONS

The purpose of this survey study was to evaluate the perception of adult learners' satisfaction, engagement, comfort level, and confidence levels with using Web 2.0 technologies, and the impact it has on their digital literacy. This chapter includes a discussion of significant findings from the literature on adult learners’ satisfaction, engagement, comfort, and confidence with these technologies, and general conclusions on adult learning and digital literacy. A discussion of the studies' limitations, recommendations for future research, and summary are also included.

This study addresses the following research questions.

1. Do differences exist among adult learners’ satisfaction with using Web 2.0 technologies based on gender, age, income, and race?

2. Do differences exist among adult learners’ engagement with using Web 2.0 technologies in online courses based on gender, age, income, and race?

3. Do differences exist among adult learners’ level of comfort with using Web 2.0 technologies, and are their differences based on gender, age, income, and race?

4. Do differences exist among adult learners’ level of confidence with using Web 2.0 technologies based on gender, age, income, and race?
5. What is the relationship between digital literacy, satisfaction, engagement, comfort, and confidence?

**Summary**

The findings demonstrate differences based on gender, age, income, and race in adult learners’ perceptions of using Web 2.0 technologies in online learning. In addition, they demonstrate a correlation between satisfaction, engagement, comfort, confidence, and digital literacy. The data analysis showed no significant differences in adult learners’ overall satisfaction based on gender, age, income, and race when using Web 2.0 technologies described in Research Questions 1–4. It did show a correlation between satisfaction, engagement, comfort, confidence, and digital literacy.

The findings demonstrate some differences in adult learners' perceptions of Web 2.0 technologies in online learning, based on gender, age, income, and race, as well as a correlation among satisfaction, engagement, comfort, confidence, and digital literacy. The data analysis showed no significant differences in adult learners' overall satisfaction with these technologies based on gender, age, income, and race, as described in Research Questions 1–4, and a correlation between satisfaction, engagement, comfort, confidence, and digital literacy.

**Research Question 1**: Do differences exist in adult learners’ satisfaction using Web 2.0 technologies based on gender, age, race, and income? An ANOVA test administered on survey items 1-4 revealed no significant differences based on these factors. A descriptive test revealed that a significant majority (>90%) of females and males found these technologies useful and easy to incorporate in online learning. A total of 96.9% of females and 83.8% of males found that Web 2.0 products improved their satisfaction, 68% of females and 70% of males believed that these technologies would improve their grades.
Although the current study supports the overall satisfaction of participants of both genders, earlier work found differences in technology use for women and men of similar ages and professions (Compaine et al., 2001), suggesting progress in this dimension of digital literacy. The digital gender divide started to shift at the beginning of the 21st Century, when more women pursued careers and education in science, math, engineering, and technology (except for computer science). Women also become more active with digital tools than men. Hilbert's (2011) study about women's access to and use of digital information and communication technologies (ICT) noted that when women are given access, their satisfaction with technology improves their educational and work performance.

As discussed in the chapters 1 and 2 above, age can be a complicating factor in developing digital skills and levels of comfort. This study analyzed adult learners’ perceptions of technology, based on age and grouped into the following categories: 24 to 35, 36 to 44, 45 to 54, and 55 and older. Again, overall, age did not predict significant differences in satisfaction with Web 2.0 technologies in online learning: over 95% of all ages found them to be useful.

As expected, the data revealed that the 24 to 35 group, the digital natives who grew up with web-based technologies, reported the highest satisfaction, with 100% agreeing that it was easy to incorporate them into online learning. The digital immigrants, who were born earlier and lived for years without this technology, have less experience; this shows up in the data to some extent. However, while participants aged (60%) 24-35, (65.7%) 36-44, and (68%) 45-54 reported a low satisfaction that Web 2.0 technologies improved their grades, 80% of those aged 55 and above felt that it did. Times are changing: research shows that over 40% of adults 50 and older use at least one social media platform (Pew Research Center, 2019). Other studies suggest that
the digital divide is not based on age alone (Lai & Hong, 2015; Thinyane, 2010); it could be influence by economic barriers and race.

For instance, the results revealed that adult learners at all income levels had overall positive perceptions of Web 2.0 technologies, and no significant differences in their satisfaction levels. Even participants with income in the lower ranges (100% of <$19,999 and $20,000-29,000 categories) found the technologies to be useful for their online coursework, and this lowest group also found them easy to incorporate at 100%. However, participants with an income of $30-39,000 reported the lowest satisfaction, at 71.4%, finding these technologies more difficult to incorporate. The lowest levels of satisfaction appeared in the grade improvement category, for participants in the following categories: less than $19,999 (75%), $20,000-$29,000 (66.6%), $40,000-$49,000 (69.2%), $50,000-$59,000 (66.7%), and $60,000 and over (64.1%). More research is needed to determine the significance of these findings.

Additionally, these adult learners’ overall satisfaction was not significantly affected by race; all four categories (White, Black, Hispanic, and Other) reported a positive perception. The Hispanic participants had the highest perception of satisfaction, with 100% reporting that Web 2.0 technologies are useful in their online learning courses, easy to incorporate, and beneficial to grades. Similarly, the Other race group reported that 100% felt that Web 2.0 technologies are useful and improve their satisfaction. However, this 40% of this group did not believe that these technologies would improve their grades. The White and Black participants’ responses were over 90% positive in all three categories.

However, research has shown that race and income do affect access to the internet, which may in turn influence whether and how people in marginalized groups use and feel positively about Web 2.0 technologies (Pew Research Center, 2019). With few affordable broadband
options, many lower-income Americans and some minority groups rely more on their smartphones. As noted in the literature review, the Pew Research Center found that Blacks and Hispanics are less likely to have a computer but are most likely to have a mobile device (Pew Research Center, 2019); 25% of adult households earning less than $30,000 a year only had access to a smartphone for internet access (Anderson & Kumar, 2019). The Pew Research Center also found that smartphone and mobile access increased use of Web 2.0 applications in education (Pew Research Center, 2019).

Web 2.0 technologies relay less static information, facilitating transactions and supporting performance for a more engaging, personable, and social experience (Reiser & Dempsey, 2012). By examining the perceptions of adult learners, scholars can determine how to best engage them.

**Research Question 2:** Do differences exist in adult learners’ engagement with Web 2.0 technologies based on their gender, age, race, and income? To answer this question, this study administered an ANOVA test on survey items 9-11. The results reveal no significant differences in participants' engagement based on gender, age, income, or race. A descriptive test found that 94.9% of females, compared to 86.5% of males, felt that these technologies kept them engaged with their peers, and a similar number (92.8% of females and 89.2% of males) believed that they helped with engaging their professor. Additionally, Web 2.0 technologies helped 96.9% of females and 94.6% of males engage with online learning content. Overall, females communicated a slightly higher level of engagement.

How does age affect the level of engagement in this scenario? Participants in all age categories perceived that Web 2.0 technologies kept them engaged in their online course. The 36-55 group reported the highest engagement, at 97.1%, for connections with peers, professor,
and content; the youngest and oldest age groups were slightly less engaged. This could be explained by their perception of engagement; they may consider the traditional-class setting the bar for engagement, as described by Humber in the literature. He indicated that online learners have an idea of what they view as engagement based on previous academic experiences (Humber, 2018). Many of the participants in this age group, 24-35 and 55 and older, may have begun college in a traditional setting, and applied those perceptions to the online model upon their return.

The condition of income did not affect participant perceptions of engagement at a significant level either. All income groups reported positive perceptions of engagement with Web 2.0 technologies at above 90%; the two lowest groups felt engaged with their peers, professor, and content in their online course at 100%.

Equally importantly, when adult learners considered their engagement with these technologies, there were no significant differences based on race. The Hispanic and Other races reported that 100% felt that Web 2.0 technologies were useful in their engagement with their peers and professors in online courses, as did 89.5% of Whites and 95.9% of Blacks. The fact that minorities tended to feel slightly more engaged in this dimension may stem from this group’s access to mobile devices. Mobile devices play a significant role in online access for Black and Hispanic groups (Perring, 2016).

**Research Question 3**: Do differences exists in adult learners’ comfort using Web 2.0 technologies, based on their gender, age, race, and income? To answer this question, an ANOVA test was administered to examine survey items 12-17, and no significant difference in comfort level with Web 2.0 technologies based on gender, age, race, and income were found. The majority of participants in all groups felt positively about their comfort level. The results
revealed that (85.6%) females and (86.5%) males found it was easy to use a lecture or presentation video in an online course, and even higher numbers reported high comfort with social networking, instant messaging, picture and video sharing, and cloud computing.

However, a total of 57.7% of females felt it was difficult to use virtual meeting applications in online learning, compared to 21.6% of males. This may indicate that traditional male dominance of physical workplace settings can extend to the virtual environment. The result further reveals the challenge for women’s roles in the workplace. According to Catalyst's study, 45% of women business leaders reported that it was difficult to speak up in virtual meetings, and one in five women felt ignored or overlooked during video calls (Chen, 2020). This is a new application of the classic gender gap, due in part to the historical failure to recognize women's contributions to science and acknowledge female academic and technology role models (Half, 2019). The university will need to lead the efforts to close this gap: education is one of the most powerful tools that policymakers may leverage to bridge the digital gender divide ("Bridging the Digital Gender Divide," 2018).

Surprisingly, the results for comfort level found no significant difference based on age. All ages reported at more than 80% feeling comfortable using lecture or presentation video capture; one-fifth of the youngest and oldest groups found it difficult. All age groups also expressed comfort at above 90% levels with using social networking and instant messaging in online courses. While comfort with picture and video sharing applications were generally high (88%) 24-35, (91.4%) 36-44, (93.8%) 45-54, and (84.6%) 55 and older), 15.4% of participants ages 55 and older felt it was difficult to use these applications in online courses. Participants 36-44, 45-54, and 55 and older reported that over 90% were comfortable using cloud computing; 16% of those 24-35 found it difficult. The oldest group had the most difficulty with virtual
meeting applications; 19.2% felt it was difficult, compared to less than 10% of all other age groups. These findings fit with past research (Dinkin, 2018) stating that social networking sites may help access to materials but did not improve academic performance.

Regarding income, participants in the lowest bracket reported comfort with lecture applications and cloud computing at 100%. The participants with an income of $20-29,000 reported they were 100% comfortable using social networking sites, instant messaging, and cloud computing. Like the $20-29,000 income group, the $40-49,000 group also felt 100% comfortable using social networking sites. The participant perception of comfort with picture and video sharing ranged from 81.5% to 94.3%; those with the highest income (above $60,000) reported the highest comfort level. While those in the lowest income group reported ease with virtual meeting applications at 100%, 33% of participants with an income of $20-29,000 found it difficult to use virtual meetings in online courses.

Additionally, there was no significant difference with the participants comfort-level based on race. The results revealed that 100% of the Hispanic and Other races were comfortable using most Web 2.0 technology tools in their online courses. The (82.9%) White and (87.7%) Black participants expressed lower rates of comfort with lecture or presentation video capture, but reported higher levels of comfort with social networking sites and instant messaging in online courses. White and Black participants reported comfort levels at 80-94% with picture and video sharing applications. Again, the Hispanic and Other races reported 100%. However, the Other group reported only an 80% comfort level with cloud computing, compared to 89% in the White and Black groups. Hispanic and Other races reported that it was easy to use virtual meeting software, at 100%; Whites reported the lowest comfort with virtual meetings.
The data analysis on the participants’ comfort level demonstrates that access to the Internet and Web 2.0 technologies can help close the digital gap. According to a study by Urbančíková, Manakova, & Bielcheva (2017), socio-economic, demographic, and regional factors of digital literacy are based on digital prosperity. The study indicated the most relevant digital skills for general digital literacy is working with a computer or mobile devices, the Internet, and digital communication tools such as Web 2.0 technologies (Urbančíková et al., 2017).

Although the results show that the participants are comfortable using Web 2.0 technologies, it is also important to analyze their confidence levels. Participants in Mason's (2016) study were not confident in their abilities with and knowledge of these tools). The data from research question four of the current study describes these confidence levels according to gender, age, income, and race.

**Research Question 4**: Do differences exists in adult learners' confidence using Web 2.0 technologies, based on their gender, age, race, and income? An ANOVA test of survey items 20-22 demonstrated no significant differences on adult learners’ perceptions based on these factors.

A descriptive test illustrated that 96% of females and 97% of males felt confident using a computer, smartphone, other electronic devices, and Web 2.0 technologies in their online courses. However, males had the lowest confidence level (83%) with the latter when at work, compared to 94.6% of females.

In terms of age and confidence with these tools, those between 36-44 and 45-54 expressed that they were confident using computers, smartphones, other electronic devices, and Web 2.0 technologies in online courses at 100%; the youngest and oldest groups were only slightly less confident, at 96% and 88.4%, respectively. Participants (76.9%) 55 and older
reported the lowest confidence in using these technologies at work, compared to 100% of those 36-44, 84% of those 24-35, and 97.9% of those 45-54.

In addition, participants with an income of less than $19,000 and $20-29,000, and $50-59,000 expressed 100% confidence at using computers, smartphones, or other electronic devices. The other income groups reported confidence above 90%. A 100% level of confidence was reported for the $20-29,000 and $50-59,000 groups; the remaining groups reported 85%-99% confidence using Web 2.0 technologies in online courses. The majority of participants ((87.5%) <$19,000, (83.4%) $20-29,000, (88.5%) $40-49,000, (96.3%) $50-59,000, and (96.2%) $60,000+) felt confident using these tools work, while the $30-39,000 group reported the lowest confident level, at 78.6%.

On the condition of race on confidence level, 100% of Hispanics and Other races were confident using computers, smartphones, and other electronics, along with over 95% of the White and Black groups. The (75%) Hispanic participants reported the lowest confidence with using Web 2.0 technologies in online courses, compared to the (97%) White, (97%) Black, and (100%) Other. Also, 50% of the Hispanic group expressed less confidence in using Web 2.0 technologies at work (compared to White and Black (95%) and Other (80%)). This may suggest a racial disparity related to internet access issues among this group, which impacts their confidence with using technology at work.

Zara (2016) reported that only a quarter of low-income white families with internet access are mobile-only, but that number rises to 36% among low-income Hispanic households and 37% among low-income black households. People with higher incomes and educational accomplishments are more inclined to use technology in learning, while those with fewer technology assets and minorities are less likely to do so (Horrigan, 2016). However, the data
reveals that minorities with access to the internet and technology gain confidence and improve and increase their educational success.

The final question is to determine the relationship among digital literacy, satisfaction, engagement, comfort, and confidence:

**Research Question 5:** The study results established a positive correlation between digital literacy, satisfaction, engagement, comfort, and confidence. The majority of the participants had access to a smartphone, aligning with Anderson and Kumar's (2019) claims of widespread growth of Internet, broadband, and smartphone use all Americans, including those who are less-financially well-off. This access improves digital literacy and learners’ perception of satisfaction, engagement, comfort, confidence, and digital skill.

There were significant positive correlations between confidence and engagement. Sharp (2017) noted that when learners are engaged with Web 2.0 tools, they develop confidence and new technology literacies while forming connections with peers, professors, and increasing student engagement and interaction.

The correlations between satisfaction and engagement and satisfaction and comfort fit with Kim et al. (2011), who demonstrated that learning satisfaction improves when online learning utilizes several Web 2.0 technologies and provides quality instruction. The data revealed that an increase in confidence was associated with an increase in engagement. Also, an increase in satisfaction was associated with an increase in engagement. Finally, an increase in satisfaction correlated to an increase in comfort.
Interpretations of Findings

Satisfaction of Learners with Web 2.0 Technology

This discussion of learner satisfaction refers to the extent to which learners not only feel safe and comfortable using Web 2.0 technology, but also the extent to which they perceive they are likely to achieve their academic goals when they do so. Findings in the current study revealed no significant differences in the level of satisfaction with Web 2.0 technology among college students in terms of gender, age, and income.

The very slight gender-based differences in satisfaction imply that gender is not a significant determinant of learners' satisfaction with Web 2.0 technology. These findings are not consistent with those obtained in prior studies. For instance, Huang et al. (2013) found that, due to a relatively higher degree of anxiety, females were less likely to use Web 2.0 technology when compared to their male counterparts. Female students are more cautious while male students are greater risk-takers. Consequently, female students would surf the internet with extreme caution, while male students were more likely to ignore the potential risks, such as cyber-attacks and online harassment. The novel findings of the current study dispute this relationship between gender and college students' satisfaction with Web 2.0 technology.

These findings indicated no statistically significant differences in satisfaction with Web 2.0 technology among people of different age categories. The immediate implication is that college students' satisfaction with these tools is not affected by age, contrary to prior research and conventional expectations. For instance, in the literature reviewed by Alajmi (2011), there was an overwhelming body of research indicating that endorsement of Web 2.0 technology was significantly higher among youths, especially college students (aged between 18 and 22 years), as compared to older adults. However, there are prior studies that support the findings obtained
here. Dooley et al. (2012) argued that a shift in technology usage was beginning to emerge, whereby more older adults had started embracing technology, thus gradually closing the digital divide between young and old. Therefore, the non-significant results obtained in the current study are reflective of the new realities pertaining to a shifting demographic space. The growing demand for online education for adult students and the changing demographics justifies the need to provide practical, long-term teaching approaches.

Lastly, the findings of the current study indicate there are no statistically significant differences in college students' satisfaction with Web 2.0 technology in terms of income. Specifically, the findings indicate that a students' level of income does not determine their degree of satisfaction with Web 2.0 technology. These findings are inconsistent with some of those obtained by prior scholars. For instance, Mason (2016) found that 69.9% of people with lower income (less than $19999) perceived that they improved their course satisfaction. On the contrary, a higher percentage (77.8%) of people with a higher income (ranging between $50,000 - $59,999) believed this to be true.

The impact of ethnicity on satisfaction with these tools is understudied. Mason’s (2016) study found a consensus among racial categories that Web 2.0 technologies improved their course satisfaction. However, research illustrates that there is a digital gap in technology adoption based on ethnicity. Black and Hispanic adults remain less likely than whites to say they own a traditional computer or have high-speed internet at home, according to a Pew Research Center survey conducted in early 2019 (Perrin & Turner, 2019).

**Engagement of Learners and Web 2.0 Technology**

Learner engagement is the extent to which college students build commitment to their courses, which ultimately helps them to persist to graduation. The importance of learner
engagement has been emphasized in several studies, such as those by Brunvand and Byrd (2011) and Kuo et al. (2014). In the current study, the researcher found there were no statistically significant differences in student Web 2.0 engagement in terms of age, gender, race, and income. These novel findings indicate that gender is not a statistically significant determinant of adult learners’ engagement. Since no previous study has examined this specific relationship, it contributes to the existing literature by filling a knowledge gap.

Second, this study’s findings, also inconsistent with prior work, indicate that age was not a significant determinant of college adult learners’ engagement with Web 2.0 technology. According to a survey conducted by Pew Research Center, approximately 90% of American adults aged 20-29 have regular access to common social media platforms on the Web 2.0 infrastructure. However, the number of those that actually access social media sites decreases gradually as age increases. For instance, while 82% of people aged 30-49 regularly access social media, only 69% of those 50-64 do so. However, the research conducted by Pew Research Center (2019) may not be reliable since it has not been published in a scientific journal. In a more scientific qualitative study, Sharp (2017) found some people were afraid of engaging in Web 2.0 technology resources such as social media sites. However, Sharp did not assess engagement in terms of demographic variables of gender, age, income, and ethnicity. As such, the current study is the first one to scientifically address the issue of student Web 2.0 engagement in terms of age.

Similarly, level of income has been previously reported as a significant determinant of engagement with Web 2.0 technology. However, the current study reported no evidence for the impact of income on the engagement of the adult learner. According to Pew Research Center (2019), adults who have higher incomes also have higher engagement levels with web-based...
tools, such as social media sites. Conversely, individuals with smaller incomes have lower engagement levels. Again, however, this is not a scientifically validated survey, so the findings cannot be taken for face value. According to Andrew and Kumar (2019), a higher level of income may not be a significant determinant of Web 2.0 engagement, especially if the individuals of interest do not wish to engage with it. Wealthier individuals may also reside in areas or regions with an unreliable broadband connection. Therefore, the findings of the current study may be valid, considering there are many factors that may affect the relationship between income and student Web 2.0 engagement.

Lastly, the findings of the current study indicate that ethnicity is not a significant determinant of adult learners’ engagement with Web 2.0 technology. These findings contrast those obtained by other scholars. According to Magda and Capranos (2020), there are significant differences in student enrollment in online courses across ethnic categories. For instance, while 79% of all Whites have enrolled in online courses, only 6% of African American students have done so. Consequently, technology engagement is probably higher for the Whites than for the African Americans. Similar findings have been reported by other scholars, such as Kumi-Yebaoh et al. (2019) and Schindler et al. (2017). Findings obtained in prior research overwhelmingly indicate ethnicity is a significant determinant of student engagement with Web 2.0 technology.

Web 2.0 Technology Comfort Level

In the current study, there were no significant differences in adult learners’ level of comfort using Web 2.0 technology in terms of the demographic variables of gender, race, age, and income. The findings imply that none of the four demographic variables is a significant determinant of adult learners’ comfort level when using the technology. The findings are novel and add a significant bit of knowledge to existing literature since no such study has been
conducted before. In prior studies, such as Horrigan (2016), the findings indicate that generally, 48% of U.S. adults are comfortable using Web 2.0 technology. A similar study was conducted by Mason (2016), who reported varied findings. Mason (2016) and Horrigan (2016) did not focus on students, but rather United States citizens in general.

Digital Literacy and Demographic Variables

Digital literacy is an individual's degree of skill in appropriately and effectively using contemporary technologies. In education, this concept encompasses learners’ abilities to create, collaborate, and share Web 2.0 technologies, and to do so responsibly. According to Dieck (2018), digital literacy entails not only knowing how to effectively consume digital content but how to create and share it as well. In the current study, the researcher found no significant correlation between digital literacy and any of the four demographic variables of gender, age, income, and ethnicity. In the existing literature, there are no studies conducted on the association between digital literacy and gender. Consequently, the current study adds new findings to the existing literature by reporting the absence of a significant correlation. Second, these findings, in terms of the association between age and digital literacy, contrast with those of O'Keeffe (2014). Specifically, O'Keeffe (2014) reported that younger people were more tech-savvy and had more profound digital literacy skills as compared to people belonging to older generations, such as the baby boomers. The contrast in findings can be attributed to differences in study location and settings.
Recommendations for Further Research

One recommendation is to compare ethnic differences with how they perceive and use technology in learning. In our increasingly global society, research in this area can expose learners to diversity and culture and bring open-mindedness to online learning and the workplace. This diversity of digital learning styles indicates the need to understand and adjust online courses and teaching styles to create an engaging environment that challenges and empowers all learners.

Future work should also include a mixed-method study that focuses on specific Web 2.0 technologies to assess the learners' perception of using these applications in face-to-face or online instruction. There are so many choices available. It can be challenging to identify which Web 2.0 technology improved the learners' perception or digital literacy skills and to establish best practices in integrating these tools in learning.

The final recommendation is to conduct more research on socio-economic- and demographic-based perceptions of Web 2.0 technologies in learning to improve digital literacy. The digital divide has expanded, from broadband access to understanding how to use technology to navigate a global society. The research demonstrated that despite efforts to close the gap between adult learners who have access to devices and the internet, a digital equity problem still exists regarding age, economic status, and ethnicity. Higher education can help close the gap and advance equity in providing opportunities to educate adult learners on using digital technologies in learning.
Implications for Digital Literacy

This research promotes the importance of higher education institutions integrating Web 2.0 technologies in an online learning curriculum to improve digital literacy and digital inclusion. Digital literacy skills are important for adult learners to participate in our digital society. There are policies and processes to ensure learners have access to the internet and mobile devices, but digital equity goes beyond equipment and broadband. This includes training instructors on best practices to incorporate technology into instruction and provide learners with a consistent digital learning experience.

In a society increasingly dependent on computer and web-based technology, preparing adult learners for the workplace of the future is difficult, but it is imperative to find solutions. Addressing the digital divide can lead to growth in the economy, more job opportunities, increased education options, and access to information.

Conclusion

This study examined the differences in perceptions of satisfaction, engagement, comfort, and confidence levels using Web 2.0 technologies online, based on gender, age, income, and race. It also found correlations between digital literacy, satisfaction, engagement, comfort, and confidence. The key findings demonstrate that increased access to the internet and the use of Web 2.0 technologies are transforming the digital experience for women, low-income groups, digital natives, digital immigrants, and ethnic groups.

Despite the similar outcomes on satisfaction, engagement, and confidence, limited gender differences arise on the comfort level dimension when using some Web 2.0 applications. The study found that women were less comfortable in virtual meetings compared to men, evoking literature on the marginalization of women in the physical workplace.
Notably, the age groups 24-35 and 55 and older had similar perception outcomes regarding engagement and comfort level using these tools for online learning. The shared learning experience for these groups could be a result of comparing the online platform with in-class settings. Some of these participants may not have taken an online course before, and online learning can be a different case from using Web 2.0 technologies for social engagement.

Furthermore, participants with an income of $19,000 or less and $20,000-29,000 demonstrated that access to the internet and using Web 2.0 technologies, possibly due to the ubiquity of smartphones, impacted their overall satisfaction, engagement, comfort, and confidence. With fewer options for online access at their disposal, many lower-income Americans are relying more on smartphones.

The data also showed differences in ethnic groups. The Hispanic and Other races revealed an overall positive perception of satisfaction, engagement, comfort, and confidence, but Hispanics may be suffering from a digital divide when using Web 2.0 technologies at work. Similarly, African Americans were less comfortable with video and picture sharing compared to Caucasians. Chan (2017) noted that students of color often considered the implications for their racial community and that their post on social media may be interpreted as representative of their whole racial group. This final disparity in comfort with web-based tools invites further research on socio-economic and demographic determinants.
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APPENDIX A

LETTER OF CONSENT TO PARTICIPANTS
Dear Colleagues:

I want to invite you to participate in a valuable quantitative research study on adult learners’ use of Web 2.0 technologies in online learning to determine digital literacy. Your time and feedback are very much appreciated.

The following survey consists of 40 questions in multiple-choice or multi-part Likert style formats. This survey is designed to take no more than 10–15 minutes to complete. Please answer all questions to the best of your ability. All participant feedback is confidential and protected by federal statute. The survey asks general demographic questions; however, no identifying information is required (i.e., name, student ID, etc.). Your answers to demographic questions will provide the researcher with information regarding the participating population. The information collected from the demographic questions will be used for statistical purposes in identifying student satisfaction with Web 2.0 technologies in online courses and their impacts on digital literacy.

Upon completing the survey administration period, all data will be transferred from SurveyMonkey to a secure Excel document. The data file will be saved as a password-protected file as part of a secure account on OneDrive for three years.

The survey is a one-time, voluntary event. No remuneration will be provided for participation. You may opt not to complete/answer any portion of the survey. The decision to discontinue or decline participation will not negatively affect your enrollment. Thank you for taking the time to complete this survey and be part of this study. Through data collection, I hope to provide higher education faculty and staff with a better understanding of students’ attitudes on Web 2.0 technologies and the impact online learning has on digital literacy. Should you have any...
questions about the survey or research, please email me at ltd1@msstate.edu. It is my professional and ethical responsibility to provide answers to any questions or concerns.

Sincerely,

LaMetrius Daniels
APPENDIX B

WEB 2.0 AND DIGITAL TECHNOLOGIES IN HIGHER EDUCATION SURVEY
Section I

**Demographic Information**

1. What is your gender?
   - Male
   - Female

2. What is your age?
   - 24 to 35
   - 36 to 44
   - 45 to 54
   - 55 or older

3. What is your ethnicity?
   - Black or African American
   - Hispanic or Latino
   - White/Caucasian
   - Other

4. What category best represents your current income?
   - Less than $19,999
   - $20,000 – $29,000
   - $30,000 – $39,999
   - $40,000 – $49,999
   - $50,000 – $59,999
   - $60,000 and over
### Section II: Questionnaire Items

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Questionnaire Items</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Web 2.0 technologies are useful in my online learning courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Web 2.0 technologies are useful in my online learning courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>I feel that using Web 2.0 improved my satisfaction with using technology in my online course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>I feel that using Web 2.0 will improve my grades</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Web 2.0 technologies are useful in keeping me engaged with my peers in online courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Web 2.0 technologies are useful in keeping me engaged with my professor in online courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Web 2.0 technologies helped me with engaging with the content in online courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section III: Adult Learners’ Engagement in using Web 2.0 Technologies in Online Courses

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Questionnaire Items</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>How easy or difficult was it to use a lecture or presentation video capture (Panopto, Knovio, YouTube, etc.) in your online course?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>How easy or difficult was it to use social networking (Facebook, Twitter, LinkedIn) in your online course?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>How easy or difficult was it to use instant messaging (Google Messenger, GroupMe, Yahoo Chat, etc.) in your online course?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Instructions:
- Please check (√) the response that best reflects your position (Strongly agree=4, Agree=3, Disagree=2 and Strongly disagree=1).
- Please rate (√) your comfort level with using the following Web 2.0 technologies in online learning (Very easy =4, Easy=3, Difficult=2 and Very difficult=1).
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Questionnaire Items Section V (continued)</th>
<th>Very confident</th>
<th>Somewhat confident</th>
<th>Only a little confident</th>
<th>Not at all confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Overall, how confident do you feel using computers, smartphones, or other electronic devices to do the things you need to do online?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>21.</td>
<td>Overall, how confident do you feel using Web 2.0 technologies in online courses?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>22.</td>
<td>Overall, how confident do you feel using Web 2.0 technologies at work?</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Instructions:** Please check (√) the response that rates your digital literacy with using Web 2.0 technologies in online learning (Very well = 4, Somewhat well=3, Not too well=2, and Not well at all =1).

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Questionnaire Items Section VI</th>
<th>Very well</th>
<th>Somewhat well</th>
<th>Not too well</th>
<th>Not well at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.</td>
<td>How well does the statement describe you? When I get a new electronic device, I usually need someone to set it up or show me how to use it.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>24.</td>
<td>How well does the statement describe you? I am more productive because of all my electronic information devices.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>25.</td>
<td>How well does the statement describe you? I find it difficult to know whether the information online is trustworthy.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
APPENDIX C

IRB APPROVAL LETTER
From: prn199@msstate.edu
Sent Date: Monday, February 03, 2020 10:16:42 AM
To: jla17@msstate.edu, ltd1@msstate.edu, mco18@msstate.edu, pks14@msstate.edu, sbk3@msstate.edu
Cc:
Bcc:
Subject: Protocol Inactivated: IRB-19-130, A Study of the Relationship between Web 2.0 and Digital Literacy and their Impact on Students’ Satisfaction with Online Course and Learning Management

Message:
Protocol ID: IRB-19-130
Review Type: EXEMPT
Principal Investigator: James Adams

You are receiving this inactivation notification for one of the two following reasons:

1) Exempt Determinations:

This protocol has been granted an exemption determination. Based on this exemption, and in accordance with Federal Regulations which can also be found in the MSU HRPP Operations Manual, your research does not require further oversight by the HRPP.

Therefore, this study has been inactivated in our system. This means that recruitment, enrollment, data collection, and/or data analysis can continue, yet personnel and procedural amendments to this study are no longer required. If at any point, however, the risk to participants increases, you must contact the HRPP immediately.

2) Non-Exempt Approvals ( Expedited or Full Board):

A request to inactivate (with the submission of a final report) your non-Exempt protocol was submitted and approved. If this is the case, there should be no further data collection or data analysis conducted under this protocol.

For additional questions pertaining to this study, please contact the HRPP at irb@research.msstate.edu.