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Student Use Of Technology For Collaboration

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by

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DEDICATION

This dissertation is dedicated to my late mother, Lois Cadwell-Gordon. Thank you, mom, for your unwavering love and being my angel throughout this process. Thank you to my late grandmothers, Thelma Cadwell and Lille Gordon. Both of whom were never afforded the opportunity to attend college. To my daughter, Lanie, thank you for helping mommy through this process. A special thank you to my dad, Jay D Gordon. Your unconditional love and support ultimately enabled me to reach this level.

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"Trust in the LORD with all your heart, lean not on your own understanding;

In all thy ways acknowledge him, And he shall direct thy paths." (Proverbs 3:5-6)

I start by giving honor to God. This has been one of the hardest things I have done in my life. However, I know it was he who brought me through. My mom always told me education opened doors to many opportunities. I have worked so hard throughout the years to make her proud. "Mom…I hope I made you proud." Thank you to my brother Omari and my dad. My dad has helped me in more ways than I could ever thank him. Dad, thank you for the countless talks and the countless words of encouragement. Thank you for being my "Number 1 Fan". I would not be where I am without your encouragement. Lanie, thank you for doing homework with me. Lanie, everything I do is for you. Thank you for supporting mommy on this journey.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

Education has shifted in more recent years from teacher-centered instruction to student-centered instruction with a focus on student collaboration. “The U.S. Department of Education has recognized the importance of collaboration skills, and the International Society for Technology for Education (ISTE) has developed and published the National Educational Technology Standards for students, teachers and administrators to nurture collaboration skills for students” (Lee et al., 2015, p. 123). The term, collaboration, is included in national and Michigan educational standards. Although the term “collaboration” is included in the standards, the definition of collaboration has not been defined by the U.S. Department of Education, Common Core State Standards, or the State of Michigan. Across numerous disciplines, collaboration has been defined. Collaboration often means sharing and enables students to interact with one another. (Stahl, Koschmann, & Suthers, 2006). Mattessich, Murray-Close, and Monsey, (2001) defined collaboration as “mutually beneficial and well-defined relationship entered into by two or more organizations to achieve common goals” (p. 4). Richey, Klein, and Tracey (2011) defined collaboration as using different methods to encourage students working together.

The U.S. Department of Education, (2017b) mentions the need to reinvent our approach to learning and collaboration. As such, the U.S. Department of Education in conjunction with Michigan Department of Education created standards for students, which incorporate collaboration skills. Across all standards in Michigan, apart from math, collaboration is required. Within the State of Michigan collaboration is a part of the Michigan Merit Curriculum guidelines, Common Core Standards, Common Core Technical Standards, Michigan Educational Technology Standards for Students and Career Readiness Standards.

In schools today, students are regularly required to participate in collaborative learning activities such as group projects/discussions and presentations in classes (Kai-Wai Chu &

Kennedy, 2011). “Collaborative learning can be highly developmental, engaging the students in making sense of their learning and in reconstructing knowledge” (McConnell, 2006, p. 15). Collaboration also helps students make social connections.

Statement of the Problem

Standards are goals for what students should learn. “Federal policies encourage states to adapt high standards, but do not touch on curriculum, which is a state and local matter” (U.S. Department of Education, 2017a, para. 2). Therefore, standard implementation decisions are made at the state level, in conjunction with private institutions. Michigan law requires students to meet the Michigan Merit Curriculum (MMC) requirements while achieving specific standards in English, mathematics, online learning experience, physical education and health, science, social studies, visual performing and applied arts and world language. In the State of Michigan collaboration is mentioned across multiple standards platforms.

The State of Michigan relies heavily on Common Core State Standards (CCSS) and MMC. Under CCSS collaboration is required for English language arts & literacy in history/social studies, science and technical subjects. Under the writing standards comprehension and collaboration section students are required to produce collaborative writings. Under CCSS speaking and listening standards students are required to “Initiate and participate effectively in a range of collaborative discussions” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 50). Students are also required to “work with peers to promote civil, democratic discussions and decision making, set clear goals and deadlines, and establish individual roles as needed” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 50).

Michigan also has curriculum standards for high school graduation. These standards are called Michigan Merit Curriculum (MMC) and are in conjunction with CCSS. According to the Michigan Department of Education (2014) the curriculum "doesn't describe the instructional materials and approaches" (p. 1). MMC allows school districts freedom in determining the exact graduation requirements. The MMC believes there is a need to prepare students to be global contributors in society. According to Michigan Department of Education (2014), Michigan Merit Curriculum (MMC) should allow students to be productive members in the workforce.

The Michigan Department of Education in conjunction with the U.S. Department of Education also has college and career ready standards. College and career ready standards are standards that help students compete in the world around them. Under college and career ready standards students must interact and collaborate with others, effectively converse and collaborate with diverse partners and work productively in teams while using cultural/global competence.

Technology plays an intricate role in collaboration. "Technology can enable personalized learning or experiences that are more engaging and relevant" (U.S. Department of Education, 2017b, p. 12). Many schools see the role technology plays in the classroom. The State of Michigan technology standards, students are required to acquire technology literacy. "Technology literacy is the ability to responsibly use appropriate technology to communicate, solve problems, and access, manage, integrate, evaluate, and create information to improve learning in all subject areas and to acquire lifelong knowledge and skills in the 21st century" (State of Michigan, 2009, p. 1). Technology allows for students to work alone at different times, as well as, working together simultaneously. (Michigan Department of Education, 2006). ISTE (2016) implies "technology provides a forceful means to enable students to connect with others and empower them to collaboratively and individually tackle authentic problems" (p. 10). U.S. Department of Education,

(2017b) pointed out “Technology-enabled learning environments allow less experienced learners access and the ability to participate in specialized communities of practice, graduating to more complex activities and deeper participation as they gain the experience needed to become expert members of the community” (p. 9).

In the future, students will be required to use technology and their technical skills in collaboration (Michigan Department of Education, 2017). According to the U.S. Department of Education (2017b), technology provides increased ways to peak interest and provide opportunities for increased collaboration. The CCSS requires students to use technology for writing. Under the literacy in history/social studies, science and technology subjects 6-12 students are required to “Use technology, including the Internet, to produce, publish and update individual or shared writing….” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 66). CCSS has Common Core Technical Core Career Ready Practices (CCTC) section, which includes the use of collaboration. When looking at the productivity in teams while using cultural/global competence standard; students need to be optimistic team members and also ensure everyone plays their role in the overall effectiveness of the team. (Advance CTE: State Leaders Connecting Learners to Work, 2017).

The State of Michigan Department of Education has technology standards called Michigan Integrated Technology Competencies for Students (MITECS). The MITECS are created in conjunction with International Society of Technology in Education (ISTE) to help students obtain the necessary skills for the digital age and life and collaboration is a component of these standards. MITECS/ISTE standard 7, Global Collaborator, requires students to “use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally” (ISTE, 2016, p. 15). According to ISTE (2016), students will:

7a. Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

7b. Use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

7c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

7d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions. (ISTE, 2016, p. 15)

Under the MMC technology and collaboration are also intertwined. In the core, principals of online learning students are required to participate in a meaningful online experience. There are six characteristics for a quality online learning experience, with the first one focusing on collaboration among students. The first standard, collaborative experience between students, states:

> All students are required to be involved in developing working relationships with an educator and other students online. Look for online collaboration tools, such as a learning management system that must also include collaborative tools such as discussions/forums, Wikis, and Google Docs and Spreadsheets where students can work cooperatively asynchronously and synchronously" (Michigan Department of Education, 2006, p. 2).

The education system was formed on conventional learning and always carried out by the teacher. Problems can arise with students being engaged in the learning process (McConnell, 2006, p. 15). Collaboration important but it is difficult for educators to develop strategies for implementation (Lee, Huh, & Reigeluth, 2015). There are standards across multiple platforms which include collaboration, but the U.S. Department of Education and the Michigan Department of Education have limited measures to determine if and how collaboration has occurred.

Assessment of student's collaboration is important. "Assessing student achievement of course objectives, especially in a situated collaborative environment" (McNeil, 2015, p. 74) is key. An evaluation of a student's collaboration efforts may be a key component in determining if collaboration is being achieved. Performing an evaluation on student collaboration while using technology may provide lawmakers with data to determine if collaboration is effectively aligned with the standards. The MMC mentions "it is unlikely that any kind of testing-out-assessment could truly 'test' the process that occurs when a student engages with content, other students, and a teacher online" (Michigan Department of Education, 2014, p. 9). Teachers need to make sure students know that expectations are set high for academic success. (U.S. Department of Education, 2017a). Collaboration is an important skillset for students but how they obtain the skill is not articulated thus difficult to measure. However, if implemented properly collaboration has the ability to shape the learner of today for experiences tomorrow.

Purpose and Research Questions

Historically, student's educational opportunities have been limited to the walls of a classroom. In school's students need to understand the importance of collaborating locally and abroad. (Cahill, 2014). To be successful in the 21st century workforce, students need to form meaningful connections with peers. U.S. Department of Education (2017a) states for students to be prepared for higher education and remain competitive in a globally changing society schools should intertwine 21st century skills in the classroom. The 21st century skills include the use of collaboration. "The field of education now realizes the insufficiency of throwing digital tools into classrooms, without further support and expecting valid changes in teaching and more importantly, improved student outcomes" (ISTE, 2016, p. 2). Mutually accountable technology helps encourage teamwork and promotes students' use of virtual collaboration in future careers. ISTE (2016)

further explains students need skills to enter the digital age of work and life. The skills needed to reach this plateau include collaboration. To date, little evaluation has been conducted on current student use of online tools for group collaboration and if the current use is aligned with state and national standards.

The purpose of the study is to examine the current use of online tools for group collaboration among high school students. The research questions that guided the study are:

1. Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning?
2. To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with collaboration?
3. What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?

It is the aim of this study to determine the current state of student collaboration using online learning tools to identify the existing gaps in teaching and measuring student online collaboration.

Theoretical Constructs

Social constructivists theorist explain that there is no one meaning of collaboration (Richey et al., 2011). In a social constructivist environment, the goal is for student learning to be maximized. Social constructivism was developed by Lev Vygotsky in the 1930's and is an extension of Piaget's constructivism theory. Vygotsky's zone of proximal development [ZPD] is derived from the social constructivist theory. Vygotsky's ZPD focuses on three theoretical positions within the social constructivist theory. The first, implies, child development is an

independent variable of learning. The next mentions that learning being a developing process Lastly, one can overcome the first two individually by combining both (Vygotsky, 1978). ZPD describes the most important interactions between the educational culture and the pupil (Luckin, 2001). Vygotsky maintains learning should match with the development level of a child, and for children to grow, they require specific social interaction. He further states that children are much more capable of doing collaborative activities under the supervision of adults.

Communication theory has had an impact on many different disciplines. Communication involves people using private interactions and interactions among multiple groups of people (Richey et al., 2011). Wilbur Schramm proposed one of the first communication model's that used interaction. His model focused on senders and receivers interacting at the same time. We have seen a shift in communication theory from it being interactive to creatively sharing (Richey et al., 2011). This new approach is called transactional perspective. Milton Campos presents a model which falls under this new perspective. Campos' work is influenced by Piaget, Grize and Habermas. Campos created Ecology of meanings. Ecology of meaning is an "ever moving open systems with logical structures (the universals of communication) and meanings made possible by linguistic, cultural and rhetorical competences (the situated contents of communication)" (Campos, 2007, p. 400). Campos (2007) points out "The interplay of the configuration of meanings and associated images of the world in a given personal, group, or societal interaction enables the possibility of constructing and co-constructing in a knowledge-creation zone" (p. 402).

Assumptions

Based on my experience with high school students who participated in this study there are four assumptions that may impact this study. First, all individuals know the standards. The standards are restricted towards only one subject area. The students have been pre-exposed to collaboration. Lastly, making the assumption that because my student participants are collaborating using technology, I have access to the data.

Definitions and Key Terms

Collaboration: Enables learners an instructional method that promotes learners connecting with peers to transfer information, and promote sharing for a common goal (Cahill, 2014). Serce and Yildirim (2006) defined collaboration as "synchronous activity of a gathering of parties with diverse skills and backgrounds, contributing those skills and resources in an atmosphere of trust, retrospect and flexibility, in order to achieve shared goals and objectives" (p. 167).

Group Collaboration: Enabling students to bridge the divide by working together and sharing of information with their peers though collaborative learning (McConnell, 2006).

Vygotsky Zone of Proximal Development [ZPD]: "The distance between actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p.76).

Standards: Standards are goals for what students should learn. "Federal policies encourage states to adapt high standards, but do not touch on curriculum, which is a state and local matter" (U.S. Department of Education, 2017a, para. 2).

Summary

The U.S. Department of Education and Michigan Department of Education recognizes the importance of collaboration but defining collaboration in schools and how to measure collaboration is lacking. The State of Michigan Common Core State Standards (CCSS), Michigan Merit Curriculum (MMC), Michigan Integrated Technology Competencies for students (MITECS) all expect students to collaborate using technology. Educators are given the standards but are not equipped with the tools on how to incorporate them into the classroom.

The purpose of the study is to examine the current use of online tools for group collaboration among high school students. The following questions were examined: (1) Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning? (2) To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with collaboration? (3) What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?

It is the aim of this study to determine the current state of student collaboration using online learning tools to identify the existing gaps in teaching and measuring student online collaboration. The conceptual framework to this study includes social constructivist theory, communication theory and its relation to learning design and technology. The research questions helped guide the research study. Definitions and key terms were reviewed previously. In the next chapter, I discuss relevant literature to the study.

CHAPTER 2 LITERATURE REVIEW

Introduction

The purpose of the literature review is to provide a critical review of the literature related to secondary student group collaboration through the use of online technology tools. The literature review is broken down into four different constructs. The first construct focuses on online tools used for student collaboration. The next focuses on state and national and state writing standards with collaboration. Followed by national and state speaking and listening standards with collaboration. The final construct focuses on current alignment with student collaboration and technology standards. Finally, the conclusion highlights the summary of research findings. The conclusion also focuses on inferences made by numerous theorists, researchers, and educators on the effects collaboration has on student learning.

Changes in students' lifestyles are creating a need to challenge distance education and a revamp of the education system (Ge & Tok, 2003). "The U.S. Department of Education has recognized the importance of collaboration skills, and the International Society for Technology for Education has developed and published the National Educational Technology Standards for students, teachers and administrators to nurture collaboration skills for students" (Lee et al., 2015, p. 123). Students in today's information age need to develop more skillsets on working with peers and on becoming better problem solvers. (Schmitz, Baber, John, & Brown, 2009).

"Collaborative learning refers to the tasks that require joint intellectual efforts among students or between students and teachers" (Kai-Wai Chu & Kennedy, 2011, p. 582). According to Lukman and Krajnc (2012) When students work collaboratively, they develop goals together. Student-student interaction and collaboration is known to increase in virtual learning environments.

Technology is everywhere and in everything. According to (Laru, Näykki, & Järvelä, 2012), technology is so transformational that it can change learning. People are living within a technical uprising and computers are changing rapidly (McCabe & Meuter, 2011). Today the use of technology in the classroom is becoming more prominent. With the explosion of emerging technologies, socialization is becoming more and more a part of one's everyday life. In schools, students are being encouraged to use technology. Technology is changing the way students are taught. Prior to the advancement of technology, students were taught in a face-to-face classroom. Muir-Herzig (2004) implied "In a traditional teacher-centered classroom, the students are the listeners and followers. The teacher is the one given freedom to move about, to initiate actions and interactions, to ask questions and to set limits on activity time" (p. 112). In a technology driven environments, the student serves as the facilitator and are in control of the learning experience. Technology enables the students to transform the classroom into a collaborative environment.

Online Tools used for Technology Collaboration

In education today there is more of a need to look at Web 2.0 technologies (Kear, Woodthorpe, Robertson, & Hutchison, 2010). Online collaboration is drawing more interest because more people are interested in social software (Gouseti, 2013). Web 2.0 environments offer a variety of tools and technologies (Chelliah & Clarke, 2011). Collaborative technology is broad terminology and it features multiple technology tools (Raghupathi, 2016). Collaborative technology promotes teambuilding and encourages learners to foster communication through virtual collaboration (Cahill, 2014). "Collaborative learning tools refer to online technologies such as wikis, blogs, instant messages, discussion boards, synchronous chats and email used among different individual to accomplish a common task" (Kok, 2011, p.46). These applications allow users to create group workspaces co-authoring a single document. There are applications which

use profiles of people, group chats between group members, and task schedulers (Koh & Lim, 2012). Social software allows control over their learning without restriction to time and place (Beldarrain, 2006).

Common applications of Web 2.0 include: blogs, social networking sites, podcasts, virtual online games and wikis. Blogs are group of writings, which are, available on the Internet (Beldarrain, 2006). Blogs can provide personal reflection and collaboration through sharing of resources. Blogs are similar to personal diaries, with social networking allowing individuals to create profiles and share connections with other people. Wikis enable the use of technology to create collaborative works and many institutions make wikis accessible through their virtual learning communities (Kear et al., 2010).

Wikis are the most commonly used application in Web 2.0 (Kai-Wai Chu & Kennedy, 2011). Wikipedia is the wiki that most people are familiar with (Schoenberg, 2011). Wikis are a strong collaborative learning tool. Wikis is a website in the Internet, which enables people to edit pages in a collaborative environment (Su & Beaumont, 2010). Wiki software allows users to collaborate through writing, editing and create HTML linked documents. You can make adjustments and track changes that are done (Kear et al., 2010). In a school setting wikis allow for communication with students and teachers. (Trocky & Buckley, 2016). Anyone can add and edit content in a wiki. In a wiki learners have the ability to create posts, share ideas and change the setting of the learning environment (Anastasiades & Kotsidis, 2013). Wikis can be viewed as providing an archive of interaction (Trocky & Buckley, 2016). Wikis take advantage of the main characteristics of Web 2.0. Collaboration is promoted when wikis are used (Laru et al., 2012). Wikis promote collaboration in an environment which promotes sharing of information (Kear et al., 2010). Wikis helps facilitate learning at a greater distance. As a result, exchanges are increased

and students build upon what they have learned (Ertmer et al., 2011). Figure 1 illustrates the effects wiki's have on collaboration.

Wiki property	Resulting effect
Web 2.0 technology	Familiar to, and within reach for, non-tech savvy students
Document co-editing	Easy to asynchronously produce content
Automatic publishing	Easy to share, exchange, and access material
Non-hierarchical	Student-centered and owned workspace

Figure 1: Wiki's Properties Enabling Collaboration (Ertmer et al., 2011, p. 252). Used with permission.

Google Docs was introduced in 2009 as free browser-based web storage. In 2012, Google drive became the home of Google Docs. Google Drive includes different application software including spreadsheet, word processing, presentations management, and forms (Ishtaiwa & Aburezeq, 2015). Google Docs encourages people to work alone and work with peers. It allows people to edit material and collaborate on shared documents (Zheng, Lawrence, Warschauer, & Lin, 2015). Two people can edit a document at the same time with Google Docs (Kai-Wai Chu & Kennedy, 2011). Google allows users to upload files to a storage area. The shifts from PC to a cloud-based system. When you use Google Docs saving manually is not required because changes Docs save the changes automatically. Google Docs enables users can save documents in different formats, including Microsoft Word and Adobe PDF (Ishtaiwa & Aburezeq, 2015).

As cited in Dekeyser & Watson (2006), you can obtain Google Docs for free and it's a collaboration tool which is easy to use. Characteristics that make Google Docs usable and effective are:

- The application's simplicity: By registering for a log-in from Google and having an installed browser application, a user can begin collaborating on Google Docs.
- The user-friendly application: Google Docs application does not require technical knowledge, with set-up for collaboration with others is easy.

- Editing online: Google Docs support multiple editors making document changes efficiently, with update conflicts rarely occurring.

Using Google Docs has been found to be problematic. Some problems which have occured include formatting issues, conflicts when more than one person is in a document at a time and lack of offline Internet support (Ishtaiwa & Aburezeq, 2015).

Not enough investigation has been done to determine if collaboration tools have an effect on education. (Kear et al., 2010). Teachers see collaborative leaning as being positive to the education community, but there has not been enough research if collaboration is beneficial or if collaboration, when incorporated with technology, causes more issues (Kear et al., 2010). If you are not using technology correctly, collaboration will not be implemented correctly (Ishtaiwa & Aburezeq, 2015). Many research strategies have been developed on distance education rather than using collaboration in an instructional setting for groups and teambuilding (Cahill, 2014).

There are multiple collaboration tools but to date research is lacking on whether they are beneficial in the education world (Kear et al., 2010). People using collaboration tools need to be on the same page to eliminate and barriers to communication (Cahill, 2014). When using online tools all members need to participate in the discussion (Kear et al., 2010). Wikis need to include some structure because when it is missing it prohibits all students from developing meaningful participation (Kear et al., 2010). Wikis also allow for more student work to be plagiarized (Su & Beaumont, 2010).

National and State Writing Standards with Collaboration

Collaboration is mentioned within the Common Core State Standards for English language Arts & Literacy in History/Social Studies, Science and Technical Subjects and has been officially adopted by 41 states of the 50 states. The only states that have not adopted Common Core State standards are: Alaska, Florida, Indiana, Minnesota, Nebraska, Oklahoma, South Carolina, Texas and Virginia.

> The Common Core Standards for English Language & Literacy in History, Social Studies, Science, and Subjects ("the Standards") are the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of K-12 standards in order to help ensure that all students are college and career ready in literacy no later than the end of high school. (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 3)

The standards are broken down at different grade bands. The high school grade bands are for 9-10 and 11-12.

The Common Core State Standards for English language Arts & Literacy in History/Social Studies, Science and Technical Subjects are broken down into anchor standards for reading, writing, speaking and listening and college and career readiness for language. "The CCR standards anchor the document and define general, cross-disciplinary literacy expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 4). Collaboration is introduced in writing and speaking and listening. In the college and career readiness anchor standards for writing under production and distribution of writing students are expected to "use technology, including the Internet, to produce and publish writing and to interact and collaborate with others" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 41). Extending the production

and distribution of writing in grades 9-10 students are expected to "Use technology, including the Internet to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically." (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 46). In grades 11-12 students are expected to "Use technology, including the Internet to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 46). In the writing standards 35 of the 41 adopted states use the exact wording from the Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects. The states that use the exact wording include: Alabama, Arizona, Arkansas, California, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Mississippi, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Vermont, Washington, West Virginia, Wisconsin and Wyoming. Of the 41 adopted states 2 states, North Carolina and Utah had no standards attached to their state department of education page. Three states that were not a part of the Common Core had the exact same wording under writing; Alaska, Florida and Minnesota. New York eliminated the collaboration in the writing standard. Three states changed their wording of the standards. These states include: Colorado, Massachusetts and North Dakota.

Colorado has prepared graduate competencies in reading, writing, and communicating. In this area prepared graduates in Colorado's education system are expected to "Collaborate effectively as group members or leaders who listen actively and respectfully pose thoughtful

questions, acknowledge the ides of others, and contribute ideas to further the group's attainment of an objective" (Colorado Department of Education, 2010, p.7). Collaboration is further mentioned in reading, writing, and communicating under 21st century skills. Colorado points out:

> Reading, writing, and communicating must encompass collaboration skills. Students should be able to collaborate with each other in multiple settings; peer groups, one-on-one, in front of an audience, in large and small group settings, and with people of other ethnicities. Students should be able to participate in peer review, foster a safe environment for discourse, mediate opposing perspectives, contribute ideas, speak with a purpose, understand and apply knowledge of culture, and seek others' ideas (Colorado Department of Education, 2010, p. 10).

Massachusetts and North Dakota still have writing standards, but the wording is slightly different. In Massachusetts the college and career readiness anchor standard is the same as the CCSS but Production and Distribution of Writing (6) is different. Students are expected to "Use technology, including current web-based communication platforms, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information" (Massachusetts Department of Elementary and Secondary Education, 2017, p. 117). Under North Dakota's writing standards students "Use technology, including the Internet to produce, publish, and update individual or shared writing products, including new arguments or information. Use technology 's capacity to link to other information and to display information flexibility and effectively" (North Dakota Department of Public Instruction, 2017, p. 56).

National and State Speaking and Listening Standards with Collaboration

Speaking and Listening is an important aspect for students to take part in discussions as a class or in groups. National Governors Association Center for Best Practices & Council of Chief State School Officers (2010) emphasizes:

> To become college and career read, students must have ample opportunities to take part in a variety of rich, structured conversations – as part of a whole class, in small groups, and with a partner – built around important Content in various domains. The must be able to contribute appropriately to these conversations, to make comparisons and contrasts, and to analyze and synthesize a multitude of ideas in accordance with the standards of evidence appropriate to a particular discipline. Whatever their intended major or profession, high school graduates will depend heavily on their ability to listen attentively to others so that they are able to build on others' meritorious ideas while expressing their own clearly and persuasively. (p. 48)

In grades 9-10 students under speaking and listening standards comprehension and collaboration students are expected to:

1. Initiate and participate in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
    a. Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate thoughtful, well-reasoned exchange of ideas.
    b. Work with peers to set rules for collegial discussions and decision-making (e.g. informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
    c. Propel conversations by posing and responding to questions that relate the current discussion to broader these or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
    d. Respond thoughtfully to diverse perspective, summarize points of agreement and disagreement, and when warranted, qualify or justify their own views and

understanding and make new connections in light of the evidence and reasoning presented.

2. Integrate multiple sources of information presented in diverse media or formats (e.g. visually quantitively, orally) evaluating the credibility and credibility and accuracy of each source. (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 50).

In grades 11-12 students under speaking and listening standards comprehension and collaboration students are expected to:

3. Initiate and participate in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
    a. Come to discussions prepared, having read and researched material under study, explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate thoughtful, well-reasoned exchange of ideas.
    b. Work with peers to promote civil, democratic discussions and decision making set clear goals and deadlines, and establish individual roles as needed.
    c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
    d. Respond thoughtfully to diverse perspective, synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and

determine what additional information or research is required to deepen the investigation or complete the task.

4. Integrate multiple sources of information presented in diverse media or formats (e.g. visually quantitively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 50).

Of the 41 states that have adopted Common Core, 36 use the exact wording from the Speaking and Listening Standards. These states include: Alabama, Arizona, Arkansas, California, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Vermont, Washington, West Virginia, Wisconsin and Wyoming. Three states changed the wording of the standards. Two states include: Colorado and New York. Florida, Montana, North Carolina and Utah had no mention of the speaking and listening standards. Alaska and Minnesota, both of whom have not adopted the CCSS standards, had the exact same wording under speaking and listening.

In Colorado Oral Expression and Listening is Standard 1 within the reading, writing and communication content area. In this standard, students achieve evidence outcomes. In these outcomes, students are expected to:

a. Work with peers to promote civil, democratic discussions and decision making, set clear goals and deadlines, and establish individual roles as needed.

b. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
c. Implement an effective group effort that achieves a goal
d. Participate in the preparations of the group activity or product, defining and assuming individual roles and responsibilities
e. Assume a leadership role in a group that is collaboratively working to accomplish a goal
f. Self-evaluate roles in the preparation and completion of the group goal
g. Critique and offer suggestions for improving presentations given y own group and other groups (Colorado Department of Education, 2010, p. 14).

New York has speaking and listening standards. All are the same as the adopted Common Core standards except speaking and listening SL1c. Under this section New York's standard infers students should "pose and respond to questions that probe reasoning and evidence; address a full range of positions; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives" (New York State Education Department, 2017, p. 92).

Non-Common Core States and Collaboration Standards

Eight states; Alaska, Florida, Indiana, Nebraska, Oklahoma, South Carolina, and Texas, Virginia; have not adopted Common Core State Standards. Each state has their own set of state standards and each of the states mention collaboration in their state standards. Alaska, Florida, and Minnesota have not adopted the standards but use the exact wording from the CCSS in their

Department of Education Standards. The remainder of the states have their own renditions of standards that students must achieve.

Indiana closely mirrors CCSS. Indiana's standards are broken into six key areas found in literacy and science. Collaboration is mentioned under the writing process. In this standard, students "Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information" (Indiana Department of Education, 2012, p. 9). In speaking and listening Indiana also uses some CCSS standards. Indiana uses 1 and 1.b, but introduces new standards:

- 11-12.SL.2.2 Stimulate thoughtful, well-reasoned debate and exchange of ideas by referring to specific evidence from materials under study and additionally research and resources
- 11-12.SL.2.4 Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
- 11-12.SL.2.5 Conduct debate and discussion to allow all views to be presented; allow for a dissenting view, in addition to group compromise; and determine what additional information or research is required to deepen the investigation or complete the task. (Indiana Department of Education, 2014, p. 8).

Nebraska has writing and speaking and listening standards, but they are structured differently than CCSS. Collaboration is not mentioned in the writing standards portion. In speaking and listening collaboration is introduced under:

> LA 10.3.3 & 12.3.3 Collaboratively converse with peers and adults on grade-appropriate topics and texts, building on others' ideas to clearly and persuasively express one's own views while respecting diverse perspectives. (Nebraska State Board of Education, 2014, p. 58).

Nebraska has career ready practice standards. Nebraska has career readiness as an objective for college graduates. There are eleven career ready practices within Nebraska's career ready framework. Number eight focuses on working in teams. Number eight reads

A. Teamwork
    1. Builds consensus within a team to accomplish results.
    2. Contributes to team-oriented projects and assignments.
    3. Engages team members and utilizes individual talents and skills.
B. Conflict Resolution
    1. Anticipates potential sources of conflict and employs conflict resolution skills to facilitate solutions.
    2. Disagrees with a team member without causing personal offense.
    3. Negotiates with conflicting parties to agree on a reasonable and mutually acceptable solution.
C. Social and Cultural Competence
    1. Gives and earns respect by interacting positively with people of different backgrounds, experiences, and beliefs. (Nebraska State Board of Education, 2009, p. 21)**.**

Oklahoma relies on ISTE standards and also Oklahoma state standards. Oklahoma has eight ELA standards and collaboration is present under standard 1: Speaking and Listening. In this

standard there is a writing component where “Students develop and apply communication skills through speaking and active listening to create individual and group projects and presentations” (Oklahoma State Department of Education, 2016, p. 9). Oklahoma includes writing standards under speaking and listening.

> 11.1W.1 & 12.1.W.1 Students will give formal and informal presentations in a group or individually, providing textual and visual evidence to support a main idea.
>
> 11.1.W.2 & 12.1.W.2 Students will work effectively and respectfully within diverse groups, demonstrate willingness to make necessary compromises to accomplish a goal, share responsibility for collaborative work, and value contributions made by each group member. (Oklahoma State Department of Education, 2016, p. 18).

South Carolina makes no mention of collaboration in their writing standards for English. South Carolina has communication standards in English. In these standards, collaboration is used for English 3 and English 4. The standards are closely tied to the CCSS Speaking and Listening Standards. The standard reads: “Initiate and patriciate effectively in a range of collaborative discussions with diverse partners; build on the ideas of others and express own idea clearly and persuasively” (South Carolina Department of Education, 2015, p. 103).

Texas’ standards are called Texas Essential Knowledge and Skills (TEKS). In the TEKS standards are broken into stands. For English I, English II and English III under the Knowledge and skills 1 (D) strand students are expected to “participate collaboratively, building on the ideas of others, contributing relevant information, developing a plan for consensus building, and setting ground rules for decision making.” (Texas Education Agency, 2011, p. 36). For English IV students are required to “participate collaboratively, offering ideas or judgments that are purposeful in moving the team toward goals, asking relevant and insightful questions, tolerating a

range of positions and ambiguity in decision making, and evaluating the work of the group based on agreed-upon criteria." (Texas Education Agency, 2011, p. 55). Texas also has College and Career Readiness Standards. In these standards under Speaking students must "Participate actively and effectively in group discussions" (Texas Education Agency, 2009, p. 4).

Virginia has Standards of Learning (SOL). There is no mention of collaboration in the writing standards, in comparison with Common Core speaking and listening SOL 9-12 standards are:

- 9.1 Assume shared responsibility for collaborative work.
- 10.1 The student will participate in collaborate in, and report on small-group learning activities.
- 10.1 e) Demonstrate the ability to work effectively with diverse teams to accomplish a common goal.
- 11.1 h) Collaborate and report on small-group learning activities.
- 12.1 The student will make a formal oral presentation in a group or individually.
- 12.1 f) Collaborate and report on small group activities.
- 10.1 CF Work with peers to set rules for group presentations and discussions, set clear goals and deadlines, and define individual roles as needed.
- 10.1 The student will participate in, collaborate in, and report on small-group learning activities.

    a) Assume responsibilities for specific group tasks.

    b) Collaborate in the preparation of summary of the group activity.

    c) Include group members in oral presentations.

e) Demonstrate the ability to work effectively with diverse teams to accomplish a common goal.

f) Collaborate with others to exchange idea, develop new understandings, make decisions, and solve problems.

k) Evaluate effectiveness of group process in preparation and delivery of oral reports.

- 12.1 CF Work together to establish group goals, define individual roles, and report on learning activities.
- 10.1 CF Move conversations ahead by posing and responding to questions, actively involve others in the discussion, and challenge ideas. (Virginia Department of Education, 2010, p. 221-222 & 250-251).

Virginia has college and career ready English performance expectations. Collaborating falls under communicating. Students are expected to:

- Participate in, collaborate in and report on small group learning activities
- Collaborate with others to exchange idea, develop new understandings, make decisions, and solve problems.
- Demonstrate the ability to work effectively with diverse teams to accomplish a common goal. (Virginia Department of Education, 2011, p. 1).

Current Alignment with Student Collaboration with Technology Standards

Technology is an important part of our lives. Students need to use and acquire more technology skills. Technology should be integrated across different disciplines. There are no national technology standards. Technology, like CCSS is left up to individual states. Many states

follow ISTE standards. The CCSS does mention the importance the role technology plays in student's development.

> New technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication. The Internet has accelerated the speed at which connections between speaking, listening, reading and writing can be made, requiring that students be ready to use these modalities nearly simultaneously. Technology itself is changing quickly, creating a new urgency for students to be adaptable in response to change (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 48).

There are several states that include technology standards with the language arts standards. These states include: Arizona, Kentucky, Michigan, Nebraska, New Jersey, South Dakota, and Washington. Arizona's technology standards are presented in 6 strands. Collaboration is presented in Strand 1 and Strand 2; Communication and Collaboration. In this strand students are expected to use digital media to communicate and collaborate with other people (Arizona Department of Education, 2009). In Strand 1, Creativity and Innovation there is one concept: Concept 4: Use technology to create original works in innovative ways. The performance objective in this strand is students will use digital collaborative tools to synthesize information, produce original works, and express ideas. (Arizona Department of Education, 2009, p. 27).

In Strand 2 there are three concepts:

> Concept 1: Effective Communication Digital Interactions Communicate and collaborate with others.
>
> PO 1. Collaborate with peers, experts, or others in the global community employing a variety of digital tools to share findings and/ or publish in a variety of ways.
>
> PO 2. Communicate information and ideas respectfully and effectively to multiple audiences using a variety of digital environments.

Concept 2: Digital Solutions: Contribute to project teams to produce original works or solve problems

PO 1. Communicate and collaborate for the purpose of producing original works or solving problems. (Arizona Department of Education, 2009, p. 29).

Kentucky's technology standards directly align with Kentucky's academic expectations. Technology is organized around three big ideas in technology. These ideas are; information, communication and productivity, safety and ethical/social issues and research, inquiry/problem-solving and Innovation (Kentucky Department of Education, 2015). Collaboration can be found under information, communication and productivity under knowledge and understandings. "Students will understand that collaborative online projects impact life-long learning and global interactions" (Kentucky Department of Education, 2015, p. 705). Collaboration is also found under skills and communication. In this expectation "Students will use online collaboration and interactive projects (e.g., email, videoconferencing) to communicate with others (e.g., experts, mentors)" (Kentucky Department of Education, 2015, p. 705). Collaboration is found under research, inquiry/problem solving and innovations. Under Inquiry and problem solving "Students will apply teamwork and critical thinking strategies to solve technology problems" (Kentucky Department of Education, 2015, p. 709). It is also mention under innovation. In this academic expectation "Students will collaborate with peers, experts and others to develop solutions and innovative products" (Kentucky Department of Education, 2015, p. 709).

The State of Michigan Department of Education has technology standards called Michigan Integrated Technology Competencies for Students (MITECS). MITECS standard 7, Global Collaborator, requires students to "use digital tools to broaden their perspectives and enrich their

learning by collaborating with others and working effectively in teams locally and globally" (State of Michigan, 2017, p. 2) MITECS students will:

7a. Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

7b. Use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

7c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

7d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions. (State of Michigan, 2017, p. 2).

Nebraska has standards, which incorporate students using technology. Under Nebraska standards students are required to:

- LA 10.4.2 & LA 12.4.2 Digital Citizenship: Students practice the norms of appropriate and responsible technology use.
- LA 10.4.2.a & LA 12.4.2.a Students practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, appropriate language use, utilize appropriate sites and materials, respect diverse perspectives)
- LA.10.4.2.b & LA 12.4.2.b Students use appropriate digital tools (e.g., social media online collaborative tools, apps) to communicate with others for conveying information, gathering opinions, and solving problems. (Nebraska State Board of Education, 2014, p. 59).

Under New Jersey Core Curriculum Content Standards-Technology Standard 8.1, indicator 8.1.12.A.4 students are expected to "Collaborate in online course, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue" (State of New Jersey Department of Education, 2014, p. 2).

South Dakota has educational technology standards. These standards are used a guide to incorporate technology into the curriculum across all content areas (South Dakota State Board of Education, 2015). There are six stands in the technology standards. Collaboration is under Strand 5: Creativity and Innovation and Strand 6: Communication and Collaboration. Under Creativity and Innovation standard ET.CI.1 the student outcome 9-12.ET.CI.1.2 indicates students "Utilize technology for collaboration, research, publication, communication and productivity" (South Dakota State Board of Education, 2015, p. 53). Under Communication and Collaboration ET.CC.2 outcome 9-12.ET.CC.2.1 students "Collaborate with peers, experts, and others by using technology to compile, synthesize, produce, and disseminate creative works" (South Dakota State Board of Education, 2015, p. 54).

Washington has Educational Technology Learning Standards. Washington State standards are organized and educational technology academic learning requirements (EALRs). Under EALR 1 collaboration is introduced. Component 1.2 Collaborate states students "Use digital media and environments to communicate work collaboratively to support individual learning and contribute to the learning of others" (State of Washington Office of Superintendent of Public Instruction, 2008, p. 7).

Conclusion and Research Implications

With Collaboration students are empowered to obtain new skillset with a focus on 21st century skills (Shankar-Brown & Brown, 2014). The 21st century learners need opportunities, which promote interaction between the instructor and peers. Standards give a vision of what a 21st

century learner should accomplish by the end of high school. The CCSS noted "Standards leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 4). US Department of Education has no specific national standards, individual states are expected to implement standards and incorporate collaboration in these standards. Although collaboration is mentioned in every state's standards, discrepancies exist regarding how students can collaborate. The CCSS was adopted in 2010 and almost eight years later, many states have made no changes to the standards. Florida was the most recent state to unadapt CCSS standards. In January 2018, they became the ninth state declining participation in Common Core. While Arizona recently reviewed their standards and starting in the 2018-2019 academic year, they made no adjustments to the collaboration component. Three states, New York, North Dakota and Massachusetts, deviated from the standard CCSS in 2017; providing updated standards more aligned with the 21st century learner. Seven states, Alabama, Arkansas, Iowa, Louisiana, Mississippi, Missouri and New Jersey made updates in 2016 to the original CCSS. The three states, Georgia, Idaho and Kentucky, made no changes to the standards mentioning collaboration. The two states, Oklahoma and South Carolina, were not a part of CCSS, but updated their standards in 2015.

With no way of monitoring collaboration and different standards being used in each state, determining the extent to which students are collaborating is difficult. It is implied through the standards that teachers can use the tools they believe are best for their students to be successful (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

Previous research suggested that learners support each other in terms of linguistic ability and that positive collaboration can occur in web-based environments. It is suggested in previous studies that social constructivist learning improves achievement (Uzunboylu, Bicen, & Cavus, 2011). Liu and Yu-Ju (2016) pointed out that students involved in collaborative groups versus individual learning increased social competence on academic performance. Anastasiades and Kotsidis (2013) pointed out collaboration can encourage students to use new tools and increased self-efficacy.

Summary

The purpose of the literature review is to provide a critical review of the literature related to secondary student group collaboration through the use of online technology tools. The literate review is comprised of four sections; online tools used for collaboration, state and national and state writing standards with collaboration, national and state speaking and listening standards with collaboration, and current alignment with student collaboration and technology standards. Finally, the conclusion highlights the summary of research findings.

Collaborative learning involves students working together towards a common goal with other students or students working together with teachers. Social software has increased with collaborative technology. Collaborative technology includes online technologies such as wikis, blogs, instant messages, discussion boards, synchronous chats and email used among different individual to accomplish a common task" (Kok, 2011, p.46).

Collaboration is mentioned within the Common Core State Standards (CCSS) for English language Arts & Literacy in History/Social Studies, Science and Technical Subjects and has been officially adopted by 41 states of the 50 states. The only states that have not adopted Common

Core State standards are: Alaska, Florida, Indiana, Minnesota, Nebraska, Oklahoma, South Carolina, Texas and Virginia.

The CCSS for English language Arts & Literacy in History/Social Studies, Science and Technical Subjects are broken down into anchor standards for reading, writing, speaking and listening and college and career readiness for language. Collaboration is introduced in writing and speaking and listening. In the college and career readiness anchor standards for writing under production and distribution of writing students are expected to "use technology, including the Internet, to produce and publish writing and to interact and collaborate with others" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 41). Extending the production and distribution of writing in grades 9-12 students are expected to "Use technology, including the Internet to produce, publish, and update individual or shared writing products…" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 46).

Speaking and Listening is an important aspect for students to take part in discussions as a class or in groups. In CCSS under speaking and listening standards comprehension and collaboration students are expected to: "Initiate and participate in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively." (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010, p. 50).

There are no national technology standards. Technology, like CCSS is left up to individual states. There are several states that include technology standards with the language arts standards.

These states include: Arizona, Kentucky, Michigan, Nebraska, New Jersey, South Dakota, and Washington.

Many educators want to use collaboration more, but they need to see more benefits to using it in a technological age. (Kear et al., 2010). Appropriate technologies need to be selected that promote and support collaborative environments. For collaboration to be meaningful it requires teaches and students coming together for a common goal. (Gouseti, 2013). Each student must contribute his or her part in order for learning to occur in a collaborative environment (Beldarrain, 2006). Most research thus far only relies on the specific strategies instead of actually using collaborative technology for teams and working in groups (Cahill, 2014).

CHAPTER 3 METHODOLOGY

Introduction

This chapter presents the methodology used to address the research questions established for this study. The topics included in this chapter are a restatement of the purpose, the research questions, the research design, setting for the study, population/sample, instruments, data collection procedures, and data analysis. Each of these topics are presented separately.

Restatement of the Purpose

The purpose of the study is to examine the current use of online tools for group collaboration among high school students.

Research Questions

The research questions that guide the study are:

1. Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning?
2. To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with collaboration?
3. What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?

Research Design

A nonexperimental, correlational research design was used in this study. This type of research design is appropriate when the independent variable is not manipulated, and no treatment or intervention is provided for the participants. I used an adapted version of the Student

Information Technology Use and Skills in Higher Education: Survey Questionnaire (Kvavik, 2004; See Appendix A). The adaptations were made to make the survey useable for high school students taking business classes in a large suburban school district.

Setting for the Study

The setting for the study was a large school district located in a suburb of a metropolitan area. The school district has more than 16,000 students attending pre-kindergarten through 12th grade in 1 preschool, 12 elementary schools, 4 middle schools, 2 ninth grade centers, 2 high schools, and an alternative high school. The school district is racially diverse, with representation from many different ethnic groups. Table 1 presents the ethnic groups being served in the district.

Table 1

Racial Diversity in the School District

Race/Ethnicity	Number	Percent
American Indian/Alaska Native	24	<0.1
Asian	469	2.9
African American	1,735	10.7
Hispanic/Latino	653	4.0
White/Caucasian	12,615	77.5
Native Hawaiian/Pacific Islander	19	<0.1
Multi-racial	763	4.7
Total	16,278	100.0

Population/Sample

The population for this study included 10th, 11th and 12th grade high school students in a single high school located in a suburban area. These students were enrolled in business classes and included both general and special education students. Students who were in bilingual education classes and may have difficulty in understanding the survey items were excluded from the study.

To determine the appropriate sample size needed to address the research questions, G*Power 3.1 was used (Faul, Erdfelder, Buchner, & Lang, 2009). With an alpha level of .05, an effect size of .15, a sample of 98 was needed to obtain a power of .80 on the statistical analysis that was in this study. Figure 2 presents a graphical representation of the power analysis.

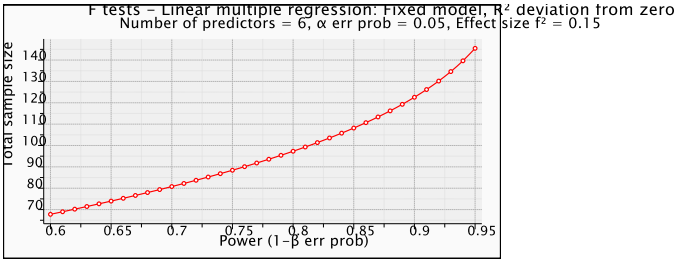

Figure 2: Power analysis (Faul et al., 2009).

Instruments

The Use of Electronic Devices (UED, Kvavik, Caruso, & Morgan, 2004) was used to obtain information regarding students' perceptions of technology in the classroom. While the UED was initially developed for college students, it was adapted with permission of the authors for use with high school students.

This survey has three parts to measure convenience, communications, and control in how students use technology. Part 1 of the survey obtained information on how students use electronic devices. The survey asked students to indicate the types of electronic devices they use and if they collaborated with their classmates on projects as part of their classes. They were then asked to indicate the number of hours spent on activities involving personal (10 items) and classroom use (9 items) of the electronic devices. The 19 items in this section were rated using a 6-point scale

ranging from 0 for do not use to 5 more than 10 hours. The students were then asked to rate their skill level with using various software programs. They used a 6-point scale ranging from 0 for do not use to 5 for very skilled.

The second section of the UED focused on use of technology in class. The first question obtained preference on the use of technology in class. The students then were asked to rate their agreement with 13 items measuring technology experiences in their classrooms. They were asked to rate each of the 13 items using a 5-point scale with 1 indicating strongly disagree and 5 indicating strongly agree. They then were asked specific questions regarding the use of technology in their classroom. The next group of items measured student perceptions of online features use in their classes to help improve learning. The 11 items were rated using a 6-point scale ranging from 0 for did not use to 5 for improved learning and improved my management of class activities. The students were then asked to rate 7 items measuring the benefits of using technology in their classrooms. The items were rated using a 5-point scale ranging from 1 for strongly disagree to 5 for strongly disagree. The barriers to the use of technology were rated by students using the same 5-point scale, ranging from 1 for strongly disagree to 5 for strongly agree.

The third section of the survey was used to obtain information about the personal characteristics of the students. The items included on this section are self-reported learning styles, gender, age, self-reported cumulative GPA, and grade level. These items use forced choice responses to provide consistency in the responses regarding their demographic characteristics.

Scoring. The numeric responses on the scales of the UED were summed to obtain total scores. The scores were then divided by the number of items on each scale to create mean scores for each of the parts. The use of means provided scores that reflected the original rating scales and allowed comparisons across each of the sections.

Validity and reliability. The survey was developed by Educause, a group that conducts research on educational issues. The development of the survey was through a comprehensive review of literature on technology use in colleges and universities (Kvavik et al., 2004). No information was presented regarding the validity or reliability of the survey. The present study used Cronbach alpha coefficients to determine the internal consistency of the UED with high school students.

Data Collection Procedures

After receiving permission from the Wayne State University Institutional Review Board (IRB) and the school at which the research was completed, the data collection process was started (See Appendix B for IRB Approval and Appendix C for Site Approval). The first step was sending information letters to the students who would be included in the study. This information letter provided parents with all of the information regarding the study, including the purpose, the extent of their child's involvement, confidentiality of all information obtained during the data collection, and voluntary nature of participating. The parents were able to elect to not allow their child to participate in the study by returning a tear-off notice to the researcher, emailing the researcher or a phone call to the researcher. Parents did not have to do anything if they choose to allow their child to participate in the study (See Appendix D).

The survey was entered into Qualtrics, a software survey program, for the students to complete. An adolescent assent form was on the first page of the survey (See Appendix D). Students agreed to participate by selecting "yes" to agree to participate. The assent form followed the same format as the adolescent assent form used in paper and pencil surveys except it did not require a signature. The students were apprised of the purpose of the study, their involvement, assurances of confidentiality, and voluntary nature of participating. Students who indicated that

they agree to participate were sent to the first item on the survey. Those who do not agree to participate were thanked and exited from the survey.

The business education teachers at the selected high school met with the researcher to discuss their participation in the study. They were asked to have the students in their business classes complete the online surveys in the computer labs during class time. The survey took no more than 15 to 30 minutes to complete. Only those students who were present were eligible to participate in the study. Students who were absent were not allowed to complete the survey at a later date. The researcher was not present when the students completed the surveys to avoid any appearance of coercion.

Data Analysis

After the surveys were completed, I downloaded the data from Qualtrics into an IBM-SPSS file for data analysis. The data was cleaned to eliminate cases with excessive missing values. After reviewing the file for completeness and accuracy, I completed tests for internal consistency using Cronbach alpha coefficients.

I scored the surveys using the author's protocols. After scoring the subscales, I ran a missing values analysis to determine the extent to which the subscales having missing values. If less than 10% of the values were missing, the mean score for the subscale were used to replace the missing values.

The data analysis was divided into three sections. The first section used frequency distributions and measures of central tendency and dispersion to provide a description of the sample. The second section of the analysis provided baseline statistics on the scaled variables using descriptive statistics. In addition, Pearson product moment correlations was used to provide an intercorrelation matrix to indicate the relationships among the variables. The third section of the

analysis used a combination of inferential statistical analyses to test the hypotheses and address the research questions. The first question used stepwise multiple linear regression analysis to determine which of the independent variables, technology tools students use for school, self-reported skills level with technology, and perceptions of online features that improve learning can be used to predict the dependent variable, perceptions of the use of technology in their classes. The second research question used Pearson product moment correlations to determine the strength and direction of the relationships between self-reported experiences with technology, benefits to using technology, and barriers to using technology. A one-way multivariate analysis of variance (MANOVA) was used to determine if benefits and barriers to using technology differ by self-reported learning style. All decisions on the statistical significance were made using a criterion alpha level of .05. Table 2 presents results of the statistical analysis used to test each hypothesis and address the research questions.

Table 2

Statistical Analysis

Research Question and Hypotheses	Variables	Statistical Analysis
1. Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning?	Dependent Variable Perceptions of the use of technology for collaboration Independent Variables • Technology tools students use for school • Self-reported skills level with technology • Perceptions of online features that improve learning	Stepwise multiple linear regression analysis was used to determine if the independent variables can be used to predict perceptions of the use of technology for collaboration. Prior to conducting the stepwise multiple linear regression analysis, a intercorrelation matrix using Pearson product moment correlations was developed to determine which of the independent variables are significantly related to the dependent variable.
2. To what extent is there a relationship between students' perceptions of benefits and barriers to using technology for collaboration in classes and their self-reported experiences with technology?	Dependent Variable Self-reported experiences with technology Independent Variable Benefits to using technology for collaboration Barriers to using technology for collaboration	Pearson product moment correlations were used to determine the direction and magnitude of the relationships between self-reported experiences with technology and benefits and barriers to using technology for collaboration.
3. What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?	Dependent Variable Perceptions of the benefits and barriers to using technology in classes Independent Variable Ways that students use collaboration to complete assignments	A one-way multivariate analysis of variance was used to determine if there is a difference in perceptions of benefits and barriers to using technology in classes by self-reported learning styles. If a statistically significant difference was found on the MANOVA, univariate F tests were interpreted to determine which of the dependent variables are differing by self-reported learning style. If either of the dependent variables differ significantly by self-reported learning style, simple effects were used to determine which of the learning styles are contributing to the statistically significant result.

Summary

The purpose of the study is to examine the current use of online tools for group collaboration among high school students. The research questions that guide the study were: (1) Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning? (2) To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with collaboration? (3) What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?

A nonexperimental, correlational research design was used in this study. An adapted version of the Student Information Technology Use and Skills in Higher Education: Survey Questionnaire (Kvavik, 2004) was used in this study. This survey has three parts to measure convenience, communications, and control in how students use technology. The setting for the study was a large school district located in a suburb of a metropolitan area. The population for this study included 10th, 11th and 12th grade high school students in a single high school located in a suburban area enrolled in business classes and included both general and special education students. To determine the appropriate sample size needed to address the research questions, G*Power 3.1 was used (Faul, Erdfelder, Buchner, & Lang, 2009). With an alpha level of .05, an effect size of .15, a sample of 98 was needed to obtain a power of .80 on the statistical analysis that was in this study. For the data collection the first step of the study was sending information letters to the students who would be included in the study. The parents were able to elect to not allow their child to participate in the study. The survey was entered into Qualtrics, a software survey program, for the students to complete. The survey took approximately 15 to 30 minutes to

complete. The data were downloaded to IBM-SPSS ver. 25 for statistical analysis. The results of these analyses are presented in Chapter 4.

CHAPTER 4 RESULTS

Chapter 4 presents the results of the statistical analyses that were used to describe the sample and address the research questions and test the associated hypotheses. The chapter is divided into three sections. The first section uses frequency distributions to describe the students who participated in the study. The second section provides descriptions of the items on the survey using frequency distributions. This section also provides the descriptive variables used to provide information on the scaled variables that were developed on the survey section. The third section provides the results of the inferential analyses that were used to address the research questions and test the associated hypotheses.

The purpose of this study was to examine the current use of online tools for group collaboration among high school students. An online survey was completed by 140 students enrolled in business classes at a single suburban high school. A missing values examination indicated that the students had responded to all of the items on the survey.

Description of the Sample

The students were asked to indicate their gender, age, grade and cumulative grade point average on the survey. Their responses were summarized using frequency distributions. Table 3 presents results of this analysis.

Table 3

Frequency Distributions: Demographic Characteristics (N = 140)

Demographic Characteristics	N	%
Gender		
Male	99	70.7
Female	41	29.3
Age		
15	11	7.9
16	38	27.1
17	67	47.9
18	24	17.1
Grade		
10^{th}	12	8.6
11^{th}	44	31.4
12^{th}	84	60.0
Cumulative GPA		
Under 2.00	3	2.3
2.00 to 2.24	2	1.5
2.25 to 2.99	24	18.2
3.00 to 3.24	27	20.5
3.25 to 3.49	34	25.8
3.50 to 3.74	14	10.6
3.75 to 4.00	28	21.2

Note: 8 students reported "Don't Know for GPA

The majority of students (n = 99, 70.7%) reported their gender as male, with 41 (29.3%) indicating their gender as female. The students ranged in age from 15 to 18, with the largest group comprised of students who were 17 years old (n = 67, 47.9%). Eleven (7.9%) students were 15 years of age and 24 (17.1%) indicated their ages as 18 years. Most of the students participating in the study were in the 12^{th} grade (n = 84, 60.0%), with 12 (8.6%) students in the 10^{th} grade and 44 (31.4%) students in the 11^{th} grade. The grade point averages were from 2.00 to 4.00. The largest group of students (n = 34, 25.8%) self-reported their GPAs as between 3.25 and 3.49, while 28 (21.2%) indicating their GPAs were between 3.76 and 4.00. Three (2.3%) students had GPAs that were under 2.00 and 2 (1.5%) had GPAs between 2.00 and 2.24.

The students were asked to indicate the types of electronic devices that they had access to at home. As they were instructed to select all of the options they had at home, the number of responses exceeded the number of students in the study. Table 3 presents results of this analysis.

Table 4

*Types of Electronic Devices Students had Access to at Home (*N *= 140)*

Types of Electronic Devices	N	%
Smart phone	135	96.4
Personal laptop computer	88	62.9
Personal desk top computer	53	37.9
Tablet computer	49	35.0
Other	10	7.1

The majority of students (n = 135, 96.4%) reported they had smart phones, with 88 (62.9%) indicating they had personal laptop computers. Fifty-three students reported they had personal desk top computers and 49 (35.0%) had tablets (I pad, Kindle, etc.). Ten (7.1%) students reported other electronic devices, including game consoles (X box, PS4, etc.).

The students were asked to indicate the number of hours each week that they spent on electronic devices to collaborate with their classmates. The responses to these items ranged from do not use to more than 10 hours. Frequency distributions were used to summarize these data for presentation in Table 5.

Table 5

*Frequency Distributions: Hours Spent on Collaborative Activities with Classmates (*N = *140)*

Collaborative Activities with Classmates	Do not use		Less than 1 hour		1 to 2 hours		3 to 5 hours		6 to 10 hours		More than 10 hours	
	n	%	n	%	n	%	n	%	n	%	n	%
Collaborative classroom activities and studying using an electronic device	7	5.0	48	34.3	42	30.0	28	20.0	10	7.1	5	3.6
Collaborating using library resources to complete classroom assignments	47	33.6	56	40.0	26	18.6	7	5.0	3	2.1	1	0.7
Collaborative writing documents for your classwork	16	11.4	50	35.7	46	32.9	22	15.7	5	3.6	1	0.7
Collaborative written documents for pleasure	76	54.3	36	25.7	16	11.4	9	6.4	9	6.4	3	2.1
Collaborating with friends or acquaintances using instant messaging	9	6.4	18	12.9	38	27.1	36	25.7	24	17.1	15	10.7
Collaborating through playing computer games	39	27.9	31	22.1	27	19.3	21	15.0	10	7.1	12	8.6

Most of the students spent 1 to 2 hours a week collaborating on classroom activities and studying, using library resources to complete assignments, writing documents for classwork, and writing documents for pleasure. They were more likely to spend more time collaborating with friends using instant messaging. The greatest number of students indicated they did not spend time collaborating through playing computer games.

The students were also asked to indicate the number of hours spent each week collaborating on specific types of activities. The students responded to each type of activity on a 6-point scale ranging from do not use to more than 10 hours a week. The results of these analyses are presented in Table 6.

Table 6

*Frequency Distributions: Hours Spent Collaborating on Activities (*N = *140)*

Collaborative Activities with Classmates	Do not use		Less than 1 hour		1 to 2 hours		3 to 5 hours		6 to 10 hours		More than 10 hours	
	n	%	n	%	n	%	n	%	n	%	n	%
Collaborating to creating, reading, sending email	43	30.7	68	48.6	24	17.1	4	2.9	0	0.0	1	0.7
Collaborating to create/write documents (word processing)	20	14.3	54	38.6	38	27.1	25	17.9	3	2.1	0	0.0
Collaborating create/use spreadsheets or charts (Excel)	77	55.0	39	27.9	18	12.9	3	2.1	1	0.7	2	1.4
Collaborating create/use presentations (PowerPoint)	19	13.6	76	54.3	33	23.6	11	7.9	0	0.0	1	0.7
Collaborating to create/use graphics (Photoshop)	67	47.9	44	31.4	21	15.0	4	2.9	4	2.9	0	0.0
Collaborating for creating and editing video/audio	62	44.3	49	35.0	21	15.0	6	4.3	1	0.7	1	0.7
Collaborating to create web pages	102	72.9	21	15.0	11	7.9	5	3.6	0	0.0	1	0.7
Collaborating through completing a learning activity	26	18.6	47	33.6	35	25.0	19	13.6	7	5.0	6	4.3

The largest group of students reported they did not collaborate to create spreadsheets, create use graphics, create or edit video/audio, or create web pages. In contrast, the students were more likely to spend 1 to 2 hours collaborating in creating, reading, and sending email; create/write documents, create/use presentations, and complete a learning activity.

The students were asked to self-report their skill levels with different types of computer programs and applications. Their responses were on a scale of 1 to 6, with 1 indicating do not use and 6 indicating very skilled. Table 7 provides results of the descriptive analysis used to summarize these data.

Table 7

*Descriptive Statistics: Students' Self-reported Skill Levels (*N = *140)*

				Range	
Computer Programs and Applications	M	SD	Median	Minimum	Maximum
Email	4.39	1.33	5.00	1	6
Instant messenger	5.04	1.24	5.00	1	6
Web searching	4.96	1.20	5.00	1	6
Word processing (Word)	4.74	1.08	5.00	1	6
Spreadsheets (Excel)	3.51	1.44	4.00	1	6
Presentation software (PowerPoint)	4.76	.94	5.00	1	6
Graphics (Photoshop, Flash)	2.98	1.53	3.00	1	6
Creating and editing video/audio	3.27	1.46	4.00	1	6
Creating web pages	2.66	1.46	3.00	1	6
Course management systems (Blackboard or Schoology)	4.19	1.24	4.00	1	6

The students self-reported their skills higher in using apps, including email (M = 4.39, SD = 1.33), instant messenger (M = 5.04, SD = 1.24), and web searching (M = 4.96, SD = 1.20). While their skills levels were high in regard to using word processing programs (Word; M = 4.74, SD = 1.08) and presentation software (PowerPoint; M = 4.76, SD = .94), their skills were lower for spreadsheets (Excel; M = 3.51, SD = 1.44), graphics (Photoshop, Flash; M = 2.98, SD = 1.53), creating and editing video/audio (M = 3.27, SD = 1.46), and creating web pages (M = 2.66, SD = 1.46). Their skill levels were good for the use of course management systems (Blackboard or Schoology; M = 4.19, SD = 1.24).

The students were asked to indicate their preferences for the use of technology to collaborate with other students in their classes. The students were asked to indicate all that applied, with the number of responses exceeding the number of students in the study. Their responses to this question were summarized using frequency distributions for presentation in Table 8.

Table 8

*Self-Reported Use of Technology in Class (*N = *140)*

Self-reported Use of Technology in Class	N	%
I prefer taking classes that use no information technology/	12	8.6
I prefer taking classes that use limited technology features (e.g., email to instructors and limited use of PowerPoint in class)	37	26.4
I prefer taking classes that use a moderate level of technology (e.g., email, several PowerPoint presentations, some online activities or content)	85	60.7
I prefer taking classes that use technology extensively (e.g., class lecture notes on-line, computer simulations, PowerPoint presentations, streaming video or audio, etc.)	44	31.4
I prefer taking classes that are delivered entirely "on-line" with no required face-to-face interactions.	18	12.9

Eighty-five (60.7%) of the students indicated they preferred classes with a moderate amount of technology. The fewest number of students (n = 12, 8.6%) reported they preferred classes that use no technology, followed by 18 (12.9%) students who preferred taking classes on line, with no face-to-face contact. Thirty-seven (26.4%) students preferred taking classes with limited technology and 44 (31.4%) preferred taking classes that had extensive use of technology.

The students were asked how they learn best, given five choices. Their responses were summarized using frequency distributions. Table 9 presents results of this analysis.

Table 9

*Self-reported Learning Preferences (*N *= 140)*

Self-reported Learning Preferences	N	%
I learn best by working alone and thinking through concepts and problems myself.	23	16.4
I learn better by working alone in some situations.	22	15.7
I learn equally well by working alone and by discussing concepts and problems with others.	52	37.1
I learn better by discussing concepts and problems with others in some situations.	26	18.6
I learn best by collaborating with others and discussing concepts and problems with them.	17	12.1

The greatest number of students (n = 52, 37.1%) indicated they worked equally well by working alone or by discussing concepts and problems with others. In contrast, 17 (12.1%) students reported they worked best by collaborating with others and discussing concepts and problems with them. Twenty-three (16.4%) students preferred working alone and thinking through concepts and problems by themselves.

Scaled Variables

Five subscales were developed from the survey. These subscales measure experiences in collaborating with other students, collaborative technology helped students, collaborating helped improve learning, benefits of using technology in class, and barriers of using technology in class. Student responses were summed and divided by the number of items on each scale to obtain a mean score that reflected the original unit measure. Table 10 presents results of these analyses.

Table 10

Descriptive Statistics: Scaled Variables

					Range	
Scale	N	M	SD	Median	Minimum	Maximum
Experiences in collaborating with other students	140	3.29	.67	3.33	1.00	5.00
Collaborative technology helped students	140	3.39	.71	3.57	1.00	4.8
Collaborating helped improve learning	140	4.18	.86	4.20	1.00	6.00
Benefits of using technology in class	140	3.61	.76	3.83	1.00	5.00
Barriers to using technology in class	140	2.34	.82	2.20	1.00	4.60

The students had the highest mean scores (M = 4.18, SD = .86) for collaborating helped improve learning. The median score on this scale was 4.20, with a range from 1.00 to 6.00. The response codes for this scale were from 1 to 6, with 1 indicating that collaborating did not help learning and a 6 indicating that collaborating improved learning and improved my management of my class activities. The remaining scales were on a scale from 1 to 5, with 1 indicating strongly disagree and 5 indicating strongly agree. Barriers to using technology in class (M = 2.34, SD = .82) had the lowest scores. The median score was 2.20, with a range from 1.00 to 4.60.

Research Questions

Three research questions were addressed in this study. Each of these questions were addressed inferential statistical analyses. All decisions on the statistical significance were made using a criterion alpha level of .05.

1. Can students' perceptions of the use of technology in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning?

A stepwise multiple linear regression analysis was used to determine which of the independent variables; collaborative technology helped students, skill level with applications, and collaboration helped improve learning; could predict the dependent variable, experiences in collaborating with other students. The results of this analysis are presented in Table 11.

Table 11

Stepwise Multiple Linear Regression Analysis: Experiences in Collaborating with Other Students

Independent Variable	Constant	B	β	ΔR^2	t	Sig
Included Variables						
Use of collaborative technology helped students	.89	.62	.66	.48	10.57	<.001
Skill level with applications		.14	.13	.02	2.09	.038
Excluded Variables						
Collaborating helped improve learning			.03		.38	.71

Multiple R	.71
Multiple R2	.50
F	67.05
DF	2, 139
Sig	<.001

Two independent variables, use of collaborative technology helped students and skill level with applications, entered the stepwise multiple linear regression equation, accounting for 50% of the variance in experiences in collaborating with other students, $F (2, 139) = 67.05$, $p < .001$. Use of collaborative technology helped students entered the equation first, explaining 48% of the variance in experiences in collaborating with other students ($t = 10.57$, $p < .001$). Skill level with applications accounted for an additional 2% of the variance in the independent variable ($t = 2.09$, $p = .038$). A positive relationship was found for both independent variables with the dependent variable, indicating that higher scores on experiences in collaborating with other students was associated with higher scores for use of collaborative technology helped students and skill level of with applications. One independent variable, collaborating helped improve learning did not enter

the stepwise multiple linear regression equation, indicating it was not a statistically significant predictor of experiences in collaborating with other students.

2. To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with technology?

Pearson product moment correlations were used to determine the strength and direction of the relationships between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with technology. The results of these analyses are presented in Table 12.

Table 12

Pearson Product Moment Correlations: Perceptions of Benefits and Barriers to using Technology in Classes and Self-reported Experiences with Technology

Self-reported experiences with technology	Benefits of Collaboration			Barriers to Collaboration		
	n	r	p	n	r	p
Skill level with programs and apps	140	.21	.012	140	.18	.034
Email	140	.11	.208	140	-.26	.002
Instant messenger	140	.08	.370	140	-.16	.057
Web surfing	140	.17	.042	140	-.22	.008
Word processing (Word)	140	.10	.251	140	-.31	<.001
Spreadsheets (Excel)	140	.09	.274	140	-.06	.504
Presentation software (PowerPoint)	140	.20	.018	140	-.29	.001
Graphics (Photoshop, Flash)	140	.20	.017	140	.07	.434
Creating and editing video/audio	140	.23	.006	140	-.03	.713
Creating web pages	140	.09	.271	140	.01	.881
Course management systems (Blackboard/Schoology)	140	.23	.007	140	-.17	.050

The correlation between skill level with programs and apps and benefits of collaboration was statistically significant, ($r = .21$, $p = .012$), indicating that students who perceived benefits

from collaboration were more likely to have higher self-reported skills with programs and apps. In examining individual programs and apps, statistically significant correlations were found between benefits of collaboration and web surfing ($r = .17$, $p = .042$), presentation software ($r = .20$, $p = .018$), creating and editing video/audio ($r = .23$, $p = .006$), and course management systems ($r = .23$, $p = .007$). These correlations were in a positive direction, indicating that students who perceived greater benefits from collaboration were more likely to report higher skill levels with these programs and apps.

The correlation between barriers to collaboration and self-reported skill levels with programs and apps was statistically significant, ($r = .18$, $p = .034$). The positive direction of the relationship provided support that students who perceived greater barriers to collaboration also reported higher skill levels for programs and apps. An inspection of the correlations between perceived barriers to collaboration and the individual programs and apps provided evidence of statistically significant correlations with email ($r = -.26$, $p = .002$), web surfing ($r = -.22$, $p = .008$), word processing ($r = -0.31$, $p < 001$), presentation software ($r = -.29$, $p = .001$), and course management systems ($r = -.17$, $p = .050$). The correlations that were in a negative direction indicated that students who perceived greater barriers to collaboration were more likely to self-report higher skill levels with the apps. The remaining correlations were not statistically significant, indicating that their self-reported skill levels were not associated with their perceptions of benefits and barriers of collaboration.

3. What is the difference in students' perceptions of the benefits and barriers to using technology in their classes and how they self-report their learning preference?

A multivariate analysis of variance (MANOVA) was used to determine if a difference existed between benefits and barriers of collaboration by students' self-report of how they learn best. The results of the MANOVA is presented in Table 13.

Table 13

Multivariate Analysis of Variance: Benefits and Barriers of Collaboration by Self-reported Learning Styles

Wilk's Lambda	F	DF	Sig	η^2
.93	1.30	8, 268	.246	.04

The results of the MANOVA comparing benefits and barriers of collaboration by the students' self-reported learning styles was not statistically significant, F (8, 268), p = .246, η^2 = .04. The effect size of .04 indicated that the finding had little practical significance. This finding indicated that the perceptions of benefits and barriers of collaboration did not differ by how students preferred to learn. To further explore the lack of differences, descriptive statistics are presented in Table 14.

Table 14

Descriptive Statistics: Benefits and Barriers of Collaboration by Self-reported Learning Styles

Benefits and Barriers of Collaboration	N	M	SD
Benefits of Collaboration			
I learn best by working alone and thinking through concepts and problems myself	23	3.36	.83
I learn better by working alone in some situations	22	3.54	.71
I learn equally well by working alone and by discussing concepts and problems with others	52	3.62	.71
I learn better by discussing concepts and problems with others in some situations	26	3.78	.68
I learn best by collaborating with others and discussing concepts and problems with them	17	3.73	.94
Benefits of Collaboration			
I learn best by working alone and thinking through concepts and problems myself	23	2.44	.77
I learn better by working alone in some situations	22	2.70	1.01
I learn equally well by working alone and by discussing concepts and problems with others	52	2.27	.75
I learn better by discussing concepts and problems with others in some situations	26	2.25	.75
I learn best by collaborating with others and discussing concepts and problems with them	17	2.10	.82

The largest group of students (n = 52) self-reported that they learned equally well by working alone and by discussing concepts and problems with others. Students who reported they learned best by collaborating with others and discussing concepts and problems with them (M = 3.73, SD = .94) than students who preferred to work alone (M = 3.36, SD = .83), although these differences were not statistically significant. Students who preferred to work alone in some situations (M = 2.70, SD = 1.01) had the highest scores for barriers to collaboration, while those who preferred learning by collaborating with others had the lowest scores (M = 2.10, SD = .82). The differences between the five learning styles on the barriers to collaboration were not statistically significant.

Summary

This chapter presents the results of the results of the statistical analyses. The chapter is divided into three sections. The purpose of this study was to examine the current use of online tools for group collaboration among high school students. An online survey was completed by 140 students enrolled in business classes at a single suburban high school. The students were asked to indicate their gender, age, grade and cumulative grade point average on the survey. The majority of the students were male, in the 12^{th} grade and generally had self-reported cumulative GPAs over 3.00. Almost all of the students owned smart phones, with the majority also reporting they had a laptop computer. Collaboration among the students was low and their skill levels with programs and apps varied depending on how much they were used for at school and home. The largest group of students preferred having a moderate level of technology in their classes. Their learning preferences in regard to collaboration with their classmates varied, with the largest group reporting they learned equally well alone and through collaboration with their peers. Their responses were summarized using frequency distributions. Three research questions were addressed in this study. Each of these questions were addressed using inferential statistical analyses. All decisions on the statistical significance were made using a criterion alpha level of .05. Stepwise multiple linear regression analysis used on the first research question found that use of collaborative technology helped students and skill level with applications explained 50% of the variance in experiences in collaborating with other students. Students perceptions of the benefits and barriers associated with collaboration were related to the self-reported experiences with technology. A MANOVA using benefits and barriers of collaboration as the dependent variables and self-reported learning styles as the independent variable was not statistically significant. A discussion of the findings and implication for practice and further research can be presented in Chapter 5.

CHAPTER 5 SUMMARY, DISCUSSION, AND RECOMMENDATIONS

With technology continuing to evolve collaboration is becoming an intricate topic. The purpose of the study is to examine the current use of online tools for group collaboration among high school students. The research questions that guided the study are:

1. Can students' perceptions of the use of technology for collaboration in their classes be predicted from the technology tools students use for school, self-reported skill level with technology, and perceptions of online features that improve learning?
2. To what extent is there a relationship between students' perceptions of benefits and barriers to using technology in classes and their self-reported experiences with collaboration?
3. What is the difference in students' perceptions of the benefits and barriers to using technology to collaborate in their classes and complete assignments?

Discussion

An initiative for students in today's K-12 schools is intended to help students obtain 21st century skills. According to Montiel-Overall (2005), collaboration is a new hot topic in the 21st century of education because more students have developed technology skills.

The significant predictors were the use of collaborative technology helped students and skill level with applications. Students with a higher skill level and students who used more technology were more likely to collaborate. The use of technology encourages students to be more interactive, especially when using instant messenger, Twitter, Instagram, and Facebook. Most students have grown up using computers and cell phones. Students like social software because it is easy to use. The applications they like to use most are easy to use on a desktop and mobile platform. Moving into the classroom, students are using technology for writing papers and creating

presentations. These platforms are among the easiest to use. Students report the highest level of skill with the easiest collaboration software. They need to be challenged and required to use more difficult collaboration software. If they use more challenging software, they will see more benefits to collaboration. They will not be limited but they are capable to learn, and their skill level will increase.

In this study the higher the skill level the more likely a student is to have perceived benefits. The students reported higher skill level in email, web surfing, word processing, and presentation software. Recently the school district implemented the use of Office 365™ and is promoting the use of the application software for collaboration. Every student in the district has direct access to the suite of software for download on their home computer, which might further explain the student's stronger familiarity with the applications included in the suite. Cloud computing allows convenience and enhances collaboration with students. Through community awareness, the teacher understands and is aware of the strengths and weaknesses of each student. Through collaboration, students can help their peers to improve skill levels. The addition of collaborative technology linked between school and home can help minimize barriers to collaboration.

Collaboration allows for students to make informed choices (Coleman & Bandyopadhyay, 2011). They suggested collaboration makes for more informed and better decisions than what could come from individual approaches. Students who collaborate often have improved academic achievement. Further research on the effects that collaboration has on student academic achievement would be beneficial. Agosto et al. (2013) mentions collaborative learning helps students become more prepared for the working worlds. Liu and Yu-Ju (2016) pointed out that students who are involved in collaboration groups experience increased social competence on academic performance than students who work alone.

The students self-reported their benefits and barriers. There was no difference in scores. Their learning preference is not determined by how much technology they want in class. Students generally want some technology in their classes, but do not want their entire class to be either online or without any technology. This might be attributed to the fact that students are in a traditional classroom environment. Many students have not been exposed to a non traditional classroom. The school is introducing more technology to the teachers and students. Most of the teachers are still learning the technology. They have yet to teach the students or they are only teaching students entry level skills. Some of the more in-depth software is more difficult to teach and students are more resistant to things that challenge their minds. Many students view applications, such as, spreadsheets and web development as unnecessary programs to learn. They do not believe they will use those programs in the future and therefore are more resistant to learning them. Since they are more resistant to learning them, they are resistant to collaborating using those programs.

In this study most students responded they learn equally by collaborating and working alone. Collaboration can improve academic achievement, promote better attitudes, and increase student retention. More instructional approaches should be created to help students with the benefits of collaboration (Agosto et al., 2013). Researchers are noticing new technologies can be created to increase social communications (Beldarrain, 2006). Uzunboylu et al. (2011) suggested "The creation of an effective web-based collaborative learning environment is therefore an ongoing challenge in the effort to enhance learning through the Internet and related technologies" (p. 722). Overall, students viewed the benefits of collaboration positively, leading to the conclusion that collaboration is a good learning tool. They also perceived the barriers negatively, indicating the barriers were not impeding their collaboration with their peers. Collaboration needs to be

integrated across the curriculum to help students prepare for the future, where people collaborate locally, nationally, and internationally.

Implications for Educators

The U.S. Department of Education and Michigan Department of Education have standards, but they fail to mention how collaboration are assessed. Although each standard articulates the importance of collaboration, current standards do not indicate how teachers could implement and evaluate student collaboration using technology. Teachers can identify the tools used from the study and help better prepare students to enter the 21st century workforce.

Collaboration, like any other skill, needs to be learned, with teachers helping students learn to collaborate. Teachers in elementary schools need to help students learn to collaborate by using cooperative learning assignments in English language arts, science, and math. They need to integrate technology into these assignments. Students who start group work early will be more willing to collaborate when they get to high school and eventually in college or work. Teachers need to encourage collaboration on projects that use technology. Teachers also need to take advantage of the learning management software (LMS) that school districts offer. LMS software provides an excellent opportunity for students to collaborate through discussions and other group assignments.

Most teenagers use technology proficiently, especially social media sites and text messaging. Putting their skills to work for their assignments can help them hone their skills and prepare them for the future. Collaboration can take place using text messaging and email to compare outcomes and work out problems associated with assignments. Teachers need to foster this process by encouraging collaboration and discouraging working alone.

Implications in Learning Design and Technology

In this study students reported their interactions with their peers using technology. In the learning design and technology community, collaboration is becoming more prominent under social communication and social constructivism. Communication in its simplest form is used everyday (Richey et al., 2011). Communication is important in collaboration because communication now involves sharing of information. Communication "includes interactions (most often public) between groups and large masses of people" (Richey et al., 2011, p. 31). The students in this study indicated they like to collaborate with their peers. The students reported they spend most of their time collaborating using instant messenger with friends. Instant messenger is a popular social software among teenagers. For future research in the field, students need to be introduced to more social software. While the students report they use instant messenger, most need to take more advantage of software which promotes collaboration. The students in this district use Office 365™ but the teachers need to use the collaboration tools included in Office 365™ more effectively. Students are given more learning support in the learning environment with Digital learning tools (U.S. Department of Education, 2017b). The future of the field has more students being introduced to digital learning tools. These tools will enable students to collaborate and interact with their peers more.

Active participation is promoted in social constructivist theory because students use social communication more (Schunk, 2012). Social constructivists view collaboration as an innovative way for students to learn. In social constructivism collaboration and interaction is key to promote dialogue and goal directed activity. Students are more involved in social constructivism and collaboration enables them to change their learning style to become better learners (Kumar & Sharma, 2016). In this study students viewed collaboration positively indicating they view

collaboration as a positive tool to learning. The students also reported they like using collaboration, but they do not want to collaborate using only technology. They enjoy some interaction face to face. This might be credited to the fact that students do not use the collaboration software to its fullest potential. If they use more of the in-depth programs they might like to collaborate more. The school district involved in the study does not offer many classes that are totally online only. This might attribute to the reason that students prefer to work alone and with their peers. Social constructivist learning promotes group learning and collaboration. "As students model for and observe each other, they not only teach skills but also experience higher self-efficacy or learning" (Schunk, 2012, p. 235). In this study the students self-reported their skill level. Students who perceived benefits from collaborative technology were more likely to report a higher skill level.

In the 21st century students in schools are required to reach their full potential. Learning design and technology promotes different learning platforms using technology. According to Montiel-Overall, (2005) collaboration is more prevalent in the today than any time before . The students in this study like to use technology to collaborate and they like interaction with their peers. Most students at the high school level are being introduced to collaboration using technology. Teachers should require students to collaborate more using technology applications they have less familiarity with. In workplaces of today and the future students will need strong collaboration and communication skills (McNeil, 2015). In the future students will be required to collaborate in higher education and in workplaces.

This study provides a snapshot of students using technology to collaborate. More work in the field of learning design and technology can be done to help foster collaboration at lower grade levels, as well as, in higher education. As technology changes, so will students and their technology skill level. "In the classroom of the future-which must be created today-instructional technologies

will be applied in new and unconventional ways to improve learning, create new knowledge, and especially provide access to the worlds of information that technology can bring to less mobile, rural, and inner city students" (Schmitz et al., 2009, p. 67). Collaboration has the ability of reaching students all around the world. Its gives students the opportunity for new experiences and new perspectives.

Limitations

The study was limited to one high school and the findings may not be generalized to other high schools in the State of Michigan. The sample included only students enrolled in business courses at the high school. Students in other programs may not have the same skill levels with technology and may have different perceptions of the use of collaboration in their classes. A third limitation is the use of self-report. Their responses may reflect social desirability bias, which is a type of bias where study participants tend to respond to survey items that they feel the researcher wants. This bias may account for the high scores obtained on some of the scales.

Recommendations for Future Research

This study raises questions that can be addressed using further research. Recommendations for further research include:

1. Additional research is needed to determine if the perceptions of students regarding collaboration and technology in their classes are shared by students in other programs, such as liberal arts, science, or special education.
2. The study should be replicated in other schools located in different geographic regions, where schools may be smaller and depend on technology to provide advanced classes in science, mathematics, social sciences, or English language arts. This type of study could provide additional evidence that the use of technology and collaboration among students is necessary for learning to occur.

3. Future research could benefit by having students indicate what type of discussions are taking place when they collaborate. Understanding the types of discussions could allow researchers to determine the extent to which the students were on task and how much time were spent in off task activities.
4. Further research can be conducted using collaborative teams. The students indicated that they do collaborate but made no mention of their teams. The additional research would help determine each student's contributions to a team.
5. Additional research can be done on students who take the advanced technology courses to determine if they differ on times spent collaborating with classmates, the activities on which they collaborate, or the skill level of the students.

Summary

Collaboration is becoming more prevalent in today's 21st century classroom. In this study collaborative technology helped student's skill level with applications. It appears that applications which were easier to use saw more collaboration among students. Students need to be challenged to use more difficult software programs. The use of cloud computing has enabled students to collaborate at a higher rate. The school recently implemented Office 365™ for student to use to promote collaborative efforts. This might explain the student's strong usage of email, word processing and presentation software. Students preference in learning with face to face and using technology might be associated with the notion that the study was conducted in a traditional school setting. Many students have not been exposed to online courses. For the future of learning design and technology, students should be encouraged to collaborate more using technology. Students also need to be introduced to online learning early, so they can develop a familiarity with using

technology to collaborate with peers. In the 21st century students will experience collaboration in higher education and in their workplaces.

APPENDIX A: SURVEY (1)

Section 1: Use of Electronic Devices

1. Which of the following electronic devices do you own? Check all that apply.
   - ❒ Personal desktop computer
   - ❒ Personal laptop computer
   - ❒ Tablet computer
   - ❒ Smart phone
   - ❒ Other _____

2. Do you collaborate with other classmates on projects as part of your classes?
   ❒ Yes ❒ No

3. How many hours each week do you normally spend on each of the following activities using an electronic device.

0	1	2	3	4	5
Do not use	Less than 1 hour	1 to 2 hours	3 to 5 hours	6 to 10 hours	More than 10 hours

How many hours each week do you normally spend on each of the following activities using an electronic device?	0	1	2	3	4	5
1. Classroom activities and studying using an electronic device						
2. Using library resources to complete a course assignment						
3. Surfing the Internet for information to support your classwork						
4. Writing documents for your classwork						
5. Creating, reading, sending email						
6. Writing documents for pleasure						
7. Chatting with friends or acquaintances using instant messaging						
8. Surfing the Internet for pleasure						
9. Online shopping						
10. Playing computer games						

APPENDIX A: SURVEY (2)

How many hours each week do you normally spend on each of the following activities using an electronic device.?						
1. Creating, reading, sending email						
2. Writing documents (word processing)						
3. Creating spreadsheets or charts (Excel)						
4. Creating presentations (PowerPoint)						
5. Creating graphics (Photoshop, Flash, etc)						
6. Creating and editing video/audio						
7. Creating web pages						
8. Completing a learning activity or accessing information for a course (Blackboard or Schoology)						
How many hours each week do you normally spend on each of the following activities using an electronic device.?	0	1	2	3	4	5
9. Using a library resource to complete a class assignment						

4. What is your skill level using the following computer programs and applications?

0	1	2	3	4	5
Do not use	Very Unskilled	Unskilled	Somewhat Skilled	Skilled	Very Skilled

What is your skill level using the following computer programs and applications	0	1	2	3	4	5
1. Email						
2. Instant Messenger						
3. Web Surfing						
4. Word Processing (Word)						
5. Spreadsheets (Excel)						
10. Presentation software (PowerPoint)						
11. Graphics (Photoshop, Flash)						
12. Creating and editing video/audio						
13. Creating web pages						
14. Course management systems (Blackboard or Schoology)						
15. Online library resources						

APPENDIX A: SURVEY (3)

Section 2: Use of Technology in Classes

1. Which of the following best describes your preference with regard to the use of technology in your classes? Check all that apply?
   - ❒ I prefer taking classes that use no information technology.
   - ❒ I prefer taking classes that use limited technology features (e.g., email to instructors and limited use of PowerPoint in class).
   - ❒ I prefer taking classes that use a moderate level of technology (e.g., email, several PowerPoint presentations, some online activities or content).
   - ❒ I prefer taking classes that use technology extensively (e.g., class lecture notes on-line, computer simulations, PowerPoint presentations, streaming video or audio etc.).
   - ❒ I prefer taking classes that are delivered entirely "on-line" with no required face-to-face interactions.

2. To what extent do each of the following describe your technology experiences?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

To what extent does each of the following describe your experiences in your classes?	1	2	3	4	5
1. I spend more time engaged in course activities in those courses that require me to use technology.					
2. The use of technology in my classes met my expectations.					
3. The teacher's use of technology in my classes has increased my interest in the subject matter.					
4. I primarily use technology in course to improve my interest in the subject matter.					
5. I get better grades in courses that use technology.					
6. Teacher's need to give us more in-class training for technology they are using in the class.					
To what extent has the use of technology in classes helped you?					
7. The use of technology in classes has helped me to understand complex topics.					
8. The use of technology in classes has helped me to communicate better with the teacher.					
9. The use of technology has helped to communicate and collaborate with my classmates.					
10. The use of technology in classes has resulted in prompt feedback from the teacher.					
11. The use of technology in courses provides more opportunities for practice and reinforcement.					
12. Classes that use technology are more likely to focus on real-world tasks and examples.					
13. Classes that use technology allow me to take greater control of my class activities e.g., planning, apportioning time, noting success and failure).					

APPENDIX A: SURVEY (4)

2. Have you taken a class that used a course management system (such as Blackboard or Schoology)? If no, go to #6. If yes, go to #4.
   - ❒ Yes
   - ❒ No

3. How would you describe your own overall experience using a course management system (such as Blackboard or Schoology).
   - ❒ Very negative
   - ❒ Negative
   - ❒ Neutral
   - ❒ Positive
   - ❒ Very positive

4. For each of the online features used in your classes, how did the features help you improve learning or your ability to manage your class activities?

0	1	2	3	4	5
Did not use	Negative effect	Improved learning	Neutral	Improved my management of class activities	Improved learning and improved my management of my class activities

How did the online features help you improve learning or your ability to manage your class activities?	0	1	2	3	4	5
1. Syllabus						
2. Online readings and links to other text-based course materials.						
3. Online discussion board (posting comments, questions and responses).						
4. Access to sample exams and quizzes for learning purposes.						
5. Taking exams and quizzes online for grading purposes.						
6. Turning in assignments online.						
7. Getting assignments back from teacher with comments and grade						
8. Sharing materials among students.						
9. Keeping track of my grades on assignments and tests.						
10. Collaborating with classmates on school-based projects.						
11. Collaborating with people outside of the school on projects.						

APPENDIX A: SURVEY (5)

5. Benefits of using technology in your classes

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Please rate your agreement that the following are benefits for you to using a computer or information technology in your coursework	1	2	3	4	5
1. Improved my learning.					
2. Saved me time					
3. Convenience					
4. Helped me manage my class activities.					
5. Learned to collaborate with peers.					
6. Prepared me for college and work.					
7. No benefits					

6. Barriers to use of technology

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Please rate your agreement that the following are barriers for you to using a computer or information technology in your coursework	1	2	3	4	5
1. It feels like extra work with little connection to the course.					
2. I don’t have the necessary skills.					
3. I don’t have the technical support I need.					
4. It is too expensive.					
5. I don’t have sufficient access to a computer.					
6. I don’t have sufficient access to a printer.					
7. I have trouble connecting to the Internet from home.					
8. There are no barriers					

APPENDIX A: SURVEY (6)

Section 3: Information About You

1. Which of the following statements best describes you?
   - ❒ I learn best by working alone and thinking through concepts and problems myself.
   - ❒ I learn better by working alone ins some situations.
   - ❒ I learn equally well by working alone and by discussing concepts and problems with others.
   - ❒ I learn better by discussing concepts and problems with others in some situations.
   - ❒ I learn best by collaborating with others and discussing concepts and problems with them.

2. What is your gender?
   - ❒ Male
   - ❒ Female

3. What is your age?
   - ❒ 14
   - ❒ 15
   - ❒ 16
   - ❒ 17
   - ❒ 18
   - ❒ 19

4. What is your cumulative GPA?
   - ❒ Under 2.00
   - ❒ 2.0-2.24
   - ❒ 2.25-2.99
   - ❒ 3.0-3.24
   - ❒ 3.25-3.49
   - ❒ 3.5-3.75
   - ❒ 3.76-4.0
   - ❒ Don’t know

5. Are you a Junior or a Senior?
   - ❒ Sophomore
   - ❒ Junior
   - ❒ Senior

APPENDIX B: WAYNE STATE IRB APPROVAL (1)

WAYNE STATE UNIVERSITY

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://irb.wayne.edu

NOTICE OF EXPEDITED APPROVAL

To: Krystal Gordon
College of Education

From: For Dr. Deborah Ellis or designee S. Millis, Ph.D / SC
Chairperson, Behavioral Institutional Review Board (B3)

Date: November 13, 2018

RE: IRB #: 103618B3E
Protocol Title: STUDENT USE OF TECHNOLOGY FOR COLLABORATION
Funding Source:
Protocol #: 1810001818

Expiration Date: November 12, 2021

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* Category (#7)* by the Chairperson/designee *for* the Wayne State University Institutional Review Board (B3) for the period of 11/13/2018 through 11/12/2021. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (revision received in the IRB Office 11/06/2018)
- Revised Research Protocol (revision received in the IRB Office 10/12/2018)
- Medical records are not being accessed therefore HIPAA does not apply
- A waiver of written documentation of consent has been granted according to 45CFR 46 117(c) and justification provided by the Principal Investigator in the Protocol Summary Form. This waiver satisfies: 1) risk is no more than minimal, 2) That the research involved no procedures for which written consent is normally required outside the research context 3) The consent process is appropriate, 4) An information sheet disclosing the required and appropriate additional elements of consent disclosure will be provided to participants.
- Parental Permission/Research Informed Consent (revision dated 11/02/2018)
- Behavioral Documentation of Adolescent Assent Form (revision dated 11/02/2018)
- Data Collection Tool (1): Survey.
- Please note: This submission was reviewed under the IRB Administration Office Flexible Review and Oversight Policy, therefore the expiration date is 11/12/2021.

* Federal regulations require that all research be reviewed at least annually. You *may* receive a *"Continuation Renewal Reminder"* approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval **before** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.

* All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.

* Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (http://www.irb.wayne.edu/policies-human-research.php).

NOTE:

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.
2. Forms should be downloaded from the IRB website at **each** use.

*Based on the Expedited Review List, revised November 1998

APPENDIX B: WAYNE STATE IRB APPROVAL (2)

WAYNE STATE UNIVERSITY

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://irb.wayne.edu

NOTICE OF EXPEDITED AMENDMENT APPROVAL

To: Krystal Gordon
College of Education

From: Dr. Deborah Ellis or designee M. Tarazi, MD/dm
Chairperson, Behavioral Institutional Review Board (B3)

Date: December 13, 2018

RE: IRB #: 103618B3E
Protocol Title: STUDENT USE OF TECHNOLOGY FOR COLLABORATION
Funding Source:
Protocol #: 1810001818

Expiration Date: November 12, 2021

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol amendment, as itemized below, was reviewed by the Chairperson/designee of the Wayne State University Institutional Review Board (B3) and is APPROVED effective immediately.

- Protocol - Accrual changes including more students were enrolled in the second quarter in the business classes than what was enrolled in first quarter causing more students needing to participate in the study.
- Parental Permission Consent Form (revision dated 12/1/2018) - Parental Permission Consent Form modified to reflect removal of language and revised lanuage to reflect participants do not need to be 18 to participate and since there are minors the Amazon research is not applicable.

Notify the IRB of any changes to the funding status of the above-referenced protocol.

APPENDIX C: APPROVAL TO CONDUCT SURVEY

September 12, 2018

Krystal Gordon

Dear Krystal Gordon

Based on my review of your research proposal, I give permission for to conduct the study entitled "Student Use of Technology for Collaboration" at School. Students' participation will be voluntary and at their own discretion.

We understand that we are confi achers, parents, and students that you have our permission to conduct the study at School and to assist you in the data collection process by sending parents' consent forms to the students' homes and allowing students to complete the online surveys during class time.

I understand that all data collected will be anonymous and will not be provided to anyone outside of the research team without permission from the Wayne State University IRB.

Sincerely,

Assistant Superintendent of Educational Services

APPENDIX D: CONSENT FORMS (1)

Parental Permission/Research Informed Consent

Title of Study: *STUDENT USE OF TECHNOLOGY FOR COLLABORATION*

Principal Investigator (PI): Krystal Gordon

Purpose

You are being asked to allow your child to be in a research study of the use of computer and internet tools in their classroom because he/she is a business student at . This study is being conducted at Wayne State University and . The estimated number of study participants to be enrolled at Wayne State University and is about 100. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, students use of online computer and internet tools will be examined and their use in collaborating with other students. The State of Michigan Department of Education has created technology standards, which includes a list of learning expectations for students. These skills cover a vast array of technology skills students are required to achieve by the end of the 12th grade. Under the Michigan Merit Curriculum (MMC) technology and collaboration are also intertwined. In the core principals of online learning students are required to participate in a meaningful online experience. There are six characteristics for a quality online learning experience, with the first one focusing on collaboration among students. students need skills to enter the digital age of work and life. The skills needed to reach this plateau include collaboration. To date, little evaluation has been conducted on current student use of online tools for group collaboration and if the current use is aligned with state and national standards.

Study Procedures

If your child agrees to take part in this research study, he/she will be asked to respond to an online survey regarding the use of online computer tools and working with other students using the computer. His/her involvement should not take more than 20 or 30 minutes. Students will be cautioned to not place any identifying information on the survey.

Students will be asked to indicate the amount of time they spend on each of these activities involving computers:

1. Classroom activities and studying using an electronic device
2. Using library resources to complete a course assignment
3. Surfing the Internet for information to support your classwork
4. Writing documents for your classwork
5. Creating, reading, sending email

APPENDIX D: CONSENT FORMS (2)

Benefits

There may be no direct benefit for your child; however, information from this study may benefit other students now or in the future.

Risks
There are no known risks at this time to participation in this study.

Costs
There are no costs to you or your child to participate in this study.

Compensation
You or your child will not be paid for taking part in this study.

Confidentiality

All information collected about your child during the course of this study will be kept confidential to the extent permitted by law. Your child will be identified in the research records by a code name or number. Information that identifies your child personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.) may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your child's identity.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to allow your child to take part in this study. You and/or your child are free to only answer questions that you want to answer. You are free to withdraw your child from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you or your child are entitled to receive.

Questions

If you have any questions about this study now or in the future, you may contact Krystal Gordon at the following phone number (586) 209-4244. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

APPENDIX D: CONSENT FORMS (3)

Participation

If you do not contact the principal investigator (PI) within a 2-week period, to state that you do not give permission for your child to be in research, your child will be enrolled into the research. You may contact the PI by telephone at , by email at , or by mailing the tear-off sheet in the enclosed postage paid, preaddressed envelope.

Optional Tear Off

If you do not wish to have your child participate in the study, you may fill out the form and return it to your child's teacher.

I do not allow my child _____to participate in this research study.
Name

_____
Printed Name of Parent

_____ _____
Signature of Parent Date

APPENDIX D: CONSENT FORMS (4)

[Behavioral]Documentation of Adolescent Assent Form

(ages 13-17)

Title: **STUDENT USE OF TECHNOLOGY FOR COLLABORATION**

Study Investigator: Krystal Gordon

Why am I here?
This is a research study. Only people who choose to take part are included in research studies. You are being asked to take part in this study because you are taking business classes at Dakota High School. Please take time to make your decision. Talk to your family about it and be sure to ask questions about anything you don't understand.

Why are they doing this study?
This study is being done to find out if high school students are using online computer and internet tools for group collaboration.

What will happen to me?
You are being asked to complete an online survey about the use of online computer and internet tools and if you are collaborating with other students in your classes using these tools.

How long will I be in the study?
You will be in the study for approximately 20 to 30 minutes.

Will the study help me?

You may not benefit from being in this study; however information from this study may help other people in the future by informing your teachers regarding the use of online computer and internet tools.

Will anything bad happen to me?
There are no risks involved with participating in this study.

Do my parents or guardians know about this? (If applicable)
This study information has been given to your parents/guardian and they said that you could be in it. You can talk this over with them before you decide.

What about confidentiality?
Every reasonable effort will be made to keep your records (medical or other) and/or your information confidential, however we do have to let some people look at your study records.

We will keep your records private unless we are required by law to share any information. The law says we have to tell someone if you might hurt yourself or someone else. The study doctor can use the study results as long as you cannot be identified.

APPENDIX D: CONSENT FORMS (5)

What if I have any questions?

For questions about the study please call Krystal Gordon at (586) 209-4244. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Do I have to be in the study?

You don't have to be in this study if you don't want to or you can stop being in the study at any time. Please discuss your decision with your parents and researcher. No one will be angry if you decide to stop being in the study.

AGREEMENT TO BE IN THE STUDY

Your signature below means that you have read the above information about the study and have had a chance to ask questions to help you understand what you will do in this study. Your signature also means that you have been told that you can change your mind later and withdraw if you want to. By signing this assent form you are not giving up any of your legal rights. You will be given a copy of this form.

_____ _____

Signature of Participant (13 yrs & older) Date

_____

Printed name of Participant (13 yrs & older)

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ABSTRACT

STUDENT USE OF TECHNOLOGY FOR COLLABORATION

by

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May 2019

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Major: Learning Design and Technology

Degree: Doctor of Philosophy

According to the U.S. Department of Education, students need to be prepared for higher education and remain competitive in a globally changing society schools should intertwine 21st century skills including collaboration in the classroom. The purpose of the study is to examine the current use of online tools for group collaboration among high school students. Social constructivists assume learning is collaborative and meaning comes from multiple perspectives. In a social constructivist environment, the goal is for student learning to be maximized. Many states have set guideline and standards that require schools to incorporate collaboration across the curriculum. A nonexperimental, correlational research design was used in this study. An adapted version of the Student Information Technology Use and Skills in Higher Education: Survey Questionnaire was used in this study. A total of 140 students in a single high school completed the online survey. The participants were in the 10th through 12th grades and were enrolled in business classes. Collaboration among the students was low and their skill levels with programs and apps varied depending on how much they were used for at school and home. The largest group of students preferred having a moderate level of technology in their classes. The findings for the three research questions posed for the study indicated that use of collaborative technology helped

students and skill level with applications could predict experiences in collaborating with other students. Students perceptions of the benefits and barriers associated with collaboration were related to the self-reported experiences with technology. Students with more experiences tended to perceive benefits in a positive way and barriers negatively. A MANOVA using benefits and barriers of collaboration as the dependent variables and self-reported learning styles as the independent variable was not statistically significant. The implications for this study is to begin collaboration early, preferably in elementary school, and continue through high school and into college. Further research is needed to determine if the students are meeting the standards set by state departments of education and the U. S. Department of Education.

AUTOBIOGRAPHICAL STATEMENT

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