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FACILITATING COLLABORATIVE GROUP WORK AMONG MIDDLE SCHOOL STUDENTS THROUGH DIGITAL GAME-BASED LEARNING: AN ACTION RESEARCH STUDY TO IMPROVE CLASSROOM INSTRUCTION

by

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Education in

Curriculum & Instruction

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DEDICATION

This dissertation is dedicated to my Proverbs 31 wife, Jenna. Sweetheart, this dissertation doesn't happen without you. You prayed for me when I felt overwhelmed; you loved me through the frustrations; you encouraged me when I didn't know if this was possible; you spoke life over me when I couldn't find the words within me. You are incredible, and I love you more than words could ever say.

To my girls, Oaklynn and Izzy, I can't wait to make up for all the lost time that I invested into this program. I did this for you and our family. You are my princesses, and I love you so much. You both find ways to melt my heart every day. I hope this dissertation will stir up within you the possibilities of what you can do in life. Nothing will be too big for you two.

To my parents, Chris and Abigail, for your encouragement and support throughout all these years. I couldn't ask for two better parents.

To my siblings, Noelle, Taylor-Lynn, Chance, and Dominique. There is NOTHING you guys can't do. I love all of you.

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ABSTRACT

This qualitative action research dissertation was an endeavor to strengthen the practitioner-researcher's ability to foster collaboration skills among eighth grade students in his elective science, technology, engineering, and mathematics (STEM) class. The research question that anchored this study was: To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning The practitioner-researcher implemented an intervention that utilized a collaborative learning framework while student groups worked together during a digital game-based learning opportunity. The synthesis of a collaboration framework, the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017), and digital game-based learning (Prensky, 2001), informed the intervention for this study. The intervention of collaborative digital game-based learning was applied in the study context, yielding key findings to inform the practitioner-researcher's practice. The study found that in the researcher's context, informal coaching was a valuable part of the collaborative intervention, and that process benchmarking with intermediate projects deadlines could help to alleviate the build.

Keywords: action research, collaboration, digital game-based learning, group work, middle school, Minecraft

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LIST OF ABBREVIATIONS

CDGBL ..... Collaborative digital game-based learning

CSC ..... Collaboration skills curriculum

CSP ..... Collaboration skills pedagogy

DGBL ..... Digital game-based learning

EEC ..... Elements of effective collaboration

M:EE ..... *Minecraft: Education Edition*

SCS ..... Student collaboration

CHAPTER 1

INTRODUCTION

As an elementary school teacher, one of my biggest professional struggles has been the effective facilitation of collaborative groups. The benefits of collaboration have been highly touted throughout my own educational experiences and even more thoroughly elevated in my professional development. However, although I have been encouraged to implement collaborative learning opportunities in my practice, facilitating collaborative group work among young learners has been a source of vexation throughout my teaching career.

Over the years, I have grouped students of varying aptitudes, personalities, and backgrounds with the expectation that they will learn how to effectively collaborate by merely engaging in tasks designed for groups of various sizes and skills. For example, I have used Kagan Structures (2003), a collection of strategies to structure collaborative groupings that support productive student interactions. When I tried these strategies, it felt like I was just teaching the structures and not necessarily the skills associated with effective collaboration. Furthermore, I felt that applying Kagan structures in real-life opportunities to collaborate outside of a classroom setting is impractical. From these experiences, I have realized that without the appropriate support for effective collaborative work that is transferable beyond the classroom, students will often struggle to collaborate effectively.

After several years in an elementary level magnet school for students identified as gifted and talented, the opportunity came for me to teach a middle school elective course that integrates concepts from Science, Technology, Engineering, and Mathematics (STEM). The first day of school was all I needed to know that middle school was a vastly different world compared to elementary school. I broke up four fights in the courtyard outside my door before the first report card went home. It was apparent to me that many of my students had things on their minds other than completing the presentations, websites, or the historical timelines required by the district-written curriculum.

The first time I saw a glimmer of excitement in my students came when I gave each of my table groups a hands-on building challenge. While most students enjoyed that activity, a familiar problem paralleled what I had observed on the elementary level - some students were shutting down, allowing others to do the work. Furthermore, the requisite cost of materials and the additional time needed to set up, tear down, and clean up made the prospect of continually implementing these types of learning opportunities a persistent challenge. I needed a breakthrough with my kids as our collective morale was fading fast, and students were actively seeking schedule changes out of my class. That breakthrough came with an iPad cart and the news that Microsoft had just released a version of the application *Minecraft: Education Edition* (M:EE) for iPads. In my previous context, I had positive experiences facilitating build projects in M:EE. Essentially, M:EE is an educational version of a popular video game that supplies end-users with unlimited building blocks (like cube-like iterations of LEGOs©) and a virtual world in which they can build whatever creations their minds can concoct.

The incorporation of M:EE seemed to achieve increased student interest in working on projects within the application. Word spread amongst the student body, and students began requesting a schedule change *into* my class rather than out of it. Even students with previous behavior issues, both inside and outside of school, showed that they had an interest in both building and coding through M:EE. The builds that students produced were advanced, and I began observing a new trend developing in each of my classes. When students had to work together in *Survival Mode,* a game setting that requires students to pool resources in order to survive within M:EE, they began negotiating trades for resources. I heard one student offer a girl twenty diamonds for some tools, to which she replied, "I am a strong, independent woman, and I can get my own diamonds." Eventually, another less beneficial trend presented itself as well.

Regularly, I would hear disagreements, often loud ones, develop within multiple groups. Collaborative builds often looked like an eclectic mess, lacking the cohesiveness that comes with students devising an agreeable plan regarding their end-product. As promising as M:EE had been in functioning as a vehicle for students to be creative, think critically, and work together, the arguments that would erupt at times due to ineffective collaboration were quite dramatic. I had a student blow up when someone snuck into his building area and took resources, leading him to shout, "My chickens! Not my chickens! Noooo!" This outburst, over this virtual transgression, completely disrupted the physical learning environment. I have learned that the social stresses that my middle schoolers face, coupled with my ineffective facilitation of collaborative learning, have made group work even more challenging to implement in class.

Over the years, the complaints I have received from students working on group work have generally fit into one of three categories. Students have expressed concerns about: imbalances in the division of labor; frustration that their voices were falling on deaf ears amongst their group members; or they have asked me to settle disagreements. My students practically beg to work with other students but have not been given educational opportunities to develop effective collaboration skills. These challenges provided me with an opportunity to develop my practice further and serve as the focus of this dissertation study.

Problem of Practice

Collaboration is one of the 21st-century skills that students need to develop as part of their k-12 education (NEA, 2012). However, developing the skills of effective collaborative learning among students in the middle school classroom is challenging work for both teachers and students (Le, Janssen, and Wubbels, 2018). The challenge of fostering effective collaborative skills in my classroom has been the ongoing problem of my practice. The development of effective collaboration skills, like many other 21st-century skills, is often overlooked by classroom teachers and often ineffective when teachers attempt to address these skills in today's classrooms (NEA, 2012). If a teacher does not apply an instructional approach that intentionally fosters the development of effective collaboration, students of all ages often struggle to collaborate effectively (Baron, 2003; Popov et al., 2012; Le, Janssen, & Wubbels, 2018). Additionally, if teachers possess negative views towards collaborative learning, they may choose to forego implementing collaborative learning opportunities altogether (Chiriac & Granström, 2012). Compounding these challenges for teachers, the lack of adequate

training on facilitating collaborative work impedes teachers' ability to teach their pupils how to effectively collaborate (Blatchford et al., 2003; Le, Janssen, and Wubbels, 2018). Likewise, when students discuss the challenges associated with effective collaboration, they often identify challenges regarding: the equitable division of the work; the feeling that their voices were unheard within their group; and the arguments that occur during collaborative work are difficult to resolve without support from the teacher (Chiriac & Granström, 2012). Viewing the problem from these two perspectives helped to frame the problem of practice for this study.

Theoretical Framework

The theoretical framework for this dissertation study draws from the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017), and digital game-based learning (Prensky, 2001). Though I had implemented digital game-based learning (DGBL) in my class before, I needed a framework to guide my facilitation of collaborative learning. The elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017), or EEC, helped to focus this study's intervention. The intervention took place during a digital game-based learning (Prensky, 2001), or DGBL, opportunity. The intersection of these two frameworks informed the theoretical framework and, in effect, the research design of this study. *Figure 1.1* represents how these models of instruction are connected, and the subsequent discussion provides a brief explanation, which is discussed further in Chapter Two of this dissertation.

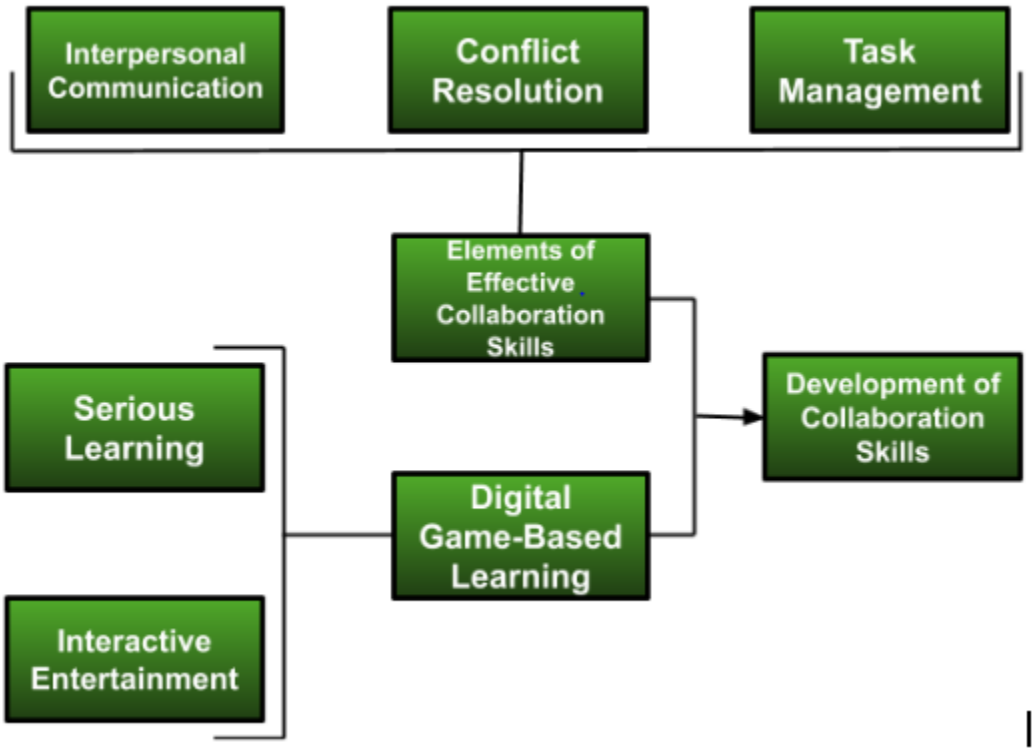

Figure 1.1. Theoretical Framework

Elements of Effective Collaboration

Lai, DiCerbo, and Foltz (2017) define collaboration as "the process of interacting and requires individuals to work together toward a common goal" (p. 9). In order to address the problem of practice, this study sought to identify a collaborative framework that addressed the interactions of students and their work processes as their group collectively progressed towards their end goal. One framework, the EEC (Lai, DiCerbo, & Foltz, 2017), provided a succinct, inclusive framework to guide the instruction. The three EEC are interpersonal communication, conflict resolution, and task management. Interpersonal communication pertains to social interaction through both words (verbal or written) and body language (non-verbal), and how effectively people listen to one another (Beebe et al., 2015). Conflict resolution is two or more parties constructively working

through disagreements by seeking an agreeable solution(s) (Wolff & Nagy, 2019). Task management involves itemizing and equitably distributing the subtasks necessary to bring the end goal to fruition (Lai, DiCerbo, & Foltz, 2017). Each of the EEC tied directly to the most common types of complaints that my students have expressed while working together. This collaboration framework guided the instructional approach with the participant group during the study while I attempted to foster this 21st-century skill in the study's classroom context. The framework also streamlined the study's focus. I strategically sought to foster these three specific elements and make communication, task management, and conflict resolution a regular topic of conversation during interactions with students. Moreover, each data collection tool integrated these three elements to glean insight on collaboration from the participant group's students.

As part of the intervention developed in this action research dissertation, it was important to facilitate a group project that students found engaging. This was due to how studies found some learners harbor negative attitudes and associations going into collaborative work opportunities due to either past experiences or their perceptions of whether the work is worthwhile (Livingstone & Lynch, 2000; Chiriac & Granström, 2012). STEM projects that have involved the "virtual sandbox" video game known as *Minecraft: Education Edition* (M:EE) eased the challenge of engaging my students. Considering that 72% of teenagers play video games on the devices at their disposal (Lenhart, Smith, Anderson, Duggan, & Perrin, 2015), this statistic could explain the high level of engagement using the educational game in my classroom. While devices were ubiquitous within my classroom context, what had been missing from my practice was a collaboration framework that would support collaborative projects. In the case of this

study, the EEC (Lai, DiCerbo, & Foltz, 2017) anchored the collaborative process while M:EE served as the virtual learning environment for students as I worked to develop the capacity to foster effective collaboration skills. One could categorize the activity in which students engaged as a DGBL opportunity (Prensky, 2001).

Digital Game-Based Learning

Prensky (2001) defines DGBL as the intersection between "serious learning and interactive entertainment" (p. 5). Situating this study within M:EE made sense because "games are the ideal learning environment with their built-in permission to fail, encouragement of outside-the-box thinking, and sense of control" (Kapp, 2012, p. xxii). Kapp (2012) maintains that "the real value in game-based mechanics is to create meaningful learning experiences" (p. xxii). The idea here was that student participants would perceive that the project was relevant to them. This would be the desired effect, as I chose the virtual learning environment with screen-centric learners in mind. Ideally, this would foster engagement, which is essential for learners to develop positive associations within their respective learning experiences (Kapp, 2012). Proponents of DGBL (Prensky, 2001; Gee, 2003; Aldrich, 2004; Johnson, 2005) have touted the advantages of leveraging the enjoyment that children find in video games for educational purposes. As Van Eck (2006) explained, "one could argue...that we have largely overcome the stigma that [digital] games are 'play' and thus the opposite of 'work'" (p. 17). Studies on DGBL have highlighted increases in student motivation (Ninaus, Moeller, McMullen, & Kiili, 2017), time spent on-task (Bragg, 2012), and core and supplemental skills (Takeuchi & Vaala, 2014).

Of relevance to the theoretical framework of this study was the need to draw a connection between DGBL and the promotion of collaborative skills. Teachers have reported seeing growth in social skills through cooperative play (Takeuchi & Vaala, 2014). Furthermore, one study found that implementing collaborative digital game-based learning (CDGBL) fostered improved learning attitudes, motivation, and self-efficacy (Sung & Hwang, 2013). Other studies found that student learning achievement during CDGBL showed improvement as well (Sung & Hwang, 2013; Hsiao, Chang, Lin, Chang, & Chen, 2014), further "bridging the gap between digital game-based learning and collaborative learning" (Hsiao et al., 2014, p. 652). As illustrated in *Figure 1.1* and throughout this section, the intersection of the EEC (Lai, DiCerbo, & Foltz, 2017) and DGBL (Prensky, 2001) could collectively provide a suitable theoretical foundation for this dissertation as I sought to answer the research questions central to this study.

Research Question

The purpose of this study was to identify and refine a set of instructional strategies that could support the development of effective collaboration skills among middle school STEM students. Through the integration of a framework for effective collaboration (Lai, DiCerbo, & Foltz, 2017) and the use of a digital game-based platform (M:EE), I attempted to authentically engage students in learning as well as provide them with an opportunity and the support to develop the skills associated with effective collaboration, an important 21st-century skill (NEA, 2012). Considering the nature of this study's problem of practice and its inherent dependence on the study context, I selected an action research approach. Action research is an endeavor to reflectively understand and solve a problem concerning a social context (McKernan, 1988). To address the

problem of my practice, the intervention for this study involved: high teacher presence, positioning me to be readily available to a small group of student participants to offer instruction, support, feedback, and reminders on the EEC (Lai, DiCerbo, & Foltz, 2017); observing their interactions as they worked collaboratively; having them complete daily exit ticket surveys; and completing practitioner-researcher reflections on the events of each day. With the purpose of this study and the theoretical framework in mind, I developed the following research question to drive this study:

> To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning?

The justification for utilizing this research question was that it focused the study on both student acquisition of collaboration skills and the strengthening of my facilitation skills. In order to aid in answering this research question, I sought to measure the following qualitative constructs that this study sought to measure, including the development of students' collaboration skills (CS), my collaboration skills curriculum (CSC), and my collaboration skills pedagogy (CSP).

Researcher Positionality

In determining a researcher's positionality, they must reflect on their personal qualities that could have an impact on their research (Herr & Anderson, 2015). As my practice as a middle school STEM teacher was the central focus of what resembled a self-study (Bullough & Pinnegar, 2001), it was vital for me to reflect on different life experiences, beliefs, and qualities that have either shaped who I am or could have had an impact on my research. This type of self-awareness is known as reflexivity (Efron &

Ravid, 2013). Given the context and purpose of my study, I operated as an insider on the continuum of positionality. For this study, I was a practitioner-researcher, who already had insider knowledge and rapport with the middle school STEM students in the research context. My interest in joining the Electives Department as a STEM teacher at my school was largely influenced by my interest in technology, and the instructional technology program I completed in graduate school. I attended graduate school while I was in the military.

I served for seven years in the Army National Guard as a chaplain assistant. My military experience had an impact on how I lead others, which generally involves assessing a situation, conducting a problem analysis, developing a plan of action, and systematically addressing each part of the plan of action, step by step. What didn't translate from the military to my practice is that so much of military leadership involves delegating tasks to others. Regarding my problem of practice, this research was an opportunity to grow as an instructor who was better equipped to lead my students as they engage in more effective collaborative work. Another facet of my positionality germane to this study is the impact of factors in my life that contributed to my interest in video games.

As a boy whose parents divorced when I was young, I struggled with the duality of seeing my stepfather as a father-figure, yet not sharing his interests. He grew up playing competitive sports, working on cars, and hunting, all of which were out of alignment with my interests. I became a self-proclaimed "gamer," playing countless hours of video games. While my friends were training for high school sports, working on cars, or hunting with their father-figures, I was nestled away in the safety and solace of

my room. Playing video games was a way for me to pass the time in a low-risk, seemingly high-reward manner that made me feel competent. I had little to no interest in working on cars or hunting like my friends. Playing sports in front of others meant answering to authority figures while risking the loss of social capital in front of spectators, in the event of failure. Now, as an adult, with a family of my own, I still play video games, albeit in a limited manner. Sometimes I play alone but find myself preferring to play with others because I see value in playing multiplayer video games from a social perspective. I appreciate being viewed by my friends as competent in virtual worlds when I am not always viewed as competent in the real world. I would venture to say that many students may feel this way, too. I maintain the personal belief that video games should be leveraged for educational purposes, though they are not always the means to every educational end. They have the power to engage students and, I believe, empower them to believe positive things about themselves that grades do not always reinforce. This belief is essential to acknowledge because I do not want to compromise the integrity of my research by failing to be transparent about my video game-related passion and beliefs. Given my positionality for this study, I needed to be mindful that my research design aligned with the need to examine my practice and not the impact of a video game on my context. My positionality is discussed more in-depth in Chapter Three.

Research Design

In order to study my classroom practice and its impact on students, I chose to use methods referred to as action research, an approach that can systematize and formalize what typically happens when teachers attempt to improve their practice (Gillis &

Jackson, 2002; Koshy, 2005). While action research provided an overall framework for organizing the work, I also selected data collection methods associated with a qualitative, self-study methodology (Bullough & Pinnegar, 2001; Efron & Ravid, 2013; Creswell, 2014). Together these two approaches became the methodological framework that I used to guide the enactment of my intervention.

The setting for this study was at Troi Willow Middle School (pseudonym), during one of my 8th grade STEM classes. The focus of this elective STEM class is to engage students in authentic learning opportunities, rooted in STEM-related fields, content, and tools. I taught one class with both 6th and 7th graders, one class with only 7th graders, and four classes of 8th grade STEM. Since most of my students were 8th graders, I chose one of my 8th-grade classes for this study. I believed what I learned from my research would be most applicable to my practice if my participant group was reflective of the majority of the students I serve. For this study, I divided the class period during which my study took place into three groups. One of the groups would comprise the participant group. Though the sample group may have resembled a convenience sample due to enrollment in my STEM class making these students readily accessible (Efron & Ravid, 2013), it was actually a purposive sample. Even though qualitative research does not have specific criteria for constituting a sample group (Efron & Ravid, 2013), and although my research question was specific to middle school students in general within my context, I was selective in who I grouped together for this study. The composition of my sample was exactly who I wanted in trying to answer this question - a diverse group of middle school students. The diversity of this participant group was a combination of students with demographics that were reasonably representative of the diversity found in

the school's overall student demographics, making this sample a representative, purposive sample (Maxwell, 2013). Over the course of ten days, all three groups worked on M:EE projects while I implemented a collaborative intervention, collected data, and made observations that informed my reflections on the action research study.

Action Research

As previously stated, action research is an endeavor to reflectively understand and solve a problem concerning a social context (McKernan, 1988). When teachers notice an issue in their context, they often adjust the curriculum or their pedagogy when they see opportunities for improvement. However, this process often occurs quickly, with few formal methods for ensuring that the work is intentional, reflexive, and transferable. Action research provides a common framework for teachers to generate and share their knowledge of classroom practice with others in the field of education (Reason & Bradbury, 2001). Unlike traditional research, the researcher is embedded within the work, alongside the participants (Kemmis & McTaggert, 2000).

This research aligned with the attributes of action research because said research was "constructivist, situational, practical, systematic, and cyclical" (Efron & Ravid, 2013, p. 7) in nature. A more in-depth discussion on how this dissertation satisfies the attributes of action research is offered in Chapter Three. Additionally, this research aligned with the goals of action research, which are to achieve outcome, process, democratic, catalytic, and dialogic validity (Herr & Anderson, 2015). A more in-depth discussion on how this dissertation satisfies the goals of action research is offered in Chapter Five. Due to the overall emphasis on data sources featuring subjective responses

from the participants and myself throughout the spiral of action cycles (Kemmis, 1982), my dissertation could best be described as qualitative (Creswell, 2014) action research.

Qualitative Self-Study Design

According to Creswell (2014), qualitative research involves "exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p. 4). Every individual has a variety of nuances that shape their perspectives on the social constructs and realities of the world around them, so in order to enact change in an educational context, qualitative researchers must seek to understand insights from educational stakeholders (Efron & Ravid, 2013). The subjective nature of the insights that came from the educational stakeholders germane to this study (student participants and myself through practitioner-researcher reflections) appropriated qualitative data for this dissertation (Creswell, 2005).

My dissertation involved the study of my practice within my own classroom; therefore, my research was characterized as a self-study (Bullough & Pinnegar, 2001). This self-study put me in the role of a reflective practitioner (Schon, 1983) as I took action towards improving my practice. In self-studies, "there is a greater emphasis on narrative, self-reflective methods" (Herr & Anderson, 2015, p. 42). The construction of these reflections adhered to guidance from Mertler (2014) by addressing three factors: "the actual event or lesson, the recollection of the event or lesson, and reviewing and responding to what actually occurred during the event or lesson" (p. 136). Through the analysis of my teacher reflections, I hoped to gain further insight into my classroom practice and how I could make improvements (Schon, 1983).

Data Collection and Analysis

Given the iterative nature of action research and the decision to collect qualitative data about my practice, the data sources chosen for this study included: a pre-intervention survey (Mertler, 2014); exit ticket surveys (Black & William, 1998); practitioner-researcher reflections (Carr & Kemmis, 1986); project artifacts (McMillan & Schumacher, 2006); and semi-structured interviews (Efron & Ravid, 2013). All survey (Black & William, 1998; Mertler, 2014) data were collected through Google Forms. The practitioner-researcher reflections (Carr & Kemmis, 1986) were written in Google Docs. The project artifacts (McMillan & Schumacher, 2006) involved taking screenshots of the projects at the conclusion of the assignment. Lastly, the semi-structured interviews (Efron & Ravid, 2013) were recorded on my phone and transcribed using Trint, an online transcription service. Student participants were deidentified using pseudonyms in the transcriptions.

During the analysis process, multiple cycles of coding were conducted (Miles, Huberman, & Saldana, 2014), allowing me to isolate emergent themes that arose from the data collected. Action research is the "systematic collection and analysis of data for the purpose of taking action and making change" (Gillis & Jackson, 2002, p. 264). During this study, I took action by implementing an intervention and collecting data with the goal of enacting changes. I reflected on and worked towards addressing this study's problem of practice - the need to more effectively facilitate my students' collaborative work opportunities. Mertler (2014) stresses that "this process of systematically collecting information followed by active reflection - all with the anticipation of improving the

teaching process - is at the core of action research (p. 13). Thus, the study I conducted should be characterized as action research.

Before the two-week study began, participants completed a survey (Mertler, 2014) to share their perspectives on questions tied to the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). Ten minutes before each class period ended, participants completed an exit ticket survey (Black & William, 1998), evaluating how well their group worked together, specifically regarding the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). After students completed the two-week project, semi-structured interviews (Efron & Ravid, 2013) were conducted with the participants to allow them to discuss the collaboration process, the curriculum, and my pedagogy during the project. The completed M:EE projects also serve as student or project artifacts (McMillan & Schumacher, 2006). I utilized the artifacts to compare and contrast each project and evaluate them for evidence of effective collaboration. Given that I was specifically looking for and encouraging the participant group towards reflecting the EEC (Lai, DiCerbo, & Foltz, 2017), I anticipated that there would be notable differences in the quality of the student artifacts at the conclusion of the project.

The survey conducted before the intervention (Mertler, 2014) featured both Likert-scale data collected using a Google Form. The qualitative data were transferred to Google Sheets and populated in tables to look for patterns within the responses. Daily exit ticket surveys (Black & William, 1998) featured Likert-scale and open-ended question data collected using a Google Form. All exit ticket data was transferred to and organized within a Google Sheet and analyzed using coding to look for emergent themes to present themselves from the data. The Likert-scale data were analyzed for means and

trends. Pre-lesson practitioner-researcher reflections (Carr & Kemmis, 1986) were written on a Google Doc. The qualitative data were organized within tables on the Google Doc and analyzed using coding to look for emergent themes to present themselves from the data. Post-lesson practitioner-researcher reflections (Carr & Kemmis, 1986), regarding both the curriculum and the practitioner researcher's teacher moves, were written on a Google Doc. The qualitative data in tables on the Google Doc were analyzed using coding to look for emergent themes to present themselves from the data. The end-product from each of the three groups served as project artifacts (McMillan & Schumacher, 2006). These artifacts were compared and contrasted after the project carried out during the study. Students from the participant group had the opportunity to respond to the project artifacts (McMillan & Schumacher, 2006) during the semi-structured interviews (Efron & Ravid, 2013). These interviews were conducted at the conclusion of the project. The qualitative data were organized within the MAXQDA software application and analyzed using coding to look for emergent themes to present themselves from the data. Greater detail regarding study design and methodology are included in Chapter 3.

Significance of Study

Through this study, I have practiced and learned new tools, strategies, and frameworks to aid in my capacity to foster my students' ability to collaborate, a vital 21st-century skill (NEA, 2012). As a result, future students that I impact, whether in the k-12, collegiate, or ed-tech sector, will have a greater likelihood of being better equipped to work with others in the modern world. As I discuss in Chapters 4 and 5, the findings of

this study speak to the importance of best practices concerning project-based learning and coaching, as well.

Another consideration for the significance of this study is that it contributes to a gap in the literature pertaining to the use of the EEC (Lai, DiCerbo, & Foltz, 2017) as a collaborative framework in an educational setting. This succinct, three-part collaborative framework was synthesized as an overlap of the commonalities found in other notable frameworks (P21, 2015; Binkley et al., 2012; Stevens & Campion, 1994). The summative paper on collaboration (Lai, DiCerbo, & Foltz, 2017) is referenced in over thirty academic publications, yet not one piece of literature empirically utilized the EEC as a framework for structuring collaborative learning opportunities.

Limitations and Delimitations of Study

Limitations are generally factors beyond our control that could potentially impact the results or findings of a study, while in contrast, the delimitations of a study are elements within our control that impact a research study (Baron, 2008). Concerning the limitations of this study: the diversion from the initial station rotation plan; the timeframe and scope of the project design; and the inability to recover Karen's semi-structured interview when I saved the recording, accidentally overwriting it, each played a part in having an impact on this study. The streamlined focus on growing in my capacity to foster collaboration, as opposed to all four of the 4Cs 21st-century skills, and the small group of participants from one of my STEM classes, rather than upwards of approximately 120 student participants from all of my classes, were delimiting factors that I implemented in this study. These limiting and delimiting factors are discussed in more detail in Chapter 5.

Organization of the Dissertation

Chapter One served as both the foundation for and an overview of my dissertation by outlining the problem of practice, the theoretical foundation, my positionality, and the research design for this study. Chapter Two will offer a more in-depth review of the literature pertinent to this study's problem of practice and theoretical foundation. This review includes literature on the challenges associated with collaboration from the student and teacher perspectives, EEC, DGBL and CDGBL. Chapter Three delineates the methodological approach and design of my research, which includes an examination of: the research context for this study; the student participants; and the instruments and tools used to collect and analyze the study data. Chapter Four will feature the presentation of the data, detail the analysis process of the data collected, interpret the data, discuss the themes that emerged from the data, and then report my findings that came from this study. Finally, I will take the opportunity in Chapter Five to reflect on my dissertation study in totality, the limitations and delimitations that affected this study, and how the study's findings will impact my practice and future research pursuits.

CHAPTER 2

LITERATURE REVIEW

Similar to the experiences of other teachers described in educational research literature, the absence of a focus on effective collaboration skills in my instructional planning and the resulting difficulty in facilitating collaborative learning led to my students struggling to effectively collaborate in my classroom (Baron, 2003; Popov et al., 2012; Le, Janssen, & Wubbels, 2018). These instructional challenges and the challenges identified by my students when they engage in collaborative learning represent the problem of practice on which this study is focused. In order to address this significant problem of practice, the purpose of this study was to identify and refine a set of instructional strategies that can support the development of effective collaboration skills among my middle school STEM students while also attempting to alleviate the challenges identified by my students that occur when they engage in collaborative learning.

Collaboration is one of the 21st-century skills that students need to develop as part of their k-12 education (NEA, 2012). However, developing the skills of effective collaborative learning among students in the middle school classroom is challenging work for both teachers and students. In order to focus this study, this qualitative, action research addressed the following research question: To what extent can I foster effective collaboration among my middle school students through the use of an instructional

planning framework for collaboration and the strategies associated with digital game-based learning?

This chapter is organized into two distinct sections focused on the review and synthesis of the relevant literature to both my problem of practice and my theoretical framework for addressing the problem. In the first section, I provide a broad overview and a study-specific synthesis of the research literature related to the challenges associated with developing effective collaboration skills among students, the problem of practice addressed by this dissertation in practice. Building on this synthesis of the relevant literature related to the problem, the second section focuses on the research literature related to the theories that I have integrated into the theoretical framework that guided this study. The chapter concludes with a discussion of how the aspects of the problem that I have discussed and the affordances of the theories I have selected are aligned in ways that directly address the research question that guided this study.

In accordance with the conceptual framework developed for this study, my review of the literature involved finding research germane to my problem of practice and uncovering literature that would contribute to the needed theories that would make up my theoretical framework. In order to achieve these goals of the literature review, I examined educational research journal articles, resources from the University of South Carolina Library, documents from the Educational Resources Information Center (ERIC), primary sources such as books written by researchers and other scholars, as well as other sources related to essential elements of this action research project. Given the use of action research focused on a significant problem of practice for this dissertation in practice (Herr & Anderson, 2015), I needed to develop an in-depth understanding as to

why the problem exists in both my context and the broader educational context (Mertler, 2014). Accordingly, I conducted a cause and effect analysis using a fishbone diagram (Coccia, 2018). I then looked for seminal works, primary sources, peer-reviewed articles, and current empirical research focusing on digital game-based learning, or DGBL (Prensky, 2001), the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017), and the intersection of these two concepts. For the theoretical framework, I define, examine the origination of, consider related-studies, and justify utilizing DGBL (Presnky, 2001) and the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017) for my intervention. Based on this review, I highlight the aspects of each theoretical piece of my framework that work together to support my intervention.

Challenges Associated with Classroom Collaboration

This section discusses three different topics to provide background information regarding my problem of practice. First, I will examine the growing need for collaboration skills in our society (Wagner, 2008; NEA, 2012; Lai, DiCerbo, & Foltz, 2017) and evidence that suggests these skills are not being adequately fostered in American education (Hart Research Associates, 2015). Prior to this study, I was not adequately fostering collaboration skills, corroborating the timeliness of my engagement in this action research study. Next, I will delineate the challenges associated with collaboration from the student perspective (Le, Janssen, & Wubbels, 2018; Healy, McCutcheon, & Doran, 2014; Chiriac & Granström, 2012). This will lead to my consideration of the instructional challenges of facilitating collaboration skills. Lastly, I will discuss the impact of ineffective collaboration as an issue of equity (Pellegrin & Hilton, 2012; Surr et al., 2018)

The Growing Need for Collaboration

According to the NEA (2012), the American education system "was built for an economy and a society that no longer exists" (p. 5). The manufacturing and agrarian economies that the NEA (2012) referred to demanded that schools produce workers of social utility. For the better part of the 20th century, the high-efficiency, productivity principles of Taylorism (Littler, 1978) and Fordism (Doray, 1990) utilized in factories reflected how students were educated (Burns & Botzakis, 2016). Teachers, with an emphasis on control, generally lectured whole classes of students while conditioning them to follow certain procedures and discouraging deviation from acceptable processes (Burns & Botzakis, 2016). There was little need to teach students how to collaborate because, like factory workers, each individual student had their work in front of them, had routines to follow, and did not need to discuss with their neighbor how to complete the task at hand. To this point, Kübler-Ross (2003) argued that students had grown so accustomed to passive learning strategies, that the resistance that students exhibited towards collaborative learning manifested at times as emotions consistent with trauma and grief responses. From the end of World War II, throughout the Space Race, and to the end of the Cold War, the behavioristic, teacher-centered approach to instruction largely overshadowed the need to provide a more humanistic, student-centered education (Topolovčan & Dubovicki, 2019).

Today, modern society is creating demand for students to be equipped with the skills synonymous with survival in the 21st century (P21, 2010; Wagner, 2008). The need to specifically foster collaboration skills is significant because of the demand the modern world is placing on individuals who are fluent in both people and technology

interaction and can interact with and manage both (Soulé & Warrick, 2015; & Holland, 2018). The research on collaboration highlights both the call for young people to be able to collaborate and yet, how they are not being adequately equipped with this skill. According to Attle and Baker (2007), approximately 80% of all employment opportunities involve contexts that require working with others, corroborating the value employers place on effective collaboration skills (Finelli et al., 2011; Accreditation Board for Engineering and Technology, 2017). However, according to a survey on behalf of the Association of American Colleges & Universities (Hart Research Associates, 2015), out of 400 companies surveyed, 83% of the employers rated collaborative skills as very important, yet only 37% of employers felt that college graduates were adequately equipped to work with others.

To more effectively serve my students, I needed to better understand the different challenges that act as barriers to fostering collaboration. This meant learning about impediments to collaboration from students' perspectives, why educators like me struggle to teach collaboration skills (Gillies & Boyle, 2010), and the issue of ineffective collaboration as an issue of equity.

Challenges Associated with Collaboration from the Student Perspective

Research on student perceptions about the learning environment has demonstrated the importance of ascertaining student input for classroom teachers (Wagner, Gollner, Helmke, Trautwein, & Ludtke, 2013; Fauth, Decristan, Rieser, Klieme, & Buttner, 2014), as their insight often portends subsequent learning outcomes (Kane & Cantrell, 2010; Kane & Staiger, 2012). These claims were further corroborated in a study (Wallace, Kelcey, & Ruzek, 2016) that surveyed over 25,000 middle school students and found that

student perceptions of learning paralleled achievement on standardized test scores. Some students associate little value concerning working with others, equating it to nothing more than "busy work" (Chang & Brickman, 2018). In one study conducted to glean student perceptions on why they struggle when collaborating, students reported issues such as: inadequate collaboration skills; free-riding; competence status (the opinions or ideas of students perceived as less competent were taken less seriously); and friendships (or the difficulty of challenging the ideas of other friends in a collaborative group and holding them accountable) served as obstacles in the collaborative process (Le, Janssen, & Wubbels, 2018). Students in another study (Healy, McCutcheon, & Doran, 2014) corroborated the free-riding issue, with those students who made extra effort to complete a greater share of their group's work indicating the assignment evaluation did not reinforce their effort. Other students offered the following factors as inhibitive to collaboration: groups with six or more students; overly heterogeneous group composition; allotment of insufficient work time; unclear objective; boring activity; uncertainty on how teachers will evaluate group members; and lack of teacher presence and support (Chiriac & Granström, 2012).

Instructional Challenges of Facilitating Collaboration

The passing of No Child Left Behind (NCLB) in 2001 signified a shift in the American educational system to offer a more accountable curriculum, possess a data-driven focus, and utilize research-based pedagogical approaches (Schiro, 2013). As a result, the pressure to emphasize standardized test preparation means teaching collaboration skills has mostly taken a back seat. Collaboration skills tend to be considered ancillary skills compared to the tested skills designated as high priority

(Jewell, 2017; Le, Janssen, & Wubbels, 2018). While group work focused on learning state or federally mandated learning standards can provide the context for students to practice working collaboratively, group work opportunities expressly anchored in these prioritized standards alone do not adequately yield growth in student collaboration skills (Lai, DiCerbo, & Foltz, 2017). If educators do attempt to teach collaboration skills, some tend to do so reactively as problems arise. As one teacher explained regarding her strategy for a previous activity, “I didn’t formally teach students group work skills before their collaboration. Instead, I told them about dos and don’ts such as dividing individual tasks fairly, sharing ideas modestly and not offending others” (Le, Janssen, and Wubbels, 2018, p. 114). Teachers perceive other challenges concerning facilitating collaboration as well.

In one study (LaBeouf, Griffith, & Roberts, 2016), over 300 faculty were surveyed on their perceptions of collaborative work. The predominant negative perceptions that emerged were inequitable student contributions and not liking group work in general, specifically due to the challenges of assessment and because "group work in a classroom setting did not accurately duplicate group work in work environments" (p. 17). Teachers surveyed by Le, Janssen, and Wubbels (2018) corroborated the challenges of assessment, while also indicating that they lacked training in fostering these skills or that they would forego teaching the skills altogether if their syllabus did not indicate the need to teach collaboration skills. Others have indicated that teaching these skills is difficult, the materials for these activities can be costly, and the noise levels are difficult to manage (Ghaith, 2018). Some forego collaborative learning

altogether because they feel it is not effective, students do not take collaborative work seriously, and that this format impedes student learning (Chiriac & Granström, 2012).

In addition to the challenges that both students experience while participating in and teachers face while facilitating collaborative learning, ineffective skills also raise another social justice issue regarding equity.

Ineffective Collaboration as an Issue of Equity

Collaborative learning fosters discourse for sharing different perspectives, boosts student motivation, supports higher-level thinking, promotes socialization, and provides insight into the diverse cultural backgrounds of one's peers (Johnson, Johnson, & Stanne, 2000; Ashman & Gillies, 2003; Tanner, Chatman, & Allen, 2003; Hassanien, 2006, Chiriac, 2014). Participation in a democratic, inclusive society hinges on one's ability to collaborate (Silverlock, 2000; Rees, 2009). However, some might say that classroom environments tend to function under the pedagogy of the oppressed (Freire, 1972), promoting a banking system of education that bell hooks (1994) describes as being "based on the assumption that memorizing information and regurgitating it represented gaining knowledge that could be deposited, stored, and used at a later date" (p. 5). Freire believed that this system had the potential to relegate marginalized children to being passive, voiceless learners (Eryaman, 2008). Passive learning comes at odds with what Darling-Hammond, Zielezinski, & Goldman (2014) define as equity:

> The policies and practices that ensure that every student has access to an education focused on *meaningful learning* (i.e., that teaches the deeper learning skills contemporary society requires in ways that empower students to learn independently), taught by competent and caring educators who are able to attend

to the student's social and academic needs, and supported by *adequate resources* that provide the materials and conditions for effective learning (p. 3).

One of the deeper learning skills Darling-Hammond et al. (2014) associates with equity is the ability to collaborate (Pellegrin & Hilton, 2012). Students of color or low socioeconomic status are often not allowed equitable opportunities to develop collaboration skills if their standardized test performance calls for remediation (Noguera, Darling-Hammond, & Friedlaender, 2015). For students who are English-language learners, this would potentially mean less time for working collaboratively, which has shown to promote writing skills, increase motivation to learn, boost their self-efficacy (de Oliveira & Smith, 2019), and foster academic language acquisition (Wong-Fillmore & Snow, 2005). African American students in one study (Surr et al., 2018) showed that positive, well-executed collaborative experiences were connected to higher grades. However, when this same group of students participated in eight different focus groups, they "reported lower perceived relevance of collaborative activities; more frequent experiences of exclusion, stereotyping, and marginalization; and lower perceived support from teachers for collaborative group work" (p. 30). The perceived marginalization of these students speaks on the issue of power dynamics within collaborative groups. The findings of a case study of a middle school classroom suggested that members may privilege input from some students, thereby leading to the marginalization of contributions from other members (Sung, 2018). Unfortunately, when social inequity does arise during collaborative work, if students in general struggle with either social interaction or managing their emotions, they may prove ill-equipped to redress biased treatment from their peers based on popularity or past academic achievement (Blatchford

et al., 2003). At times, when given more autonomy with group selection, students of high academic ability may gravitate towards other students of similar ability. These students may also be more likely to assume leadership roles in whichever group they are a part of, thus potentially marginalizing students of lower academic abilities (Healy, Doran, & McCutcheon, 2018). Sampson and Clark (2008) found that some students may be disadvantaged because they struggle to navigate differences of opinion, thereby allowing the ideas of others to be accepted unopposed by the group.

While collaborative work can be difficult for students, in general, to participate in (Healy, Doran, & McCutcheon, 2018) and for teachers to facilitate (Gillies & Boyle, 2010), the literature is not silent on strategies or theories that may help to better facilitate this 21st-century skill (P21, 2010; P21, 2015). The following section covers the literature relevant to the theoretical framework of this study.

Theoretical Framework

Educators have utilized strategies to implement collaborative work opportunities in their contexts with mixed results. The approach for this study utilized a framework on collaboration and a theory on learning. The collaborative framework is the elements of effective collaboration (EEC) (Lai, DiCerbo, & Foltz, 2017), a framework that was synthesized from a host of different frameworks. The theory on learning that anchored the project design for this study is digital game-based learning (DGBL) (Prensky, 2001). As discussed in Chapter One, I had already implemented DGBL in my STEM classes in the past. However, I realized that I was not adequately fostering collaboration because my students and I were experiencing many of the same challenges to the collaborative process expressed in the previous section. After discussing EEC and DGBL, the last

section will examine the synthesis of these two components, collaborative digital game-based learning (CDGBL), as the intervention applied in this study.

Elements of Effective Collaboration

Researchers (Lai, DiCerbo, & Foltz, 2017), in a joint effort between Pearson and the Partnership for 21st Century Learning (P21), reported a summary of definitions, models, features, and assessment approaches regarding collaboration. After analyzing multiple definitions on collaboration (Roschelle & Teasley, 1995; Riebe, Girardi, & Whitsed, 2016; Hughes & Jones, 2011), Lai, DiCerbo, and Foltz (2017) synthesized the following definition: "Collaboration and teamwork focuses on the process of interacting and requires individuals to work together toward a common goal" (p. 9).

The elements of effective collaboration (Lai, DiCerbo, and Foltz (2017) originated through the examination of other collaborative frameworks. Regarding collaborative frameworks, Lai, DiCerbo, and Foltz (2017) concluded that "the elements of collaboration shared across multiple frameworks include: interpersonal communication, conflict resolution, and task management" (p. 25). Interpersonal communication pertains to both what is communicated through words (verbal or written) and body language (non-verbal), and how effectively people listen to one another (Beebe et al., 2015). Conflict resolution involves two or more parties constructively working through disagreements by seeking an agreeable solution(s) (Wolff & Nagy, 2019). Task management involves itemizing and equitably distributing the subtasks necessary to bring the end goal to fruition (Lai, DiCerbo, & Foltz, 2017).

The EEC served as the collaborative framework for this study for its conciseness when compared to other frameworks (P21, 2015; Binkley et al., 2012; Stevens &

Campion, 1994), its inclusiveness for sharing commonalities with other frameworks, and because of the gap in the literature regarding the use of this framework in the body of literature on fostering collaboration. During this study's literature review, the summary on collaboration (Lai, DiCerbo, & Foltz, 2017) had been cited in literature thirty-one times. However, not one piece of literature involved utilizing the framework in researching the development of collaboration skills.

Regarding the assessment of collaboration, Lai, DiCerbo, and Foltz (2017) concluded in their summary that "assessment of collaboration requires collecting evidence of group interactions and team processes such as language used for communication, reactions to obstacles, planning documents, and approaches to decision-making" (p. 25). This assessment guidance overlapped the nature of my qualitative data collection tools, as discussed in Chapter Three.

Dewey and Piaget in Support of Collaboration

Collaborative learning is linked to the child-centered philosophies of John Dewey (Darling-Hammond, Austin, Orcutt, & Rosso, 2001), and the cognitive development research of psychologists Jean Piaget (Mayer, 2008). John Dewey's Progressive Education model espoused learning by doing, which promotes constructing meaning, social responsibility (Hopkins, 2017), creativity, and collaboration skills through participation in a democratic society (Sharan & Sharan, 1992). Dewey's philosophy of pragmatism accounted for his belief that student's talents should be developed for social utility (Martin, 2002), and that learning was only possible when nuances of each learner, such as goals and interests, were taken into consideration (Garte, 2017). This helped to reimagine the traditional role of educators from being keepers of knowledge, around

which the learning process centered to being facilitators of rich, meaningful learning experiences (Eryaman & Bruce, 2015). Dewey posited that learning environments that best fostered child development were social in nature (Henson, 2003). Furthermore, Dewey (1916) believed that the social medium was educative and "only by engaging in a joint activity, where one person's use of material and tools in consciously referred to the use other persons are making of their capacities and appliances, is a social direction of disposition attained" (p. 72).

Like Dewey, Piaget challenged the efficacy of the traditional instructional model due to the passive role that learners assumed during the lectures (Piaget & Inhelder, 2000). He argued that this was due to the contrast that often existed between what the students actually perceived and what the instructor taught (Labinowicz, 1980). He found the traditional lecture method of instruction to be lacking in stimulating students' cognitive processes when compared to engaging with fellow pupils in the classroom context (Piaget & Inhelder, 2000). According to Weil and Murphy (1982):

> for Piaget, there were four tenets of learning: (a) students should construct their own learning in order for the knowledge to be meaningful; (b) optimal learning takes place when students can be active and interact with concrete materials; (c) learning should be student-centered and individualized; and (d) social interaction and cooperative work should play a significant role in the classroom (as cited in Hinson, 2005, p. 33).

Like collaborative learning, DGBL (Prensky, 2001) has the potential to satisfy each of these four tenets of learning.

Digital Game-Based Learning

In his seminal book *Digital Game-Based Learning,* Prensky (2001) defines digital game-based learning (DGBL) as the intersection between "serious learning and interactive entertainment" (p. 5). Over time, this definition has evolved, more recently and specifically, into one Coffey (2017) offers as being an "an instructional method that incorporates educational content or learning principles into computer or video games with the goal of engaging learners" (para. 1). According to Kapp (2012), "games are the ideal learning environment with their built-in permission to fail, encouragement of outside-the-box thinking, and sense of control" (p. xxii). Kapp (2012) maintains that "the real value in game-based mechanics is to create meaningful learning experiences" (p. xxii). Ideally, this sense of relevance fosters engagement, which is essential for learners to develop positive associations within their respective learning experiences (Kapp, 2012). In order to evaluate the DGBL project I assigned during this study, I utilized a DGBL rubric developed by Shanahan (2017) and was informed by Lepper's *Instructional Design Principles for Intrinsic Motivation* (Lepper, 1988). The DGBL rubric (Shanahan, 2017) emphasizes the following criteria for any game-based learning program: academic achievement, student motivation and engagement, social learning, 21st-century skills, and immersive learning experiences (see *Table 2.1*):

Table 2.1 *DGBL Program Rubric (Shanahan, 2017)*

Program Priority	Performance Standard	Description of Proficient Practices and Outcomes

Academic Achievement	• Subject relevancy • Content proficiency • Scaffolding	The game introduced in the classroom is relevant to the educator's overall curriculum and allows students to demonstrate proficiency within the content. The game is adequately scaffolded to appropriately challenge individual students.
Student Motivation and Engagement	• Increased interest in content area • Actively on-task • Maintained or increased attendance	Students show an increased interest in a content area and remain actively on-task throughout the game. Students are motivated to come to class and participate in gameplay.
Social Learning	• Working in groups • Thinking out loud • Knowledge sharing	Students interact positively and constructively with one another around game content. Students also help each other solve complex problems around gameplay and offer each other complementary insights.
21st Century Skills	• Life and career skills • Critical thinking, communication, collaboration, and creativity • Technology skills	Students can autonomously proceed through the activity by using creative and critical thinking skills. The game used offers students an opportunity to learn about a career or profession that otherwise would be difficult to introduce.
Immersive Learning Experiences	• Game provides access to opportunities otherwise unavailable • Game allows students to become decision-makers or stakeholders	Students adopt and identify with the perspective or vantage point offered by the game. Content is experienced through the lens of the game world and avatar, allowing the student to become the decision-maker and stakeholder.

Lepper's *Instructional Design Principles for Intrinsic Motivation* (1988) feature the principles of control, challenge, curiosity, and contextualization. Video game designer Rafe Koster describes the almost magnetic force that draws kids to video games is that they desire to engage in what he calls "unforced learning" (as cited in Prensky, 2006, p. 2). Additionally, gamers are generally in pursuit of what McGonigal (2007) describes as an "epic win" or the sense of elation felt when something is accomplished within a gaming context which was done so while facing great odds. This "gamification" would essentially involve "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10).

If game-based learning is to occur, educators must utilize "a game in which people want to invest brain share, time, and energy" (Kapp, 2012, p. 11). If games, with their innate ability to entertain and motivate people, are designed with epic missions (McGonigal, 2007) that feature embedded educational objectives (essentially gamifying the curriculum), an intersectional phenomenon is created that leverages the draw of games for the cause of education.

Learning games can facilitate circumstances that empower students to be active stakeholders in their learning (Gee, 2007) without delaying the application of knowledge and skills, which can sabotage learning (Gresalfi, Martin, Hand, & Greeno, 2009). Educational opportunities present themselves when these games facilitate students engaging in discourse and exploring the cause and effect implications of their choices on their classmates and the virtual learning context (Prensky, 2001).

No matter the age of the learner, whether a child or in adulthood, Sáez-López et al. (2015) posed that "learning is more effective when it is active and problem-based and gives immediate feedback" (p. 115). Dweck and Molden (2005) argued that positive feedback regarding efforts and not identity, like what video games provide, helps youth develop a growth mindset regarding their aptitude.

A second prong to this argument is that "educational video games foster the fact that students are actually part of the learning environment, rather than being a passive recipient listening to someone with more experience" (Sáez-López et al., 2015, p. 116). Rather than educational contexts being teacher-centered in which students are relegated to being sponges of information, "one of the most powerful opportunities offered by games is that players are not just observers but are often protagonists who make decisions that affect the game world" (Barab et al., 2010, p. 527).

Given that “games are able to promote higher-order thinking and social skills” (Sáez-López et al., 2015, p. 115), another claim of this study asserts that leveraging this motivation for gaming “may have advantages from a pedagogical perspective” (p. 114). The utilization of games for education highlights a connection between learning and social development through “new technologies and methodologies for creating a deeply immersive and highly interactive curriculum” (Sáez-López et al., 2015, p. 116). Bilton (2013) points to a study which “found that game-based play could raise cognitive learning for students by as much as 12 percent and improve hand-eye coordination, problem-solving ability and memory” (para. 13).

Minecraft in Support of DGBL

The game title *Minecraft* is derived from the act of in-game *mining* for the purpose of *crafting* more useful resources in order to survive. *Minecraft* is an "open-world sandbox," and surpassed the 100 million user mark within seven years of its 2009 debut (Makuch, 2016), prompting TeacherGaming LLC's attempt to leverage the game's creative potential with the release of *MinecraftEDU* in 2011 (TeacherGaming, LLC, 2012). As of January 2016, Microsoft purchased both TeacherGaming and *MinecraftEDU* (Schaffhauser, 2016) and has since released an updated version of the software called *Minecraft Education Edition* (M:EE). Both classroom-oriented iterations are still in use and serve as mirror reproductions of the original game (Ellison, Evans, & Pike, 2016), but also include settings that allow instructors to more easily facilitate explicit learning opportunities. Risberg (2015) declared one value of using *Minecraft* is to teach executive functioning because today's learners struggle with employing skills associated with the authentic demands of society, such as "setting goals, long-term planning, organizational skills, and sustaining effort and attention. And as every teacher and parent knows, extreme frustration is felt by everyone-students, teachers, and parents-whenever a child feels overwhelmed with what needs to be done" (p. 45). Ellison et al. (2016) effectively described both the benefits of the program and the primary hindrance to having more youth play *Minecraft* when they said:

> By allowing its players to build simulated, virtual worlds, *Minecraft* aims to foster creativity, control, and imagination. Yet while the affordances of playing *Minecraft* spark collaborative learning, critical thinking, and problem-solving skills among youth, one constraint still remains: there appears to

be a disconnect between some teachers' and parents' understandings about the *Minecraft* world's mechanisms, uses, and benefits (p. 25).

To say that educational stakeholders have started noticing *Minecraft's* potential in the classroom would be an understatement. For example, "in 2013, Minecraft was added to the core curriculum in Sweden. They found that learning Minecraft builds imagination, teaches schoolkids about environmental issues, and makes them better problem solvers" (Hansen, 2016, p. 293). Conversely, as with any phenomena, some perspectives run counter to the perceived benefits of the intersection of video games and education.

Alternative Perspectives on Video Games in Education

In light of the tendency for academia to focus psychological research on potential adverse effects of playing video games (Anderson et al., 2010; Ferguson, 2013; Lemola et al., 2011), it makes sense that perhaps teachers would orient towards a negative affect regarding the integration of *Minecraft*, or any other video game, into their contextual practice. Compounding the situation further were reports that came out following different school shooting events (Ferguson, 2007; Obama & Biden, 2013) that deemed more aggressive, gun-centered shooter games as the common denominator. Conceding that the most prominent motivating factor for people to play video games is the entertainment factor (Sáez-López et al., 2015), it stands to reason that teachers find themselves at a crossroads with the proposition of incorporating educational games into their curriculum.

Though today's students are more plugged-in than generations past, this is not necessarily true of the adult stakeholders in their education. In a national study conducted amongst over one hundred teachers and teacher librarians (TLs), Hovious and

Van Eck (2014) found that, even though a current trend is leveraging TLs to offer supplemental makerspace/technology opportunities, the most common use of digital games by TLs was to reinforce skills for utilizing libraries. TLs and teachers alike "perceived lack of time, lack of infrastructure, and lack of support as barriers to using digital games" (Hovious & Van Eck, 2014, p. 34), results that seem to be echoed in the findings of other studies as well (Becker & Jacobsen, 2005).

Young et al. (2012) maintained reservations that learning games could be masquerading as tools not sufficiently designed to meet the educational demands of the modern-day classroom. Additionally, teachers may require support in using games, including *Minecraft*, in their context (Nebel, Schneider, & Rey, 2016), and this could limit their willingness to utilize the program. Though he predicted it would eventually fall, Prensky (2001) spoke of a perceived wall between learning and fun and how some believe they do not go together.

Intervention - Collaborative Digital Game-Based Learning

Of particular relevance to this theoretical framework is the need to draw a connection between DGBL and the promotion of collaborative skills. This intersection is known as collaborative digital game-based learning (CDGBL), which is "when students work with partners or in small groups and are provided with the opportunity to communicate with others and work together to achieve a common goal during game play" (Serrano, 2019, p. 7). Research studying CDGBL has shown promise regarding both social and academic skills. In a national survey (Takeuchi and Vaala, 2014), approximately 700 K-8 teachers offered their perspectives on teaching with digital games, indicating they saw growth in social skills through cooperative play. In another

study of 93 sixth grade math students, CDGBL was shown to foster improved learning attitudes, motivation, self-efficacy, and learning achievement (Sung & Hwang, 2013). The promotion of learning achievement was corroborated in a study of 49 fifth grade electrical science students (Hsiao, Chang, Lin, Chang, & Chen, 2014), further "bridging the gap between digital game-based learning and collaborative learning" (Hsiao et al., 2014, p. 652). Of more relevance is how a study of small groups of middle schoolers collaborating in *Minecraft* showed "the potential to serve as a fruitful context for promoting collaboration among middle school students" (Davis, Boss, & Meas, p. 71).

Statistics show that 72% of teenagers between the ages of 13-17 play video games on the devices at their disposal (Lenhart, Smith, Anderson, Duggan, & Perrin, 2015). As an 8th grade teacher, the students that I teach fall in this demographic, with some identifying as "gamers." Data has shown that the majority of avid gamers collaborate by playing socially, via a multiplayer mode (Electronic Software Association, 2017). Jimenez (2015) argued that the two critical gleanings from social gaming are the development of a collaborative experience and the discourse that ensues. Gamers have a propensity toward the multiplayer mode of gameplay due to the "companionship, collaboration, competition, and challenge" it fosters (Trespalacios, Chamberlain, & Gallagher, 2011, p. 49). Since gamers generally prefer social gaming in collaborative contexts (Trespalacios, Chamberlain, & Gallagher, 2011; Electronic Software Association, 2017) and gaming is, statistically speaking, widely popular amongst students in the age demographic that I teach (Lenhart et al., 2015), then it makes sense to investigate the potential of leveraging this pastime to foster collaboration in the classroom. Furthermore, for the reasons listed in this section, it stands to reason that an

intervention rooted in CDGBL would be appropriate in seeking to answer this study's research question.

Play, Playgrounds, and the Sandbox 2.0

Piaget (1933) found play to be a valuable socialization mechanism within one's development. Likewise, Vygotsky believed that play positively contributed to the development of youth (Bodrova & Leong, 2015). He also highlighted the relationship between imagination and play, stating that "the old adage that children's play is imagination in action can be reversed: we can say that imagination in adolescents and schoolchildren is play without action" (Vygotsky, 1967, p. 8). Vygotsky (1967) believed that the efficacy of the learning process hinges on the need for the process to be social by nature, thus accounting for his seeing value in play. In fact, the psychologist theorized that play and human development were inseparable (1967), thus giving further credence to this dissertation study.

The value of play historically and theoretically draws roots in the evolution of the playground. Initial iterations of schools were more focused on preparing the young for the labor demands of urban sprawl than meeting their developmental needs (Vinovskis, 1996). There was no recess, and there was no play - playgrounds had yet to be conceptualized. As Kinard (2015) states, "shifting ideas about the early part of a person's life began to shift the landscape" (p. 92), educationally and physically. Rousseau (1762) raised awareness on the developmental needs and potential of youth and how critical the early childhood stage was to one's growth. European influences intertwined with undertones of the late 19th-century concrete jungle were evident in the first playgrounds, as they were metallic structures designed for the development of gymnastics-related skills

on pavement (Frost, 2012) - a recipe for injuries and the antecedent for the inception of sandboxes.

One Dutch architect, Aldo Van Eyck, saw the constructive and social development potential in play spaces that featured sand as the primary medium (Solomon, 2015). Van Eyck was inspired by snow (Lefaivre, de Roode, & Fuchs, 2002) and the tendency of youth to utilize WWII bomb craters and debris in imaginative play activities (Norman, 2010). Over the decades to follow, playground equipment has since evolved with the acknowledgment of designing with safety as a top priority (Frost, 2012). Likewise, *Minecraft* may signal the next stage in the evolution of sandboxes. Deemed "Sandbox 2.0" (Kinnard, 2015, p. 94), *Minecraft* features a pixelated virtual space in which end users utilize tools and a cubic block medium to synthesize builds that go beyond a simple sandcastle. Enhanced resourcefulness and friendships are byproducts of the digital civilizations that are born out of the imagination of end-users (Duncan, 2011). Given the both the literature and anecdotal evidence, it stood to reason that M:EE was a suitable virtual learning environment in which to situate the CDGBL intervention.

Conclusion

While stakeholders in American education have not historically prioritized the development of collaboration skills, evidence suggests that various sectors of industry and 21st-century society, in general, are catalyzing a greater sense of urgency to equip learners with this vital skill set. Although the collaborative process may present challenges for students and teachers alike, the literature clearly establishes what effective collaboration looks like and offers insight on approaches to implementing opportunities to facilitate collaborative work opportunities. Theoretically and empirically, CDGBL

showed promise as a worthwhile approach in which to anchor this study's intervention. The following chapter provides greater detail on the methodology used to implement the intervention for this study.

CHAPTER 3

METHODOLOGY

The purpose of this qualitative, action research study was to identify and refine a set of instructional strategies that can support the development of effective collaboration skills among my middle school STEM (Science, Technology, Engineering, and Mathematics) students. After ten years of working as a classroom teacher, I have recognized the need to improve my ability to effectively facilitate collaborative learning opportunities for my students. This aspect of my teaching represents the problem of practice on which this dissertation in practice is focused.

Before this study, my eighth grade STEM class primarily focused on collaborative learning, thus corroborating the importance of addressing my problem of practice. Accordingly, a reasonable approach through which I could address my problem of practice was to implement an intervention and closely examine how my students and I learn to develop collaboration skills. Through the integration of an effective framework for collaboration (Lai, DiCerbo, & Foltz, 2017) and the use of a digital game-based platform (Minecraft: Education Edition), I attempted to authentically engage students in learning as well as provide them with an opportunity and the support to develop their collaboration skills. Taking into account the intersection of my problem of practice and the theoretical framework for this study, the research question I sought to address was:

To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning?

In this chapter, I will provide a thorough description of the student participants, my positionality as it pertains to the study, and the context in which the study took place. This is followed by a detailed description of the research design and the intervention I developed to address the problem of practice. This chapter concludes with a description of how I measured and analyzed the impact of my intervention on the development of collaboration skills and my capacity to facilitate collaborative work opportunities.

Context, Participants, and Positionality

To give an overview of the research setting, my context (on the macro level) is in the Southwest region of the United States, located (on the micro-level) in a city of approximately 100,000 residents, at one of three local public middle schools. The period in which the study took place was 8th grade STEM with a class size of 32 students. The class, which normally sat at eight different tables prior to the study, was divided into three groups to aid classroom management during a collaborative project. The students were grouped as a table group with other table groups because for these larger groups, I wanted students to work with at least some students with whom they rapport and experience working with. Though the intervention was implemented in the class as a whole, only one of the three groups was the participant group. The sampling of the participant group was purposive. The eleven students in the participant group were specifically grouped because their demographics were adequately representative of the diversity of the school's student population, making for a representative, purposive

sample (Maxwell, 2013). Demographic data regarding the subpopulations represented in the study context shows a sample group comprised of: four boys and seven girls; five Hispanic students; five White students; one African American student; seven students who were historically underserved; three students who received special education services and accommodations; one student had a 504 plan; one student who spent time in a program for students who have had behavioral issues.

The rationale for 11 participants in the study group was that the initial plan involved having 32 students rotate through three stations, so I split the class as evenly as possible into three groups. Another reason I wanted to have three rotation groups was the *Minecraft* server capacity constraint. When an instructor loads a *Minecraft* world, the server provides an IP address so that up to 29 end-users with that IP address can establish a connection to whatever world file is loaded by the host. This dictated that I could host a world in which I managed up to 29 students synchronously. I had 32 students and approximately 27 iPads. These factors accounted for why, initially, students were going to rotate through stations. The reason why the station rotation plan changed is that before the study began, I explained to the students in my STEM class the project's premise and how they would rotate through stations. They expressed doubts that they would have enough time to finish the project, given the scale of the project and the fact that stations would limit the amount of time they had to work on the 10-day project. With these concerns about the time constraints in mind, I decided to have the three groups work on their projects for the entire class period for the duration of the 10-day study. In order to circumvent the issue of limited iPad access, two out of the three student groups accessed the *Minecraft* world that I created, via iPads, and established a connection to the world

file that I loaded. The other group ran their own world and supplemented their lack of iPads by accessing *M:EE* on five PCs in my classroom.

The attrition of participants could have occurred if students had received behavioral consequences that exceeded or overlapped the study's anticipated duration, as determined by the campus administration team. With this consideration in mind, I could not rule out the possibility of decreased participation or attrition. While the number of participants did not fluctuate, communicating fluctuations that could have occurred within the practitioner-researcher reflections would have helped to support the dependability of the study (Mertler, 2014). Regarding dependability, I believe given my data, other researchers could interpret the data with somewhat similar findings (Mertler, 2014). Though I had a vested interest in the research outcomes and had rapport with student participants that preceded this study, I strived to maintain reflexivity and disciplined subjectivity (Efron & Ravid, 2013) through the entirety of the study. In writing about this study, I was transparent about my processes, both in what I did and what I could have done differently. This was because one of the desired outcomes of this study was my professional growth. My growth would have been compromised if my study had not been conducted with transparency throughout the intervention. On the topic of transparency, it is important to address my positionality.

Positionality is a researcher's answer to the question: "Who am I in relation to my participants and my setting?" (Herr & Anderson, 2015, p. 37). According to Herr and Anderson (2015), to forego the pursuit of lucid positionality is to risk the ethicality, validity, and trustworthiness of one’s research. Anderson & Jones (2000) described the continuum of one's positionality on a scale between insider (or one who is a member of a

race, class, gender, organization, or another social construct) and outsiders (those who are not insiders regarding certain constructs or classifications). The levels of nuance are determined based on whether or not the researcher is an insider or outsider working alone or collaborating with other insiders or outsiders. Given the context and purpose of my study, I was an insider on the continuum of positionality. It was essential for me to reflect on different life experiences, beliefs, and qualities that have shaped who I am and factors that could have had an impact on my research, as my practice was a central focus of this "self-study" (Bullough & Pinnegar, 2001). This type of self-awareness is known as reflexivity (Efron & Ravid, 2013).

. My interest in joining the Electives Department as a STEM teacher at my school was largely influenced by my interest in technology, and the instructional technology program I completed in graduate school. I attended graduate school while I was in the military. I served for seven years in the Army National Guard as a chaplain assistant. My military experience had an impact on how I lead others. What I have come to learn though is that leading soldiers and helping middle schoolers to collaborate are two different things.

Maguire (1993) affirmed that the research we conduct and the values and philosophies we maintain are inseparable. Herr and Anderson (2015) asserted that our respective passions often serve as conduits through which our action research inquiries generally flow. I am not immune from these claims, as it is no coincidence that a video game became intertwined in my dissertation study. While I am a middle-class, interracial, heterosexual male who generally subscribes to more moderate to conservative

views, I believe that the most notable thing about me that is directly relevant to this study is my passion for video games.

Growing up, I became a self-proclaimed "gamer," playing countless hours of video games. Now, as an adult, with a family of my own, I still play video games, albeit in a more limited manner - only a few times a week. Sometimes I play alone but find myself preferring to play with others because I see value in playing multiplayer video games from a social perspective. I appreciate the comradery and being viewed by my friends as competent in virtual worlds when I am not always viewed as competent in the real world. I would venture to say that many students may feel this way, too. I maintain the personal belief that video games should be leveraged for educational purposes. One of my goals for the future is to coach a high school e-sports team in which the members who share my passion for video games will have an outlet where their interests and talents will be valued. In my opinion, video games have the power to engage students and, I believe, empower them to believe positive things about themselves that grades do not always reinforce. This belief is important to acknowledge because I did not want to compromise the integrity of my research by failing to be transparent about my video game-related passion and beliefs.

I would argue that this undertaking was possible to navigate successfully because the overall purpose of my study was to grow in my capacity to facilitate collaborative work opportunities for my students and not to determine the efficacy of video games in an educational context. Thus, I believe my passion for video games did not disqualify my having conducted this research. Evidence supporting this thesis organically developed within my practice: despite my incorporation of digital game-based learning

through *M:EE* in the past, I learned that multiplayer video gameplay alone could not alleviate the ongoing problem of my practice. This is because no matter how technologically advanced our classrooms and tools become, "good teaching is the most effective instructional tool" (Hitch, 2013). Given my positionality for this study, I needed to ensure my research design aligned with the need to examine my practice and not the impact of a video game on my context.

Research Design

At the most general level, this study was a qualitative (Creswell, 2014), action research (Efron & Ravid, 2013) study that closely resembled a self-study (Bullough & Pinnegar, 2001) design. As Efron and Ravid (2013) stated, action research is "inquiry conducted by practitioners in their own educational settings in order to advance their practice and improve their students' learning," (p. 9). Given the context-dependent nature of my problem of practice, this research design allowed for both close examination of the enactment and impact the intervention would have on my students and instruction. My role in this study was that of a practitioner-researcher (Stenhouse, 1975), with insider positionality status (Herr & Anderson, 2015). This research aimed to implement an intervention geared towards growing in my capacity to facilitate collaborative work opportunities for my students.

Action research provides a common framework for teachers to generate and share knowledge of classroom practice with each other and others in the field of education (Reason & Bradbury, 2001). Unlike traditional research, the researcher is embedded within the work, alongside the participants (Kemmis & McTaggert, 2000). For this action research, I conducted an intervention, in which my role was multifaceted. During

the intervention, I provided direct instruction and modeling of collaboration skills for the class as a whole. The collaboration guidance I offered students was informed by the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). As I made observations of the participant group, I provided accountability for student participant exchanges as they engaged in interpersonal communication, conflict resolution, and task management (Lai, DiCerbo, & Foltz, 2017). As students worked, I also gave feedback, offered support, and made observations of the exchanges that took place as student participants engaged in a digital game-based learning opportunity (Prensky, 2001). The observations made during each day of the study informed my teacher reflections written throughout the inquiry.

This research aligned with the attributes of action research because said research was "constructivist, situational, practical, systematic, and cyclical" (Efron & Ravid, 2013, p. 7) in nature. The study was constructivist by design in that new knowledge was generated as I constructed meaning from the data collected for use within my own practice (Herr & Ravid, 2013). The constructivist attribute of my study concurrently located it more to the qualitative side of the research continuum (Newman & Benz, 1998; Creswell, 2014). My research featured a situational quality in which I was highly familiar with the study context, the nuances of both my participants and my class overall, and could therefore appreciate the impact these had on my study (Efron & Ravid, 2013). My research fit the practical attribute of action research because in order to improve upon my practice, I have chosen a research question germane to my problem of practice while already having access to the resources necessary to implement the study, the makings of a practical, action research pursuit (Efron & Ravid, 2013). This action

research dissertation was cyclical because, as previously addressed, this study followed a spiral of action cycles (Kemmis, 1982). The spiral of action cycles (Kemmis, 1982) functioned as the structure of my intervention, as it calls for action researchers:

> 1) to develop a *plan* of action to improve what is already happening; 2) to *act* to implement the plan; 3) to *observe* the effects of action in the context in which it occurs; and 4) to *reflect* on these effects as a basis for further planning, subsequent action and on, through a succession of cycles (p. 7).

Due to the overall emphasis on data sources featuring subjective responses from both participants and myself (Creswell, 2014) throughout the spiral of action cycles (Kemmis, 1982), my dissertation could best be described as qualitative action research. I needed to actively evaluate the ongoing action research to ensure that specific quality criteria were met with the various logistics involved with this study. Herr and Anderson (2005) wrote that "quality, goodness, validity, trustworthiness, credibility, and workability have all been suggested as terms to describe criteria for good action research" (p. 49).

Quality action research "must first and foremost meet an ethical test; that the work is directed towards positive change" (Day et al., 2006, p. 451). This work was ethical because I maintained my students' privacy throughout this study that put me into a position to become a better educator for my students. Positive change will come from this study that allows future students in my classroom to collaborate more effectively because I will be able to more effectively equip them with collaboration skills and facilitate their collaborative learning.

Regarding goodness, “good research...uncovers what people believe - it uncovers a variety of subjective truths. Goodness is judged by the degree to which the researcher explores the full range of beliefs and presents them clearly objectively” (Marshall, 1989, pp. 7-8). There were multiple perspectives from multiple students sharing multiple truths, and goodness is embedded in this research in that I objectively and accurately portrayed what students believed to be true (Smith, 1989).

For validity, Herr and Anderson (2005) offered five validity criteria for action research: 1) outcome - the generation of new knowledge; 2) process - the achievement of action-oriented outcomes; 3) democratic - the education of both the participants and myself; 4) catalytic - results that are relevant to the local setting; and 5) dialogic - a sound and appropriate research methodology (p. 54). For outcome validity, given the need for more definitive research regarding the development of student collaboration skills using the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017) and the potential educational benefits of *M:EE*, some form of new knowledge, at the very least to inform my practice, came from this study. This research process will prove valid if the study actions directly manifest relevant outcomes. I am better equipped to facilitate collaborative learning as a result of this study. For dialogic validity, the soundness of the action study is highly dependent on ongoing, transparent, constructive dialogue taking place between the researcher and the participants (Herr & Anderson, 2005). The study features dialogic validity because the participants and myself alike learned about and discussed what effective collaboration looks like and how to engage in it throughout this study. The study features catalytic validity, given the potential to affect change within the research context on a larger scale, should the study results prove promising to the

proximal colleagues. Through the results of this study, I hope that colleagues within the study context will be inclined to integrate a similar intervention into their curricular endeavors.

Per Lincoln and Guba (1985), "a study's trustworthiness involves the demonstration that the researcher's interpretations of the data are credible, or 'ring true,' to those who provided the data" (as cited in Herr & Anderson, 2005, p. 50). Trustworthiness was reinforced as I gleaned feedback from and was held accountable for my interpretation of data by participants and my committee chair during this study. As the semi-structured interviews took on a conversational tone, when communicating back to students clarifying statements about my understanding of what they were saying, they were able to communicate if they felt my interpretation of their responses were accurate, and thus trustworthy. Jacobsen (1998) used the term integrity synonymously with credibility, describing the credibility of an action research study as "the quality of action which emerges from it, and the quality of data on which the action is based" (p. 130). The hope is that proximal colleagues will see a difference in the participants' respective collaboration skills. Greenwood and Levin (1998) defined workability as "the extent to which actions occur which lead to a resolution of the problem that led to the study" (as cited in Herr & Anderson, 2005, p. 55).

According to Creswell (2014), qualitative research involves "exploring and understanding the meaning [which] individuals or groups ascribe to a social or human problem" (p. 4). Every individual has a variety of nuances that shape their perspectives on the social constructs and realities of the world around them, so in order to enact change in an educational context, qualitative researchers must seek to understand insights

from educational stakeholders (Efron & Ravid, 2013). The subjective nature of the insights that came from the educational stakeholders germane to this study, student participants and myself, appropriated qualitative data for this dissertation (Creswell, 2005).

Developed as a dissertation in practice, this study focused on my practice within my classroom, reflecting a self-study approach (Bullough & Pinnegar, 2001). In self-studies, "there is a greater emphasis on narrative, self-reflective methods" (Herr & Anderson, 2015, p. 42). This self-study put me in the role of a reflective practitioner (Schon, 1983) as I took action towards improving my practice. The construction of these reflections adhered to guidance from Mertler (2014) by addressing three factors: "the actual event or lesson, the recollection of the event or lesson, and reviewing and responding to what actually occurred during the event or lesson" (p. 136). Through the analysis of my teacher reflections, I hoped to gain further insight into my classroom practice and how I could make improvements (Schon, 1983).

Qualitative constructs that this study sought to measure included the development of students' collaboration skills (CS), my collaboration skills curriculum (CSC), and my collaboration skills pedagogy (CSP). In the next section, I will describe the data collection plan and its focus on these three constructs.

This study, given its qualitative approach, action-oriented agenda, was developed through the lens of a transformative epistemological paradigm. Given the epistemological, philosophical assumption, researchers minimize the distance between themselves and the participants (Lincoln & Guba, 1988), working with them as insiders (Creswell, 2013). Working alongside this study's participants afforded me a participatory

action characterization of the inquiry as I sought to catalyze change within my professional practice, hence the transformative description of this research endeavor (Kemmis & Wilkinson, 1998).

Data Collection Measures, Instruments, and Tools

This section describes how data was collected for this study. Each component of my methodology for this dissertation study is identified and defined, including surveys, practitioner-researcher reflections, semi-structured interviews, and project artifacts. I also address how each component factors into my data collection approach. The research data collection plan is illustrated below in *Figure 3.1*:

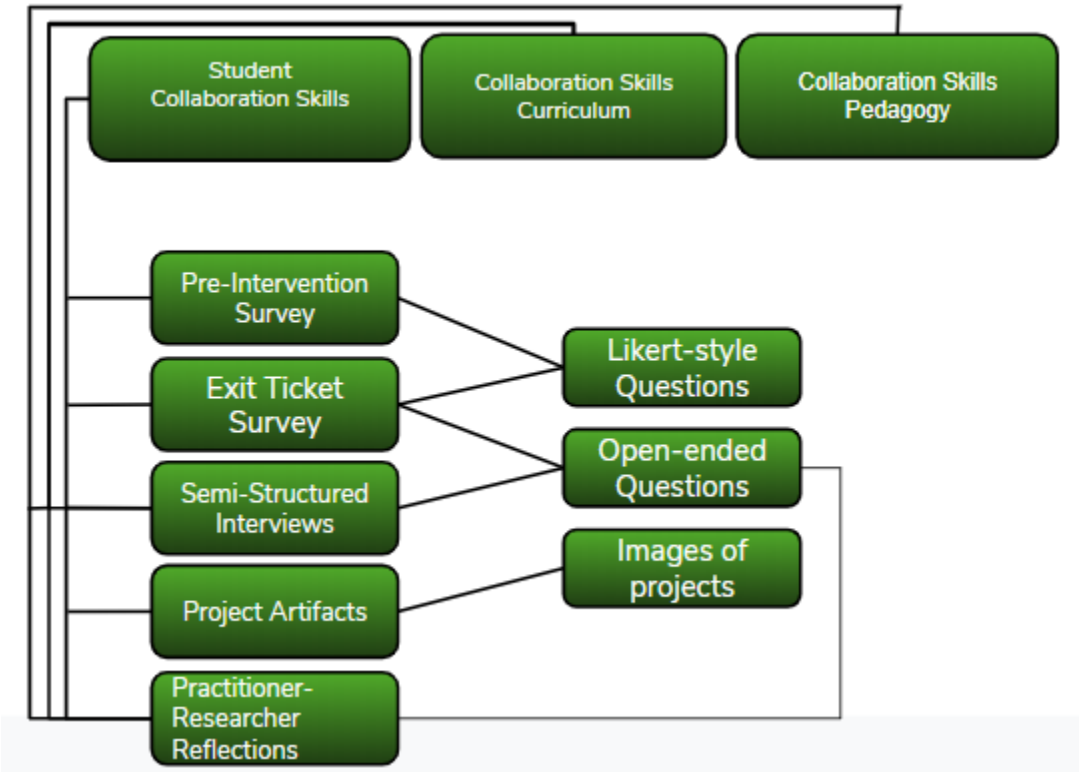

Figure 3.1. Data Collection Plan Diagram

Surveys. According to Mertler (2014), surveys "involve the administration of a set of questions or statements to a sample of people" (p. 138). Surveys are a staple data collection tool in many research designs due to the instruments being efficient, cost-effective means of gathering a wealth of data that can be promptly analyzed expeditiously (Efron & Ravid, 2013). Surveys are often used when wanting to gather information about participants' points of view, feelings, and attitudes (Fink, 2009) regarding programs, needs, outcomes, or constructs (Efron & Ravid, 2013). The process of designing a survey is rooted in a researcher's review of both the literature and surveys used in pertinent studies (Andres, 2012) while also considering the scholar's research questions, the desired data, time constraints, and participant availability (Efron & Ravid, 2013). While writing the survey items, these factors were taken into consideration to ensure that the surveys for this study were valid and reliable. Survey questions are valid when "the data that have been collected accurately measure what they [the questions] purport to measure" (Mertler, 2014, p. 137). Additionally, survey questions are reliable when they can consistently garner similar data amongst members of the participant group when administered in similar circumstances (Mertler, 2014). Surveys can be administered in various ways and can utilize a variety of question types (Efron & Ravid, 2013; Mertler, 2014; Creswell & Plano Clark, 2018). The selection of question types depends on the type of data that is needed. Both types of surveys used in this study aligned with the construct of student collaboration skills (SCS): Did my students meet their objective(s)?

In this study, surveys used two types of questions, Likert-style questions (Efron & Ravid, 2013; Mertler, 2014) and open-ended responses questions (Mertler, 2014;

Creswell & Plano Clark, 2018). Likert-style questions are closed-ended questions that ask respondents to read a statement or question and rate their relatedness levels or agreement regarding the survey item (Mertler, 2014). These questions rate a participant's "opinion, attitude, or belief about the question or statement provided (Efron & Ravid, 2013, p. 116). Likert or Likert-style questions are the most frequently used format for rated responses (Mertler & Charles, 2011). Open-ended questions are those "in which the researcher does not use predetermined categories or scales to collect the data" (Creswell & Plano Clark, 2018, p. 179). These questions are generally "used to help explain why people have responded a certain way, or to clarify answers to other questions" (Efron & Ravid, 2013, p. 121). In the context of this study, open-ended questions were used in this fashion to glean more information regarding the preceding responses to Likert-style questions.

Participants in this study completed a pre-intervention survey (see Appendix A) to self-assess their views on aspects of collaboration. The pre-intervention survey featured Likert-style questions, comprised with the help of resources on collaboration (P21, 2015; Lai, DiCerbo, & Foltz, 2017). The qualities within each resource that aligned with components of effective collaboration (Lai, DiCerbo, & Foltz, 2017) were used to write the pre-intervention survey items. The survey included a total of 15 questions, with multiple questions assessing each of the components of effective collaboration (Lai, DiCerbo, & Foltz, 2017) to ensure a greater measure of reliability (Efron & Ravid, 2013). Most of the questions in the pre-intervention survey focused on task management, consisting of three questions on conflict resolution, four questions on communication, and eight questions on task management. While this may seem like an imbalance, there

is data from the job sector that may support placing such a strong emphasis on task management. Task management is an issue for many organizations when trying to coordinate their projects. The Project Management Institute (PMI) published a report (2018), highlighting the issue of ineffective task management. Over 5400 international respondents from various industries and government agencies reported that: projects lost ten cents of every dollar invested due to ineffective task management; 43% of projects were completed over budget; and approximately 50% of all projects were not completed on time. The organizations most likely to circumvent this issue are ones utilizing tools known as task management software, collaborative work, and work coordination platforms (PMI, 2018). If industries across the world need help to stay on task and to manage their collaborative work, it stands to reason that task management is a complex skill that K-12 students need help in developing.

Additional smaller surveys, known as exit tickets, were used more frequently during the implementation of the intervention. Exit tickets, derived from the seminal work of Black and William (1998) on formative and self-assessment, are "short response tasks that teachers administer to students after an activity" (Fowler, Windschitl, & Richards, 2019, p. 19). Each participant was provided with opportunities to self-assess how effectively they believed their group was collaborating concerning elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). After each opportunity to work with their group, student participants completed an exit ticket (see Appendix B) that used a Likert scale and open-ended questions in a similar way to the pre-intervention survey. Two of the Likert-style questions pertained to the interpersonal communication and conflict resolution elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017),

gauging each participant's perceptions of how effectively their group collaborated during each class period regarding these two elements. Rather than ask students how well they managed their tasks for the day, I asked students how they would rate the progress they made for the day. Open ended-response questions followed each of the Likert-style questions to allow the participants an opportunity to elaborate on each subsequent rated response.

Practitioner Researcher Reflections. According to Yeo (2006), "practitioner research (specifically action research) provides a means to be 'critical and reflective' learners continually reviewing their own actions and seeking improvement" (as cited in Ellis, 2012, p. 41). Practitioner-researcher reflections are akin to the very nature of action research, given how action research constitutes a self-reflective inquiry (Carr & Kemmis, 1986) structured as spirals of: enacting change; observing the process and consequences of the change; reflecting on the processes and consequences of said change; and then adjusting accordingly (Kemmis & McTaggart, 2000).

For this study, I completed three types of practitioner-researcher reflections: 1) pre-lesson; 2) post-lesson; and a 3) teacher moves reflection. The construction of these reflections adhered to guidance from Mertler (2014) by addressing three factors: "the actual event or lesson, the recollection of the event or lesson, and reviewing and responding to what actually occurred during the event or lesson" (p. 136). These guidelines for the construction of the reflection questions, coupled with the alignment of the reflections to this study's research questions, established the validity of this data collection tool by ensuring I would measure what I intended to measure (Mertler &

Charles, 2011). Consistently answering the same questions ensured the reliability of the practitioner-researcher reflections (Mertler & Charles, 2011).

Before each class period, pre-lesson reflections were completed in alignment with the collaboration skills curriculum (CSC) construct: How did the curriculum support students in meeting the objective(s)? This reflection consisted of four questions: 1) What aspect of collaboration am I focusing on today?; 2) What will students be doing?; 3) What will I be doing?; and 4) What is the rationale for this plan? Both the post-lesson and the teacher moves reflections were completed after each class period. The post-lesson reflection also aligned with the CSC construct, prompting me to reflect on three questions: 1) Given the lesson plan/curriculum design, what did I intend?; 2) What actually happened?; and 3) What will I do next? The teacher moves reflection aligned with the collaboration skills pedagogy (CSP) construct: How did my pedagogy support students in meeting the objective(s)? This reflection consisted of three questions: 1) How did my teacher moves (pedagogy) support students in Group 1 in meeting their objective(s)?; 2) Discuss how effective your teacher moves (pedagogy) were in managing any off-task behaviors with Group 2?; and 3) How did my teacher moves (pedagogy) support students in Group 3 in meeting their objective(s)?

Semi-structured Interviews. Interviews are opportunities for researchers to have conversations with study participants that are anchored in the objectives of the research (McMillan & Schumacher, 2006). Researchers conduct an interview for their research in a variety of ways, including one-on-one, focus groups, telephone (Creswell, 2005), or via videoconferencing. Given my insider status as a practitioner-researcher in the study context, and that I wanted to learn about the participants' experiences while working

collaboratively, I conducted one-on-one interviews in this study. Interviews are constructed in one of three formats: 1) structured; 2) semi-structured; and 3) unstructured (Efron & Ravid, 2013). During structured interviews, the interviewer asks prepared questions verbatim from an interview guide (Mertler, 2014). For semi-structured interviews, the interviewer also asks questions prepared ahead of time but allows for probing and follow up questions to seek clarification and reactive to unexpected revelations (Efron & Ravid, 2013). Lastly, an "unstructured interview is an informal, though purposeful, conversation. The questions are broad and presented in a casual style; the interviewer lets the conversation proceed naturally on its own course (Efron & Ravid, 2013, p. 98). Considering that the participants were middle schoolers, I wanted to prepare open-ended questions to drive conversations about their experiences that allowed for probing and follow up questions. For this reason, I chose to format the interview in a semi-structured manner.

Per the semi-structured interview protocol (Appendix D) in this study, I asked students about their thoughts regarding how effectively they believed their group collaborated. I also solicited their perspectives on the efficacy of both the curricular resources I provided, and my teacher moves throughout the study. Finally, I sought to understand their take on video games in the classroom and how collaboration aids in multiplayer gaming. My goals were to strive to ask valid questions tied to my research questions and to maintain consistency in asking each participant generally the same questions. However, I understood that a limitation of including interviews in my methodology was that in trying to facilitate a conversational interview with open-ended

questions, sticking to the interview guide may sometimes prove implausible (Efron & Ravid, 2013).

Project Artifacts. The last data collection tool utilized in this research project was photographic evidence of the end product from each of the three groups of students, or the project artifacts. According to Efron and Ravid (2013), "artifacts are physical documents and records that allow teacher researchers to construct a layered and contextual understanding of their topics" (p. 123). There are three types of artifacts: 1) personal documents; 2) official documents; and 3) objects (McMillan & Schumacher, 2006). Personal documents, such as class projects, student artwork (Efron and Ravid, 2013), diaries, personal letters, and anecdotal records are those which capture "the first-person narrative that describes an individual's actions, experiences, and beliefs" (McMillan & Schumacher, 2006, p. 357). Official documents, such as: internal papers; external communication; student records and personnel files; and statistical data (McMillan & Schumacher, 2006), "provide an institutional perspective on persons, issues, and processes" (Efron and Ravid, 2013, p. 123). According to McMillan & Schumacher (2006), "objects are created symbols and tangible entities that reveal social processes, meanings, and values" (p. 358). McMillan and Schumacher (2006) offer examples such as "logos and mascots of school teams and clubs; such as athletic letters and trophies, posters, and award plaques" (p. 358). After the class project this study focused on, I took screenshots of each of the group's end products from their class projects, which would qualify the artifacts as personal documents. The hope was that after looking at the artifacts, students would see evidence of the presence or absence of effective collaboration from each project.

Research Procedure

The purpose of this study was to identify to what extent middle schoolers develop collaboration skills given an intervention that included a game-based learning opportunity and direct instruction, modeling, and accountability regarding the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). Prior to the study, I divided one of my STEM classes into three groups. Initially, these three groups were going to be rotation groups that would have allowed me to focus on one group at a time. Since my class size was 32 students, I anticipated having group sizes, and therefore a participant group, of about 10-11 students. The initial plan involved students working in one of three rotation groups. One station would have been the teacher station. I would have provided a high teacher presence at this station, and, through a cognitivist approach, I would have offered an intervention geared towards small group instruction and accountability regarding their collaborative learning as they worked on their mansion renovation projects. I would have taken notes at this station with my participant group to inform the practitioner-researcher reflections. The second station would have featured a low teacher presence. With a constructionist approach, this station would have offered students a chance to work on film festival submissions. A third station, through a behaviorist approach, would have allowed students to work on their mansion renovation projects without teacher presence. Given our campus bell schedule, each class lasted approximately 55 minutes, so I anticipated students being able to rotate the two, 25-minute rotations during each class period. For the aforementioned reasons, however, this rotation group plan changed.

After establishing the participant group, the next step involved them taking the pre-intervention survey. This survey aligned with the three components of effective

collaboration (Lai, DiCerbo, & Foltz, 2017). The Likert-style questions provided insight on each participant's attitudes regarding collaboration. The day after students completed the pre-intervention survey, the study began. Before the selected class period began each day of the study, I completed the pre-lesson teacher reflection, per the CSC construct. Towards the end of each class period, I set an alarm for 10 minutes before the bell in order to cue participants to log onto Chromebooks to complete their exit ticket for the day, in alignment with the SCS construct. After school each day, I referred to my notes to complete the post-lesson survey to evaluate the day's lesson against the CSC construct. I also completed the teacher moves survey after each class to evaluate my teacher moves in consideration of the CSP construct. At the conclusion of the project, I took pictures of each group's projects to compare the student artifacts for evidence of effective collaboration skills, in accordance with the SCS construct. For the last activity of this study, I conducted a semi-structured interview with each of the participants. The semi-structured interviews were an opportunity for participants to share their thoughts on the project overall, aligning with the SCS, CSC, and the CSP constructs. Each data collection tool aligned with the constructs I sought to measure and, thus, aligned with the research question for this study.

Data was collected from students through Google Forms, while I wrote practitioner-researcher reflections in Google Docs. I recorded the semi-structured interviews on my phone. The *Voice Memos* app can record audio as long as an iPhone has available storage. Storage was not an issue using the particular phone I had because 1GB of memory allows for the collection of approximately 100 minutes of audio. At the time of the interviews, the phone had 44GB of memory available.

The game-based learning opportunity allowed students to implement their plan of action in the M:EE game environment. To sum up this application, imagine giving kids an unlimited number of Legos and telling them to build something. That is essentially what M:EE is. For this M:EE project, groups were assigned a pre-generated woodlands mansion within the world and tasked with remodeling it. Figure 3.3 shows what a woodlands mansion looks like:

Figure 3.3. A generic woodlands mansion in pre-renovation state.

Two resources, *Lepper's Instructional Design Principles for Intrinsic Motivation* (Lepper, 1988) and a DGBL rubric (Shanahan, 2017), informed the design of the collaborative learning opportunity in M:EE. *Lepper's Instructional Design Principles for Intrinsic Motivation* (Lepper, 1988) framework features the principles of control, challenge, curiosity, and contextualization. Students had full control over the choice of materials, structures, techniques, and aesthetics. Students were naturally curious to see which team made the most improvements to the mansion. The context of the challenge outlined different design features of the mansion in its pre-renovation state that needed to be addressed. First, the mansions were initially too dark. Students needed to improve the

lighting. Second, students were to give their mansions curb appeal and give the mansion a grand entrance. Third, a large home should have designated entertaining spaces within the home and in the backyard. Fourth, a mansion should have good views, so students were to help improve how one in the home could enjoy the view. Fifth, all rooms needed to have a clear purpose. Woodlands mansions in M:EE have some rooms that lack purpose. Student were to give every room a clear purpose. Additionally, students were to look for the weaknesses in rooms that had a clear purpose and improve those spaces.

The student pre-intervention and exit ticket surveys were formatted as Google Forms. Students accessed these instruments in the class Google Classroom page. I took screenshots of the project artifacts at the conclusion of the project. Semi-structured interviews took place in my room after class or outside my classroom in the courtyard at the conclusion of the project. I initially utilized the Voice Typing tool within Google Docs to aid in transcribing the semi-structured interviews. When this proved cumbersome, I utilized a password-protected transcription service called Trint to transcribe the recordings. The transcriptions were deidentified by assigning pseudonyms to each student participant. Students will have password-protected logins for Google Classroom, further helping to protect their privacy during their participation in this study.

Treatment, Processing, and Analysis of Data

The research question I sought to answer through this study is: To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning? In order to answer this question, the data collected during the study had to be processed and analyzed to uncover emergent themes. These themes

were analyzed to isolate key findings for this study. The EEC (Lai, DiCerbo, & Foltz, 2017) framework for collaboration influenced the makeup of the following qualitative data collection instruments.

For the pre-intervention survey (Mertler, 2014), Google Forms were utilized for data collection. After transferring this survey data to Google Sheets, the data was organized sequentially, displaying student perceptions of their experiences in various aspects of working collaboratively in group projects. This survey data was displayed in a table in Google Docs and underwent descriptive analysis for patterns in the data.

The exit ticket survey (Black & William, 1998) data was collected daily through Google Forms. After transferring this survey data to Google Sheets, the data was organized sequentially by day of submission. The 5-point Likert-scale data was analyzed for the mean for each question for each day. After plotting the mean data on a line graph, trends were also displayed in a line chart pertaining to interpersonal communication and conflict resolution. The open-ended survey responses were checked for relevance to the constructs germane to this study. Relevant responses were coded, and the codes were checked for patterns, then for emergent themes. These responses were checked for completion during the study and analyzed after the study.

The practitioner-researcher reflection (Carr & Kemmis, 1986) entries were written in tables within a Google Docs file. The reflections were checked for relevance to the constructs germane to this study. Relevant responses were coded, and the codes were checked for patterns, then for emergent themes. These reflections were completed each day during the study. The data was utilized during the intervention and analyzed after completing the study.

The project artifacts (McMillan & Schumacher, 2006) were produced by each of the three groups in my STEM class. I took screenshots of each group's artifact at the conclusion of the project. In order to allow student participants to offer their perceptions on the project artifacts, the first question asked during the semi-structured interviews utilized photo-elicitation (Collier, 1957). This meant that after students looked at pictures of each artifact, they shared their insights regarding what each artifact said about how well each group collaborated.

The semi-structured interview (Efron & Ravid, 2013) response transcripts were produced and revised for accuracy within the Trint online transcription service. This qualitative data was imported to a project file within the MAXQDA software application. This application allowed me to manage and organize my wealth of data. MAXQDA also aided in isolating data that was relevant to each of the study constructs. Notes and highlighting were utilized during the first coding cycle (Saldaña, 2013) to help with the condensing of the data (Miles, Huberman, & Saldaña, 2014). I then took the transcription statements related to the constructs I sought to measure and transferred them to Google Docs. Through the use of margin notes (using the comment feature) and tables within Google Docs, I was able to code the data and place the construct-related codes in different table rows that coordinated with a priori themes. When codes presented themselves that did not fit a priori themes, emergent themes arose from the data, which I will discuss in Chapter 4.

Summary

In this chapter, I described the conditions of the context for this study and the problem of practice that this action research sought to address. Various factors and

theories informed the research question and intervention featured in this research study. The sampling approach, constraints, and characteristics of the study participants group have been discussed. Data collection measures, instruments, and tools used in the data collection process were identified. This study's research procedure has been described. Lastly, the treatment, processing, and analysis of this study's data sets have been detailed. In the next chapter, I will present the data, discuss the analysis and interpretation of the data, and share the findings of this study.

CHAPTER 4

FINDINGS

The purpose of this qualitative, action research study (Creswell, 2014; Efron & Ravid, 2013) was to deepen my understanding of how I can use game-based learning strategies and a framework for developing collaboration skills in order to more effectively facilitate collaborative learning for my science, technology, engineering, and mathematics (STEM) students. Growing in this capacity would aid in addressing a prevalent problem of my practice in that the issues students experienced while collaborating could have largely been circumvented if I did a better job of fostering effective collaboration skills. To address this problem, I sought to investigate whether a focused intervention could help me to foster effective collaboration skills. The intervention was applied during a project in one of my STEM classes that included direct instruction, modeling, and accountability on a group project set in the *Minecraft: Education Edition* (M:EE) virtual learning environment. I had three student groups for the ten-day project. One group was a purposive sample of eleven students. While the intervention was implemented in the class as whole, my level of teacher presence varied between each group. I was often in close proximity to the participant group to more readily intervene, offer feedback, provide support, and make observations. I was always near enough to a second group to overhear most conversations, check on progress, offer feedback and support, and to see what they were doing. I was mostly furthest away from the third group, but I still: checked on them; was within earshot to hear some of their

conversations; could see their progress on the computer screens across the room; and intervened as necessary.

Even though the overall structure of the study changed in order to give my students more time to finish their project, this intervention design was theoretically rooted in elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017) and digital game-based learning (Prensky, 2001). The intersection of these two theories comprised the intervention I implemented while seeking to answer the research question that I intended to answer: How can a collaboration framework and digital game-based learning help me foster effective collaboration skills among middle school learners? The qualitative constructs that this study sought to measure include the development of students' collaboration skills (SCS), my collaboration skills curriculum (CSC), and my collaboration skills pedagogy (CSP).

Chapter Four is organized in a format according to data that is germane to each of the constructs I sought to measure. In the first section, I will present data concerning the measurement of SCS. The second section will feature data concerning CSC. The third section will focus on data pertinent to my CSP. Each section focusing on these three constructs will feature a coding table, followed by the presentation of evidence for and a discussion on themes that emerged from the codes. With consideration given to these emergent themes, I will then examine the general findings and results of the study.

Data Presentation and Interpretation

Once I finished collecting data, I began preparing my data for analysis. I uploaded the interview transcripts to the MAXQDA data analysis application. Next, I installed my practitioner reflection data into different tables on two separate Google Docs. For the exit ticket survey data, I color-coded the data according to the day of submission during the study to add contrast and aid

readability. I then began the coding process. Notes and highlighting were utilized during the first coding cycle (Saldaña, 2013) to help with the condensing of the data (Miles, Huberman, & Saldaña, 2014). I specifically looked for statements that were relevant to the constructs that I was seeking to measure. During the second cycle of coding, the first cycle codes were analyzed for the prevalence of themes. The first construct I examined was Student Collaboration Skills (SCS).

Construct #1: Student Collaboration Skills

Per *Figure 3.1* in the previous chapter, I sought to measure the development of SCS through the use of student surveys (Mertler, 2014; Black & William, 1998), semi-structured interviews (Efron & Ravid, 2013), project artifacts (Efron & Ravid, 2013), and practitioner-researcher reflections (Mertler, 2014) data sources. To get a sense of what the students' collaboration skills were prior to the intervention, I first analyzed the data from the pre-intervention survey in which the students self-assessed their views regarding different components of collaboration. To determine if growth took place regarding this construct during and after the intervention, I considered the exit tickets, project artifacts, and exit interview transcripts. The interview transcripts additionally provided student insights on the project artifacts. The first question of the semi-structured interviews employed a technique called photo-elicitation (Collier, 1957) in which the interviewer includes images as a tool to catalyze discourse (Harper, 2002; Creswell, 2013). Next, I looked for significant statements that were germane to the SCS construct. Then, I examined the significant statements for emergent themes within this portion of the data. To conclude my analysis of data concerning the SCS construct, I collectively employed the data comparison, significant statements, and the emergent themes to determine my findings regarding my intervention concerning this construct.

Student Collaboration Skills: Pre-intervention Survey Data

The pre-intervention survey (Appendix A) intended to measure how the participants viewed or valued components associated with collaboration that aligned with the EEC (Lai, DiCerbo, & Foltz, 2017). Students completed the survey using Google Forms, a digital, cloud-based survey tool. The survey consisted of Likert-style questions (Efron & Ravid, 2013; Mertler, 2014) with a 1-5 scale (1-least important, 5-most important) to rate their perceived level of importance regarding a component of collaboration. Table 4.1 shows a summary of the responses to this survey. Questions 1, 7, 13, and 14 pertained to interpersonal communication. Questions 2, 3, and 6 pertained to conflict resolution. Questions 4, 5, 8, 9, 10, 11, 12, and 15 related to task management. Interpersonal communication, task management, and conflict resolution comprise the EEC (Lai, DiCerbo, & Foltz, 2017) framework that is a part of this study's theoretical foundation.

Table 4.1 *Summary of Student Responses: Pre-Intervention Survey*

Totals (N=11),
= Interpersonal Communication-Related
= Task Management-Related
= Conflict Resolution-Related

	1	2	3	4	5
1.Ability to work respectfully & effectively with others	0%	0%	27.27%	63.64%	9.09%
2.Flexibility when working with others	0%	0%	36.36%	36.36%	27.27%
3.Willingness to compromise when others have different ideas	0%	9.09%	45.45%	36.36%	9.09%

4.Members do their fair share of work	0%	0%	0%	**27.27%**	**72.73%**
5.Plan out a project before beginning	9.09%	0%	0%	**63.64%**	**27.27%**
6.Think about what you say before saying it	0%	0%	45.45%	9.09%	45.45%
7.Willingness to help others understand tasks to do	0%	0%	18.18%	27.27%	54.55%
8.Desire to take the lead when working with others	9.09%	9.09%	45.45%	9.09%	27.27%
9.Stay organized when working with others	9.09%	0%	9.09%	63.64%	18.18%
10.Each member should have certain jobs or roles	0%	0%	9.09%	**45.45%**	**45.45%**
11.Important to stay on task?	0%	9.09%	18.18%	27.27%	45.45%
12.How well you stay on task?	0%	9.09%	27.27%	54.55%	9.09%
13.Brainstorm & discuss everyone's ideas before working	0%	18.18%	36.36%	18.18%	27.27%
14.Listening when working with others	0%	0%	18.18%	18.18%	63.64%
15.Produce high-quality work	0%	0%	9.09%	**36.36%**	**54.55%**

While assembling the summary table above, the components that this group of students most highly valued became decidedly clear. According to *Figure 4.1* and noted using a bold font, the student participants indicated their perceptions on the most important components of collaboration included the need for equitable workloads, the

need to plan before beginning the work, the need to produce high-quality work, and group members having certain jobs or roles. Equitable workloads (Question 4) proved to be the most important component of collaboration to this group, with 100% of student participants indicating this component was very important, rating it as either a 4 or 5. The other highly rated components were planning before beginning group work (Question 5), the importance of producing high-quality work (Question 15), and group members having certain jobs or roles (Question 10). Each of these scored as very important components of collaboration, with approximately 91% of student participants rating these components either a 4 or 5.

By ranking each of the components according to their importance rating, I found that the items that scored the lowest were the importance of brainstorming (Question 13), willingness to compromise (Question 3), and the desire to take the lead when working with others (Question 8). For the importance of brainstorming and the willingness to compromise, 45% of student participants rated these components as either a 4 or 5. The factor that student participants found to be the least important was the desire to take the lead while working with others, with only 36% of student participants scoring the component as a 4 or 5.

Only 55% of students in Group 1 found components related to conflict resolution to be very important. 70% of students in Group 1 rated components related to interpersonal communication as very important. Lastly, 78% of students in Group 1 rated components related to task management as very important. From these numbers, one could deduce that the group as a whole thought that task management was the most important element of effective collaboration. The data further corroborated this

deduction in that the four most important components of collaboration, as rated by the students, were all related to task management.

I found it interesting that these three components scored as the three collaborative factors of lowest importance to the participants. Generally, my personal bias holds that brainstorming and planning are intertwined when I work collaboratively, so I found the low rating for the importance of brainstorming to be interesting. Initially, concerning the importance of planning, the rating for brainstorming seemed like perhaps an outlier data point. That the importance of brainstorming and the willingness to compromise scoring equally as low made sense to me. When people brainstorm, sometimes mutually exclusive ideas are presented, potentially forcing group members to have uncomfortable conversations where an agreeable middle ground needs to be found. The high level of importance for equitable workloads (Question 4) reminded me of a complaint I commonly received from students over the years as they attempted to work collaboratively. Perhaps these students have had similar issues concerning equitable workloads, either previously or during my class. I was caught off guard by the high ratings that the importance of planning (Question 5) and the importance of group members having jobs or roles (Question 10). These two results evoked personal feelings of disequilibrium because, throughout my career, my view has been that students generally begin working without a solid plan and sans concrete roles for each member to fulfill. I generally do not assign jobs or roles because, anecdotally speaking, this generally seems to lead to members of a group being unhappy with their assigned role, with the potential to negatively affect their participation in the project.

In summary, my descriptive analysis would have helped elucidate my student participants' inclinations regarding collaboration prior to this study's intervention. Unfortunately, due to lack of time, the pre-intervention survey was not analyzed to inform the intervention. With their preferences in mind, it would have stood to reason that this group of students generally wanted to work collaboratively with as little discomfort as possible. They wanted to work with like-minded peers with whom they already enjoyed rapport and pre-established comfort levels, thereby mitigating the likelihood of the need to compromise. In their ideal collaborative work environment, those surveyed would only need to engage in surface-level planning sessions, because everyone would know what to do, how to do it, and who is doing what. No one would have to assume a leadership role, and the end result would inevitably prove to be of high quality. This seems to be almost a utopian type of collaborative work experience. Fittingly, two subgroups of students not used to working together were grouped to comprise the participant group.

Student Collaboration Skills: Coding Table

The next step in the data analysis process involved examining data from the semi-structured interviews, project artifacts, practitioner-researcher reflections, and exit ticket surveys to identify statements related to the development of SCS. Specifically, if statements seemed to be connected to the members of Group 1 meeting their objectives, which were to complete the end-task of the project and to grow as collaborators. Data that seemed to fit this criterion were compiled into a table. A mixture of Descriptive, In Vivo, Process, and Causation coding was utilized during the first coding cycle (Saldaña, 2013) to help with condensing the data (Miles, Huberman, & Saldaña, 2014). During the

second cycle of coding, the first cycle codes were analyzed for the prevalence of themes and subthemes (Miles, Huberman, & Saldaña, 2014). During the second pass of analysis, these codes produced emergent themes and subthemes (Miles, Huberman, & Saldaña, 2014). Several themes were already established, or a priori themes, by different elements of this study's conceptual framework, a concept that Strauss and Corbin (1990) called theoretical sensitivity. Given this study's theoretical foundation, the questions germane to the project artifacts on semi-structured interview protocol (see Appendix D) (Coffey & Atkinson, 1996), and the need to explicitly teach collaboration skills (Lai, DiCerbo, & Foltz, 2017), the second wave of coding began with the following a priori themes: interpersonal communication, task management, conflict resolution, end products, and explicit instruction. The coding table regarding SCS (*Figure 4.2*) is listed below:

Table 4.2 *Coding Table: SCS*

Theme	Subthemes	Codes	Example
Interpersonal Communication	Amongst participant group members	Planning and set tasks decreased need to communicate, talk through ideas, shared ideas X8, whole group communicated positively, communicated as necessary, positive on-task communication, discuss ideas X3, Matthew moves closer to introverted partners to boost communication, quiet student pitches idea to Matthew, student offers suggestion, group supports suggestion, shared vision for garden roof, student suggests idea, students support suggestion, Ivy encourages group to communicate, solicited input from everyone, communicated positively, less communication with set jobs	[Day 10] "We shared more ideas and talked more often." - Ivy

		X3, respectful communication, communicated well, no arguments, share more ideas, talked more often, listened to everyone's ideas	
	Perceptions of other groups communica-tion	other groups didn't communicate,	[regarding other groups] "I think some of the groups didn't really communicate as well as others." – John
Task Management	Planning	Step by step, blueprint aided task management, on same page, plan X2, student planning, Different ideas = combine parts of the ideas, tried to stay on same page, planning boosted productivity, brainstorming X4, student finishes blueprint to aid task management X2, planned tasks, took notes on ideas, have a game plan	[Day 6] "...one thing that stood out is how they used the blueprint that Polly had made to aid in the planning and task management process."
	Jobs	set tasks X2, jobs = better task management, students divvied out work to establish tasks, set jobs X2	[regarding task management] "...everyone had their own tasks...everyone knew what they were doing..." - Claire
	Productivity	Productive X2, project more complete compared to others, we got a lot more done, very productive, students highly engaged, highly motivated, students engaged - working into time to finish exit ticket, got a lot more done, everything works out well	[Day 4] "After class, Abby and Claire said that Group 1 'got a lot done today.'"
	Other	Individual group members did	[on what the

	groups	whatever they wanted, didn't get as much done,	other projects say about how well they collaborated] "They just did whatever they wanted to. So they didn't get as much done." - John
Conflict Resolution	Impending conflict	Students recognized communication issue, student recognizes issue with carpet, prevented with compromise X2, breakdown in communication @2, diversion from plan, deadline stress, not on same page	[Day 8] "We just found out that different floors had different materials for the walls." - Claire
	Conflict engagement	Students engaged in conflict X3,	[Day 9] "Everything seemed to be going smoothly until Ivy said that she felt that the subgroup that Matthew was a part of wasn't doing anything. Matthew took offense and stood up for his partners, and tension started to build." -PRR
	Emotions during conflict	Resolving conflict = scary, calm down,	"...so I kind of stepped in...and got them to calm down, and it worked, which was a little scary." - Claire

	Conflict intervention	student intervened to stop conflict X2, student mediation, take a breather, open our minds, seeing issue from other person's perspective, students suggest intervention, student intervenes to mediate X2,	“I explained what she [Ivy] meant and how it maybe might have come across the wrong way, but she didn’t mean it like that.” - Claire
	Conflict result	Student resolves conflict, conflicts that arose were resolved, student intervention successful, Claire’s mediation resolves conflict, carpet issue resolved	“And it solved it.” - Claire
End Product	Group 1	High-quality project = priority, unique, better than original, a lot of effort, anxious to see how project would come out	“We gave ideas, and we made it...different, we made it stand out, we made sure it was more than the original, we made sure it was unique, and we put a lot of effort.” - Ivy
	Other groups’ projects	other artifact showed lack of planning, other artifact looked unfinished	[regarding group 2's project] "...it looks sort of half-finished." - Ivy
Explicit Instruction	Teacher Feedback	Whole-class feedback, teacher recognizes communication issue, teacher recognizes task management issue, teacher intervenes to give feedback, teacher reinforces group 1’s productivity, teacher reviews class feedback slides; planned intervention to model, planned intervention to suggest	[Day 5] “Class Feedback Slides included: Reminders that the groups (specifically groups 2 and 3) need to communicate more; the observation that

			groups (specifically 2 and 3) are demoing and building without a plan; metacognitive modeling for thinking before they speak to their group members; reminder that students often get off track when they perceive they don't have anything to do - a blueprint can help with this [showed group 1's blueprint that Polly drew.]" - PRR
	Student response to feedback	Students impressed by group 1's progress, all group 1 on task for duration of class after feedback slides, whole class affirmation boosted student motivation	[Day 5] "The groups were in awe of the progress that group 1 had made." - PRR
Student Leadership	**Student moves**	**Polly finishes blueprint, Matthew supports Bobby, students ask Abby for help with ideas, Abby offers suggestions, Matthew recognizes proximity/communication issue, Matthew offers solution, John agrees to solution, student move - agency, Matthew solicits feedback from Bobby to get him to communicate, Matthew uses**	**[Day 6] "At one point, Bobby quietly communicated to Matthew that they might want to move the grand staircase from in front of the main entrance on the 1st floor to closer to the**

	suggestions, Claire helps grab Chromebooks for exit tickets, Claire worked to involve Amanda and Elizabeth, student leaders implement plan to fix communication issue, plan makes a difference, Stressed importance of blueprint, teacher suggestion, teacher shares observation, teacher asks for insight, Student leaders agree to use suggestion, student agrees to make blueprint, students offer insight, de facto SLs met with me after class, SLs update me on progress,	**back of the first floor to open up that space. Matthew encouraged him to speak up to share the idea, and everyone was in agreement." - PRR**

Student Collaboration Skills: Emergent Theme

In addition to the a priori themes mentioned above, another theme emerged as patterns within the data presented themselves. The emergent theme that arose from the data pertaining to SCS (*Table 4.2*) was student leadership. The data used as evidence to establish this theme from the various data sources is listed in *Table 4.3* below:

Table 4.3 *Emergent Themes and Excerpts of Evidence: SCS*

Theme	Evidence
Student Leadership	● [Day 6] "At one point, Bobby quietly communicated to Matthew that they might want to move the grand staircase from in front of the main entrance on the 1st floor to closer to the back of the first floor to open up that space. Matthew encouraged him to speak up to share the idea, and everyone was in agreement." - PRR ● [Day 7] "I enjoyed seeing the leaders step up today. Polly asked Abby for interior decoration ideas, and before long, Abby was asked for ideas from other group members. Bobby's iPad battery was running low, so he moved by the nearest wall outlet to charge his tablet. Matthew encouraged John to move with him to sit by Bobby. As Bobby was working on the

	stairs, Matthew was working on the library. Matthew asked Bobby for feedback, and if he had any ideas for some of the design choices he needed to make to put the finishing touches on the library. Bobby quietly shared his ideas with Matthew." - PPR ● [Day 7] “When it was time for the group to work on their exit tickets, Matthew, Abby, Karen, Polly, and Claire all took longer than 2 minutes to end their current tasks in order to begin their exit tickets. When Claire finally tore away, she grabbed Chromebooks for each of the group members who needed Chromebooks so that they could work on their exit tickets.”- PRR

Theme: Student Leadership. The data showed that Group 1 had a handful of students that observably supported their group members, both during and after class, throughout this project. The codes indicated on numerous occasions that Claire, Matthew, Polly, and Abby made efforts to help lead their group towards meeting their objective. Their efforts to lead their group made the absence of student leadership in other groups noticeable, with this absence mentioned several times in the Practitioner Researcher Reflections. These four students were heavily involved in all aspects of this project. For Matthew, Claire, Polly, and Abby, their additional efforts seemed to contrast their responses on the survey they took prior to the intervention.

On a five-point scale, Matthew rated the importance of brainstorming prior to working collaboratively and listening to everyone's ideas as a two (Pre-intervention Survey, Q13). However, he was instrumental in the brainstorming process by helping to bridge the familiarity divide between the two subgroups of students on his team, those he was accustomed to working with, and those he was not. During the brainstorming session, he was heavily involved in the discussion to create "a Harry Potter-like moat" (Teacher Reflection, Day 2). In fact, regarding his de facto leadership role he played in

the project, he seemed proud during the interview that "we had the project planned out to where we knew what we were gonna do, you know, we took it step by step" (Exit Interview, para. 21). This is also ironic considering he had rated the importance of staying on task while working with others as a two out of five (Pre-intervention Survey, Q11). Playing a part in making sure a project was planned out in an orderly, step-by-step fashion would seem to place importance on the tasks at hand, thus the importance of staying on task. Furthermore, regarding his low rating of listening to everyone's ideas when working collaboratively (Pre-intervention Survey, Q13), two of his more introverted partners, Bobby and John, were frequently confiding their ideas to him (John's Exit Interview, para. 15; Teacher Reflection, Day 4). This led to Matthew frequently advocating for Bobby and John (Teacher Reflection, Day 4-5). He also rated being flexible when working with others (Pre-intervention Survey, Q2) as a three out of five, suggesting an indifference towards flexibility. However, when Bobby suggested completely moving the staircase, Matthew suggested that being open to Bobby's idea "helped with the downstairs and then we got everything done" (Exit Interview, Matthew, para. 117).

Claire and Polly both rated their desire to take the lead when working with others as a three out of five (Pre-intervention Survey, Q8). Nevertheless, both girls played important roles in their group's project by applying their leadership skills. Claire and Matthew were the de facto leaders of each of their respective subgroups (Practitioner Researcher Reflections). However, Matthew would, at times, look to Claire for guidance, reinforcing the perception that different group members and I shared that Claire was the overall leader of the student participant group (Practitioner Researcher Reflections; Semi-

structured Interviews). Polly stepped up as a leader, by advocating for some of the more introverted members of the group (Practitioner Researcher Reflections), staying after class to discuss the group's progress (Practitioner Researcher Reflections), and sketching a blueprint of the group's mansion (Practitioner Researcher Reflections; Semi-structured Interview). She clearly labeled all three floors of the mansion with both room names and the names of which group member(s) was responsible for working on which rooms. Abby rated the importance of staying on task as a three out of five (Pre-intervention Survey, Q11). However, there was never a time when I observed that Abby was off task.

If the pre-intervention views on collaboration compared to what students actually did while collaborating during the intervention are any indication, it stands to reason that the intervention fostered the development of student leadership skills, at least as far as these students are concerned.

Construct #2: Collaboration Skills Curriculum

Another construct I sought to evaluate was my collaboration skills curriculum (CSC). Specifically, I wanted to see how the curriculum supported students in meeting their objectives. Per *Figure 3.1* in the previous chapter, the semi-structured interview transcripts, exit tickets surveys, and practitioner-researcher reflections data sources were utilized in the evaluation of the CSC. These data sources were examined for codes germane to the curriculum aspect of this study. Given that DGBL (Prensky, 2001) informed the project design for this study, my knowledge of the semi-structured interview protocol (Appendix D); and my responses to the practitioner-researcher reflections, the data analysis process started with a list of a priori themes. These a priori themes were learning, entertainment, resources, and project management. The first pass

of coding revealed a variety of codes, with several not fitting any of the a priori themes. Again, during this process, a mixture of Descriptive, In Vivo, Process, and Causation coding were utilized during the first coding cycle (Saldaña, 2013) to help with condensing the data (Miles, Huberman, & Saldaña, 2014).

During the second cycle of coding, the first cycle codes were analyzed for the prevalence of themes and subthemes. During the second pass of analysis, these codes produced emergent themes and subthemes (Miles, Huberman, & Saldaña, 2014). The coding table (*Table 4.4*) is listed below:

Table 4.4 *Coding Table: CSC*

Theme	Subthemes	Codes	Example
Learning	Learning behaviors	engagement, had to think, had to be creative X2, had to talk more, easier to 3D model, learn quicker, communicate more, share more ideas, brainstorming aesthetic choices, video games allow more creativity,	"The advantages would be that for me, it helps like I learn quicker when I do stuff like that." - Aaron
	Learning modes	Multiple ways of learning, active learning, hands-on,	“You're showing there's more of a possibility of learning, like there's not just one way. There's like multiple, you're showing like kids there's multiple ways of doing things.” - Polly
	Learning activities	different game made math fun, modern-day	"...it was like this wizard game and...it was actually pretty fun because it was a competition and you had to

			like complete quests and...you would get to an objective, and you would have to do math problems…" - Matthew
Deadline	**Emotions tied to Deadline**	**Stress led to temper flares, stressful toward deadline, deadline created fear of ideas being unattainable**	**"It was sometimes stressful at the very end because, like that's when everybody was starting to get like tempered." - Polly**
	Behaviors tied to Deadline	**preparing for conflicts as deadline approaches, deadline reminder**	**“Also, I want to remind them of the project due date next week.” - Me**
Resources	Resource Qualities	resources had good ideas, adequate resources, project had good resources, use examples to encourage more effort,	“Resources - those were actually really good ideas and kind of helped, like, with some of the different ideas.” - Claire
	Resource Suggestions	real-world examples, student examples, use examples as evidence of collaboration,	“So, I feel like showing examples of what...communication can do next to what like arguing can do...would be a better idea.” - Ivy
Entertainment		Fun while learning, fun X3, enjoyable, enjoyment X2, some video games are not fun, more fun, fun compared to other assignments entertainment, high scores foster competition	“Well advantages is...it makes it funner than doing it on paper.” - John

Self-Determination	**Qualities of Self**	**Confidence, self-efficacy, motivation, more interest, confidence to give others advice online**	**Like we know what we're doing, it's like, it's like we know what this stuff is and you're trying to like incorporate it, and it's like really meaningful to us like we know what this is, we like this, we can do it." - Abby**
	Qualities of Video Games	**Meaningful, Relevant, video games are relatable**	**"The advantages most likely because like we can all relate to video games." - Ivy**
Project Management	Project Requirements	Discuss project directions, accountability, intended to show YouTube example, intended to push the use of project resources, project requirements	"I will show the class as a whole the following YouTube after I explain the project directions posted on Google Classroom." - Me
	Feedback	Guiding students to resolve their conflicts, Teacher stresses importance of having a plan, whole-class feedback, showcase group progress on project, whole-class feedback, teacher to offer suggestions to student leaders	"I intended to push the need for the groups to have a plan for their projects going forward. Research has shown that planning, part of task-management, increases the chances of achieving successful project outcomes (University of Leicester, 2009)." - Me
	Teacher Behaviors	Managing virtual avatars, intended to check progress, teacher proximity, teacher presence,	"The intent was to check in more with each group to ensure that they were progressing okay." - Me

Collaboration Skills Curriculum: Emergent Themes

The emergent themes that arose from the data pertaining to CSC were deadline and self-determination. Data used as evidence to establish these two themes from the exit interviews and the teacher reflections are listed in *Table 4.5* below:

Table 4.5 *Emergent Themes and Excerpts of Evidence: CSC*

Theme	Evidence
Deadline	● "I know every group they were afraid of making something too big because of the deadline again…" - Ivy ● "It was sometimes stressful at the very end because like that's when everybody was starting to get like tempered..." - Polly ● [Day 5] "Also, I want to remind them of the project due date next week." - PRR ● [Day 8] "I intended to aid Group 1 in resolving any conflicts that may arise, as they are fully aware that they are in crunch time now. In my experience, the last few days of projects tend to be the most stressful and, thus, I anticipate this group will have some form of conflict." - PRR
Self-Determination	● Like we know what we're doing, it's like, it's like we know what this stuff is and you're trying to like incorporate it, and it's like really meaningful to us like we know what this is, we like this, we can do it." - Abby ● "The advantages most likely because like we can all relate to video games." - Ivy ● And kids would be interested more when it's a game…" - Polly ● "Maybe some students won't like, like they don't like games that you have for them to play. Like some teachers, they give like too much educational games, like you really don't do anything but add numbers." - Bobby

Theme: Deadline. On several occasions, students either mentioned the deadline or how they wished they had more time to work on their project (Exit Tickets; Semi-structured Interviews). The codes (see *Table 4.5*) indicate the deadline led to fear, stress, and tension that put limitations on the planning process (Semi-structured

Interviews), breakdowns in communication (Exit Tickets, Day 8), and conflict (Exit Tickets, Day 9; Semi-structured Interviews). This further validated their emphasis on planning in their collaborative process for the sake of efficiency. Ivy alluded to this when she said, "I know every group, they were afraid of making something too big because of the deadline" (Semi-structured Interviews). Another connection to planning came in each group's artifacts at the project's deadline. Other than minor nuances concerning the silhouette of and terrain surrounding each mansion, *Figure 4.1* captures what each group started with:

Figure 4.1. Generic woodlands mansion in pre-renovation state.

Although each woodland mansion populated in the virtual world with a few nuances in their floor plan and room composition, each group essentially began the project with similar three-story mansions to renovate.

Group 3 worked on their project without any teacher presence. While I did get onto students from that group for being off track at times (Teacher Reflections), they basically had autonomy when working on this project. *Figure 4.2* shows Group 3's project artifact:

Figure 4.2. Exterior of Group 3's project artifact.

They commonly discussed topics that were unrelated to their project (Teacher Reflections, Day 5) and never truly had a cohesive plan for their project, as illustrated by the eclectic nature of the second floor common area of their mansion in which they spent most of their time (see *Figure 4.3* below):

Figure 4.3. Group 3's project artifact: Second-floor common area.

I do not suspect that this group had a sense of urgency regarding the deadline. Upon completing one of the themed rooms Group 3 referred to as the "Gucci Room (the opening of which is marked by the green and red flags in *Figure 4.3* above)," one of the students stated, "it's so ugly, it's great." Group 3 spent most of their time working on the

2nd-floor common area (shown in *Figure 4.3* above), yet it was unfinished, as evidenced by the unfinished ceiling and the inconsistent choice of materials used in the wall. This overemphasis on this one area over the other areas of their mansion led to the appearance of the first floor being bare, as shown in *Figure 4.4*:

Figure 4.4. Group 3's project artifact: First-floor.

As the deadline approached, it appears this group came to terms with time running out on the project, mainly working on "the kitchen on the bottom floor" (Practitioner Researcher Reflections, Day 8). Groups 3 make a concerted effort to finish their themed rooms up until the end of the project (Practitioner Researcher Reflections, Days 9-10).

For Group 2, I had high hopes for their project because a handful of students in this group had an eye for design. I saw an area that one of these creative students worked on and was impressed. See *Figure 4.5* below:

Figure 4.5. Group 2’s project artifact: Common area.

Unfortunately, Group 2 was never able to agree on a cohesive plan, with group members choosing to work on the project while making decisions unilaterally. Their most productive days of the project were Day 5 (after showing Group 1's progress), and Day 10, the project deadline (Practitioner Researcher Reflections). The most significant piece of evidence that Group 2's project would have benefited from having a plan is shown in *Figure 4.6* below:

Figure 4.6. Exterior of Group 2’s project artifact.

This group seemed to have the most distractions that impeded their ability to complete their project before the deadline. On Day 6 (Practitioner Researcher

Reflections), a student teleported to Group 3's mansion and blew a hole in one of their exterior walls. On Day 7 (Practitioner Researcher Reflections), a student would not stop calling other group members' names. When I asked him to step outside to discuss the issue, he grabbed his backpack and left my room. On Day 8 (Practitioner Researcher Reflections), one student called out other members of Group 2 for getting off track by playing "Hide and Go Seek" in their mansion. On Day 9, I had to disable their chat feature because "their chat communication was off track" (Practitioner Researcher Reflections). On the day of the project deadline, one student walked straight to a corner in my classroom and started crying because "he was upset about a breakup" (Practitioner Researcher Reflections, Day 10). Group 2 definitely faced several issues that kept them from having a higher quality end-product at the project deadline.

The evidence suggests that Group 1, the participant group, valued planning. According to Likert scale data from the pre-intervention survey, approximately 91% of participants rated the importance of planning when working collaboratively as a 4 or 5 on a five-point scale (Question 5). During the exit interviews, in 7/10 transcripts reviewed, participants discussed in some manner the benefit of their group having a plan. The quality of Group 1's end product further illustrated the importance they placed on planning as compared to the other two groups. See *Figure 4.7*:

Figure 4.7. Exterior of Group 1's project artifact.

The participant group discussed on several occasions, as Claire described, "we had a game, like a main plan." (Exit interviews, line 57; Exit tickets). I think this push to stick to some sort of plan can explain the consistent design choices the group made that created cohesion between the exterior and the interior, as seen in *Figure 4.8*:

Figure 4.8. Interior of Group 1's mansion.

Is it any wonder that Group 1 produced the strongest end product? According to Chiriac and Granström (2012), the success of a group can be tied to how well they grasp and plan for the task at hand. The importance of planning to Group 1, in addition to the

lack of planning and distractions by Groups 2 and 3, is evident in the project artifacts submitted at the deadline.

After coding the data and identifying emergent themes, the exit ticket Likert-scale data was analyzed to determine what effect the approaching deadline may have had on the group. See *Figure 4.9* below:

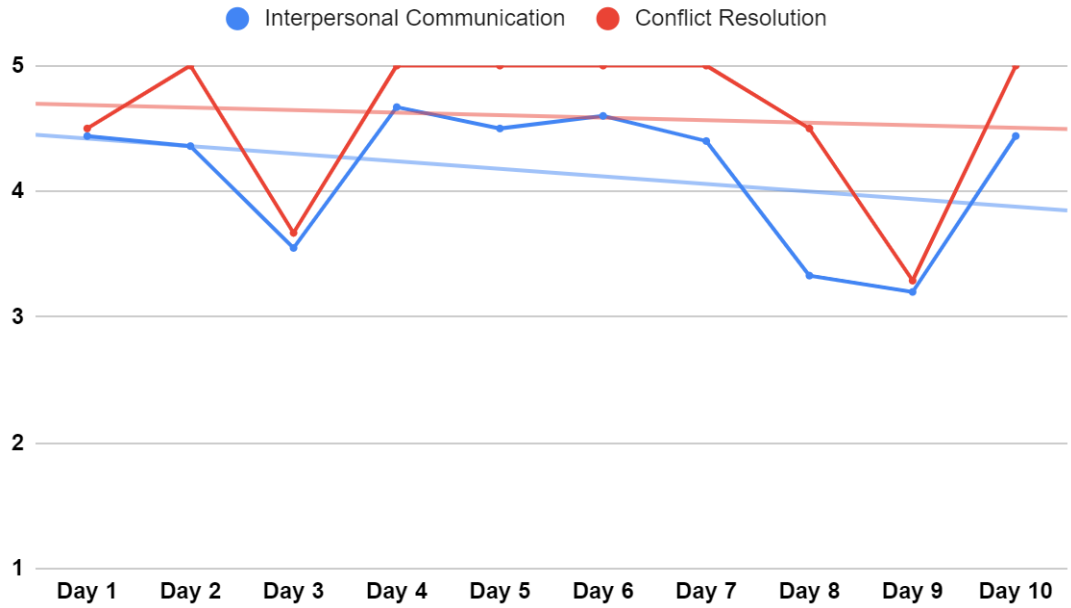

Figure 4.9. Exit ticket surveys: Means and trends of Likert-scale data.

While the expectation would be to see progress with these two data lines, the data did not fulfill this expectation. The exit ticket Likert-scale data (*Figure 4.9*) showed a slight downward trend regarding conflict resolution and a more noticeable downward trend regarding interpersonal communication from Day 1 through the project deadline. Noticeable dips are evident on Day 3 in both student perceptions of the group's interpersonal communication and conflict resolution. After looking at the data, this dip can be attributed to the fact that Group 1 consisted of two different table groups not accustomed to working together. As Claire explained, "we made an effort to

communicate, but most attempts [were] dismissed just as quickly as they [came]" (Exit Tickets, Day 3). The other two noticeable dips in the data came closer to the deadline on Days 8 and 9. These drops likely are attributed to two issues that occurred. On Day 8, Claire explained that "we just found out that different floors had different materials for the walls" (Exit Tickets). Karen seemed to be the student most affected by this dilemma because she explained that:

> nobody told what to do so I did what Abby told me to do and use birch wood but NO I was informed right after to use white [concrete] and I had to go back and make it all over again so I go[t] mad and I still am mad (Exit Tickets, Day 8).

On Day 9, Claire explained that:

> because of the problem of miscommunication and the stress of the deadline being tomorrow the three of us very stressed (sic), but everyone seemed to be in their own world and I just had to stop a fight between Ivy and Matthew due to miscommunication (Exit Tickets, Day 9).

Though the means of student responses for each day are represented in the plotted points in *Figure 4.9*, the question asked regarding conflict resolution on the exit tickets was written with the presumption that there would be conflict. This could be assumed to be a limitation of the study.

Given the aforementioned data in this section, it becomes apparent that the lesson added pressure that led to an increase in the need for conflict resolution and breakdowns in communication. I need to explore how my curriculum can better support groups in their efforts to meet their project deadlines.

Theme: Self-determination. Some codes did not fit any of the aforementioned a priori themes or the theme concerning the project deadline. These codes seemed to be related to students' unique perceptions. Upon further review, I found that the commonality between each of these codes was the concept of self-determination. Self-determination is defined by Field et al. (1998) as:

> (a) awareness of personal preferences, interests, strengths, and limitations; (b) ability to (i) differentiate between wants and needs. (ii) make choices based on preferences, interests, wants, and needs, (iii) consider multiple options and anticipate consequences for decisions, (iv) initiate and take action when needed, (v) evaluate decisions based on the outcomes of the previous decision and revise future decisions accordingly, (vi) set and work toward goals, (vii) regulate behavior, (viii) use communication skills such as negotiation, compromise, and persuasion to reach goals, and (ix) assume responsibility for actions and decisions; (c) skills for problem-solving; (d) a striving for independence while recognizing interdependence with others; (e) self-advocacy and self-evaluation skills; (f) independent performance and adjustment skills; (g) persistence; (h) self-confidence; (i) pride; and (j) creativity (as cited in Wehmeyer, Field, Doren, Jones, & Mason, 2004).

Self-determined people are, "individuals [who] have greater ability to take control of their lives and assume the role of successful adults in our society" because of "a combination of skills, knowledge, and beliefs" equipping them to "engage in goal-directed, self-regulated, autonomous behavior" (Field et al. 1998, p. 2).

One comment that stood out from the semi-structured interviews came from Abby regarding the potential advantages of incorporating video games into the curriculum. She said, “we know what we're doing, it's like, it's like we know what this stuff is and you're trying to like incorporate it, and it's like really meaningful to us like we know what this is, we like this, we can do it” (Semi-structured Interviews). Another striking response from Ivy came out during the semi-structured interviews regarding how video games position her to offer advice and help online gamers who may be older than her:

> And so, I like online, the way I always seen it. I like saw it like this ever since I first started like the people, they don't see your face, they just see your voice and …they see your personality and that's what I like. I don't like them really seeing me in person because I can't, in human, like, communication, face to face, I can't really speak well. Like for some reason, the things I say don't mean the same as they do whenever I'm texting or something because I can, I help people online with depression and I text, I text them and I'm able to type these long paragraphs, and I help them. I've been helping some people for years. So, to me it is just better. And then in real life, I feel like people don't really take it seriously and then knowing that online, they don't really know my age, so they can't judge my age, they can't, they could take my advice and they wouldn't know I'm 14 years old. They will think I'm like, I don't know, 18 or something giving them, like, life advice for their depression or something.

These statements would seem to indicate that perhaps video games fosters self-determination within these students. Additionally, perhaps another reason that games are so meaningful to Abby is that she is one of several students to self-identify as a “gamer”

(Semi-structured Interviews). Ivy claimed that "we can all relate to video games" (Semi-structured Interviews), while Polly claimed the integration boosts student interest" (Semi-structured Interviews). This would suggest that if we are to truly seek to center our curricular efforts on learners (Weil & Murphy, 1982; Topolovčan & Dubovicki, 2019), the integration of video games for DGBL may be worth further investigation.

Construct #3: Collaboration Skills Pedagogy

The last construct I sought to analyze was my collaboration skills pedagogy (CSP). Simply put, how did my teacher moves foster the development of collaboration skills? Per *Figure 3.1* in the previous chapter, I utilized the semi-structured interviews and the practitioner-researcher reflection data sources in seeking evidence of the development of CSP. However, one piece of data from the exit tickets proved to be relevant as well. When analyzing this construct, I first examined the transcripts of the exit interviews. Per the semi-structured interview protocol, I sought to glean the students' insight on what they perceived I could have done better to aid their collaboration process. I coded the transcriptions for data concerning my CSP. I then considered my CSP as I read through and coded the practitioner-researcher reflections, looking for instances in which I sought to aid the development of collaboration skills amongst my students with my teacher moves. The a priori theme in this coding table was classroom practice. The list of codes, subthemes, a priori theme, and the emergent theme are compiled in *Table 4.6* below:

Table 4.6 *Coding Table: CSP*

Theme	Subthemes	Codes	Example

Classroom Practice	Teacher moves in support of communication	Student suggestion - seating arrangement to foster communication, involving introverted students through student leaders, teacher intervenes to understand, give feedback, and ensure quieter student is heard, recognizes student communication issue	[Day 6] "When Bobby shared his idea about the 1st floor staircase with Matthew, I asked the two privately what Bobby's idea was. I encouraged Bobby by saying that sounded like a good idea. I then encouraged the rest of the group that they might want to hear Bobby's idea. Bobby shared and they thought it was a great idea." - PRR
	Teacher moves in support of task management	Will discuss with leaders progress and what could improve it, follow up with other groups on progress, rainy weather = lethargic students → played upbeat music, teacher shows group progress → affirm group's hard work, teacher checks in with each group for progress updates	[Day 3] "I will follow up with the other groups to see how or if the blueprints are coming along." - PRR
	Teacher moves in support of conflict resolution	Teacher recognizes impending conflict, teacher recognition move-intervened to understand, suggested conflict resolution approach, student used suggestion, conflict averted, teacher recognized another impending conflict, teacher intervenes to understand and suggest, student used suggestion, teacher successfully intervenes to resolve conflict	[Day 8] "We almost did horrible [with conflict resolution] but Mr. Hooks helped us solve it." - Bobby

Informal Coaching	**Discussion**	**discuss progress X5, Student insight on progress and tasks to be completed, talked w/ student leaders after class X2, student leaders share insight, conversation about how to involve quieter students,**	**[Day 2] "I will talk with them after class to gauge where they think the group is and what can help improve their progress." - PRR**
	Identify challenges	**students recognize communication issue, Students implement idea to fix issue, student move - intermingle subgroups, student intervention boosts communication, teacher recognized TM issue, need to involve introverted group members, communication issue with introverted members**	**[Day 3] " I talked to Claire, Matthew, and Polly yesterday after class while they plugged in my iPads. They talked to me and each other and to me about whether intermingling the members of the two different table groups would help to boost their communication in Group 1 overall."**
	Support	**Teacher offered suggestions, students used suggestions, leadership development, emergent student leadership, worked with student leaders after class X2, teacher intervenes to suggest student agrees to use suggestion, best teacher move - meeting with and supporting student leaders after class, teacher affirms student leadership's advocacy, teacher will continue to meet with student leaders after school to**	**[Day 7] "I was able to model trying to find an agreeable solution to conflicts…" - PRR**

	support them, teacher models how to potentially involve introverted members teacher models compromise,

CSP: Theme

From the coding table above related to CSP (*Table 4.6*), one theme emerged as a pattern within the data presented itself. The emergent theme that arose from the data pertaining to CSP (*Table 4.6*) was informal coaching. The data used as evidence to establish this theme from the exit interviews and the teacher reflections are also listed in *Table 4.7* below:

Table 4.7 *Emergent Themes and Excerpts of Evidence: CSP*

Theme	Evidence
Informal Coaching	● [Day 2] "Two students, Claire and Matthew in particular, have stepped up as leaders in the participant group. I will talk with them after class to gauge where they think the group is and what can help improve their progress." ● [Day 3] "The best teacher moves I make in supporting Group 1 seem to be when meeting with groups leaders after class. ● [Day 3] "After class, I met with Claire, Polly, and Matthew, the de facto leaders as they helped plug in the iPads. I stressed the importance of completing the blueprint and how it would aid in their task management moving forward. They were agreeable and Polly took on the challenge of working on the blueprint."

Theme: Informal Coaching. I only initially intended to talk with Matthew and Claire one time after class "to gauge where they think the group is and what can help improve their progress" (Teacher Reflections, Day 2). However, Matthew, Claire, Polly, and Abby, started voluntarily staying after class to plug in the iPads and to discuss how

their project was going for the duration of the project. This time spent working with them, which was during my conference period, turned into a time of informal coaching in which I was able to work directly with the de facto leaders of the group to develop their leadership and collaboration skills. Informal coaching is an informal "opportunity or a particularly useful time to facilitate some sort of change" (Lawson & Flocke, 2009, p. 26). I address my perceived value of the informal coaching time with those students in an excerpt from my teacher reflections:

> The best teacher moves I make in supporting Group 1 seem to be when meeting with [the] groups leaders after class. Polly, Matthew, and Claire do an excellent job leading their group by connecting with them, and by giving a voice to those students who either don't seem to have a voice or simply don't speak up. With my military background, I see value in this pattern of interaction. When I was a sergeant in the Army National Guard, I would attend meetings with the commander and other non-commissioned officers that led each of our unit's sections. The commander would distribute the mission to us, and we would delegate the subtasks necessary to complete said mission to our respective sections. If I want to reach my students in this group, particularly my more introverted participants, this seems to be the most natural, effective means in helping to reach or involve them. Meeting with the leaders of this group after class, I believe, will prove to be fruitful given the blueprint and the communication we have about their progress now (Day 3).

Understandably, the main times I intervened during my students' collaborative process was to offer feedback and guidance when conflicts arose (Teacher Reflections;

Exit Tickets). As Bobby stated, "We almost did horrible [with conflict resolution], but Mr. Hooks helped us solve it" (Exit Tickets, Day 8). What is surprising is how few conflicts arose with Group 1 when according to the Likert scale data, only approximately 45% of the participants rated their willingness to compromise when working collaboratively as a 4 or 5 on a five-point scale (Pre-intervention Survey, Question 3). I believe that I have grown as a facilitator of collaborative projects because, in the past, I viewed the conflicts that arose in my different groups of students as "drama," and would discourage students from having, or letting me hear them having, any type of conflict. Now, I see conflicts during the collaborative process as learning opportunities and teachable moments.

Summary

This study encompassed ten days of class time. During this time, students collaboratively worked on a digital game-based learning project. Multiple data sources were utilized to collect data to gain insight from multiple perspectives on how I could grow as an educator of collaborative learning. With regard to my research question, the constructs I sought to measure, and the data analysis process, two key findings concerning my practice arose:

1. Impromptu opportunities to engage the de facto leaders of the participant group in informal coaching proved to be a powerful, unplanned component of the collaborative intervention.
2. Structured benchmarks, with intermediate deadlines to more evenly distribute the pressure, can help mitigate the issue at the end of a project.

The first key finding is that impromptu opportunities to engage the de facto leaders of the participant group in informal coaching proved to be a powerful, unplanned component of the collaborative intervention. Informal coaching implies the need to actively look for opportunities to provide feedback, share observations, and explicitly teach collaboration skills to students. At times, the opportunity to engage students in informal coaching may come after class. When I designed the project for this study, I embedded a whole-class instructional time on Day 5 to offer feedback, share observations, and give direct instruction on collaboration skills. However, it seemed as though the time spent after class informally coaching the de facto student leaders of Group 1 produced the greatest return on investment.

The second key finding is that structured benchmarks, with intermediate deadlines to more evenly distribute the pressure, can help mitigate the issue at the end of a project. Students cited the project deadline as the source of fear, stress, and breakdowns in communication. Data from Likert-style questions on the daily exit ticket surveys indicated that both interpersonal communication and conflict resolution trended negatively as the project deadline approached. These gleanings from the data induced the finding that periodic deadlines, or process benchmarking, may benefit students, and myself alike by more evenly distributing the pressure throughout a given project. In effect, this could lead to less stress, less conflict, and fewer breakdowns in communication.

In this chapter, I have presented the data from my dissertation study, discussed the emergent themes that arose from the data, and have identified key findings from the study. In Chapter 5, I will discuss the implications of the key findings from this study,

and what impact this finding will have on my practice in relation to my problem of practice.

CHAPTER 5

IMPLICATIONS

Practitioner researchers should leverage findings from their action research studies to affect change within their practice (Day et al., 2016). Based on the key findings discussed in Chapter 4, this chapter will first provide a synopsis of the study, as well as the findings that were engendered by this study. Next, I will discuss the implications of these key findings on my practice and the alignment of these findings with the literature. Then, I will reflect on the methodological design and the limitations associated with my study. This reflection will be followed by the delineation of my plan of implementation to integrate the findings of this study into my practice. Chapter 5 will conclude with a reflection on this action research study as a whole, including how it has led to the generation of new knowledge, the action-oriented outcomes that will emanate in my context, and how it has empowered me as a practitioner-researcher.

Overview of the Study

The problem of my practice was characterized as the absence of a focus on effective collaboration skills in my instructional planning and the resulting difficulty in facilitating collaborative learning in my classroom led to my students struggling to effectively collaborate (Baron, 2003; Popov et al., 2012; Le, Janssen, & Wubbels, 2018). While I cannot control all of the challenges that students associate with collaborative learning, what I have learned from this study should help me to address some of the instructional challenges associated with facilitating these types of learning opportunities

within my practice. With this problem of practice in mind, I designed an intervention to evaluate three constructs during a collaborative STEM project. The intervention manifested as the synthesis of two components aggregating my theoretical foundation, the elements of effective collaboration (Lai, DiCerbo, Foltz, 2017) and digital game-based learning (Prensky, 2001). The implementation of this intervention took place as students worked in groups to renovate a mansion within the *Minecraft: Education Edition* (M:EE) virtual learning environment. The STEM project was developed with consideration of a rubric on digital game-based learning programs (Shanahan, 2017) and informed by Lepper's *Instructional Design Principles for Intrinsic Motivation* (Lepper, 1988), featuring the principles of control, challenge, curiosity, and contextualization. The constructs measured during this intervention were: 1) student collaboration skills (SCS) - Did my students meet their objective(s)?; 2) collaboration skills curriculum (CSC) - How did the curriculum support students in meeting the objective(s)?; and 3) collaboration skills pedagogy (CSP) - How did my pedagogy support students in meeting the objective(s)? These constructs were produced from the decomposition of this qualitative self-study's (Bullough & Pinnegar, 2001; Creswell, 2014) research question (RQ): To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning?

While I would have preferred to have implemented the study a bit differently in hindsight, I believe the study's purpose was still fulfilled. The purpose of this study was to identify and refine a set of instructional strategies that can support the development of effective collaboration skills among my middle school STEM students while also

attempting to alleviate the challenges identified by my students that occur when they engage in collaborative learning.

Two findings from this study were identified in Chapter 4. The first finding was: Impromptu opportunities to engage the de facto leaders of the participant group in informal coaching proved to be a powerful, unplanned component of the collaborative intervention. The second finding involved process benchmarking. More specifically, the second finding stated that: Structured benchmarks, with intermediate deadlines to more evenly distribute the pressure, can help mitigate the issues caused by building pressure towards the end of a project.

Implications of Findings for My Practice

The laconic renderings of this study's findings equate to the need to both integrate informal coaching into my collaborative praxis and embed process benchmarking into the design of my future projects. After discussing informal coaching, process benchmarking, and their alignment with both existing literature and my future practice, I will discuss how this intervention could be transferable to other contexts.

Informal Coaching

While I did not expect informal coaching to be a part of my intervention, given the need to explicitly teach collaboration skills (Webb, 1995; Fall et al., 1997; Lai, DiCerbo, & Foltz, 2017), this finding does align with literature. In the management world, informal coaching has shown to foster workers' capacities to lead and develop (Hunt & Weintraub, 2002). Guidance for instructional coaches has corroborated the benefits of informal coaching in the education sector, touting that "informal coaching sessions are often the most important conversation you have each week" (Sandstead,

2015). When considering this collaborative project, the time spent after class engaging in informal coaching proved to foster the most important conversations I had with the de facto leaders of Group 1. This time allowed me to foster collaborative discussions regarding the project, recognize issues and challenges they were facing, and offer them support in their pursuit of reaching their goals (Hart, 2005).

To callback a point from Chapter 1, some teachers may only reactively intervene during collaborative learning when an issue arises (Le, Janssen, & Wubbels, 2018). Most of the coaching I engaged in would be characterized as reactive. The goal of using a coaching framework would be to transition from reactive coaching to more proactive, strategic coaching. In order to more effectively and consistently implement coaching into my practice, one framework, in particular, arose from the literature that describes factors to consider regarding the implementation of coaching within one's practice (Peterson, 2009). This framework for coaching and managing performance (Peterson & Hicks, 1996; Hicks & Peterson, 1999; Peterson, 2006) was written apropos of management within the job sector in mind. However, I believe the elements delineated within the framework can be utilized by educators, considering one competency associated with a teacher's pedagogy is their proficiency with classroom management. Within the seven elements outlined in this coaching framework, coaches should: underpin the **coaching relationship** with trust, understanding, and support; offer **insight** regarding areas for improvement to increase efficacy; build **motivation** for coachees to pursue self-development; seek to enhance and offer others the benefits of the coaches resources and **capabilities**; identifies opportunities for coachees to engage in **real-world practice**; offer **accountability** for the implementation of actionable commitments; and make coachees

aware of potential barriers and how to address them within their **organizational context** (Peterson & Hicks, 1996; Hicks & Peterson, 1999; Peterson, 2006). Of these elements of coaching, with this project in mind, I believe that two of the areas in which I need the most improvement are capabilities and motivation. Regarding coaching capabilities, I need to continue growing my resource and knowledge bases in fostering collaboration. For motivation, it never crossed my mind to recommend means by which my students could pursue self-development. While this coaching element may seem more tailored to the job industry, there are developmentally appropriate resources for middle school students. Available resources that come to mind are *7 Habits of Highly Effective Teens* (Covey, 2011). Each of these habits: be proactive; begin with the end in mind; put first things first; think win-win; seek first to understand, then to be understood; synergize; and sharpen the saw would support students in the development of their collaboration skills. Even though I teach STEM, I would like to seek copies of this book to have on-hand for students to read if they are interested. I think the more effective approach would be to incorporate mini lessons on these seven habits (Covey, 2011) during future collaborative learning projects. One idea involves students engaging in dramatizations to model these habits, as well as the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017).

Process Benchmarking

When researching structured benchmarks, the term "process benchmarking" populated my search queries, often coupled with project-based learning (PBL). To integrate process benchmarking into projects, one needs to engage in the backward design (McTighe & Wiggins, 2004) of the project, which means to "begin by deciding what the final product will be, ask what knowledge students will need to master, [and]

determine what skills will need to develop in order to complete this final product" (Pieratt, 2018, para. 4). The backward design process (McTighe & Wiggins, 2004) can allow for the scheduling of benchmarks, which are "the digestible chunks that break down your project and allow students to provide you with deliverables" (Pieratt, 2018, para. 9). Designing for periodic submissions could help alleviate issues of pressure at the end of a project because the project is chunked and would allow for multiple opportunities for students to receive support and feedback throughout projects (Pieratt, 2020).

This finding aligns with the literature regarding PBL. While designing both the student project and this study, the scope of my focus became so myopic concerning the details of DGBL, I neglected to examine the overlap of the student assignment with PBL and what factors truly make for a cogent PBL opportunity. In collaboration with my adviser, it became apparent that this project aligned with PBL and aligned with elements of the gold standards of PBL (Larmer, Mergendoller, & Boss, 2015). The seven essential project design elements that comprise the gold standards of PBL are as follows: a meaningful, developmentally appropriate, **challenging problem or question**; rigorous, **sustained inquiry**; **authenticity** via real-world connections; **student voice and choice**; student and teacher **reflection** on the learning; **critique and revision** for the purpose of students ameliorating their process and products; and publishing or displaying a **public product** (Larmer, Mergendoller, & Boss, 2015).

Of these gold standards, two standards could have been satisfied more fully. For the first gold standard on which this project missed the mark, I believe it is debatable whether this project design embedded rigorous, sustained inquiry. Students engaged in

interpersonal communication and often asked each other questions. However, I would concede that the questions they asked each other, or questions I asked while coaching or collecting data from them, rarely required a substantial depth of knowledge to answer them. The other gold standard I believe this project could have better aligned with is the reflection standard. While the participants in Group 1 reflected on their efficacy and project activities, the questions did not necessarily require critical thinking. Additionally, Groups 2 and 3 were not required to reflect on any aspect of the project at all. In the future, I will focus on integrating the gold standards I did not satisfy with this project into future projects going forward. Additionally, I will utilize the gold standards of PBL intentionally in future project design efforts.

Transferability

While the aim of action research is not to produce generalizable findings from a study sample to a population (Herr & Anderson, 2015), the findings of action research can be transferable. According to Lincoln and Guba's (1985) insight on transferability, "the burden of proof lies less with the original investigator than with the person seeking to make an application elsewhere" (p. 298). Though not flawlessly, I have conducted this study according to the goals of action research (Herr & Anderson, 2005). These goals are married to five types of validity, which are discussed later in more detail in my reflection on this study's methodology. External validity, also known as generalizability (Efron & Ravid, 2013), is not one of the goals of action research. The readers of this action research study and those to whom the research findings are presented must answer the question of transferability.

While this study may have taken place within my middle school STEM classroom, the lessons learned are not necessarily limited in their applicability solely to my classroom context. Through the successes, potentially relatable failures, and learning opportunities that have developed as a result of this study, I have been empowered to function as a curriculum leader. The goal of this action research study was to grow in my capacity to facilitate collaborative learning to more effectively equip students with the tools to be successful in a society that is advancing at an overwhelmingly fast pace. Society has created a need to foster the 4Cs 21st-century skills (P21, 2010), the four skills that comprise our district's learner profile. I can offer insight to colleagues in my local setting and within my district to foster collaboration skills and best practices regarding DGBL, CDGBL, and PBL. I would opine that educators from primary, secondary, and higher education could transfer the findings from this study to their respective contexts. The findings, and the implicated frameworks, share developmental appropriateness and applicability in classrooms for learners of all ages. There is potential for these findings to transfer to the education technology (ed-tech) sector as well due to the rise of ed-tech companies and the need for curriculum development managers.

Reflection on Methodology

As discussed in Chapter 3, Herr and Anderson (2005) hold that for action research to be valid, the criteria or goals that should be satisfied are outcome, process, democratic, catalytic, and dialogic validity. In this section, I will offer a reflection on my study methodology by first addressing each of the goals of valid action research as outlined by Herr and Anderson (2005), followed by offering ruminations concerning both the limitations and delimitations of this study.

Outcome validity involves "the generation of new knowledge" (Herr & Anderson, 2005, p. 54). Before I conducted this qualitative self-study, there was a need for me to gain insight, from the literature, from my students, and from within myself, as to how I can better foster collaborative learning. The use of a collaborative framework had not previously guided my facilitation of collaborative learning. There was also a gap in the literature concerning the use of the elements of an effective collaboration framework (Lai, DiCerbo, & Foltz, 2017) used to guide the management of collaborative work opportunities. This gap in the literature was not reason enough to choose this collaborative framework. I also chose it because, more importantly, it served as a concise, inclusive framework for situating the group project assigned during this study. Therefore, the research I conducted in the literature review alone augmented my knowledge base. The findings from this study can foster new knowledge within other educators because readers will be able to learn from my successes and failures. Furthermore, these findings can help readers to learn about literature regarding informal coaching and process benchmarking that they may not have previously considered. Most importantly, I believe the data suggest that some of the students within Group 1 may have generated new knowledge and gained valuable experience on how to collaborate more effectively.

Process validity is “the achievement of action-oriented outcomes” (Herr & Anderson, 2005, p. 54). While the outcomes that have come from this study are actionable, as evidenced by the limitations of this study, the process in which the study was carried out could have been better. This study’s findings, and the literature relevant to the study findings, suggest that my project design could have been stronger. It should

not have taken a research study to realize that a framework for PBL should have been utilized to design a more effective PBL opportunity. My review of the literature could have been more efficient had I broadened the cache of search terms I utilized. For example, at one point, I experienced a time in which it was difficult to find useful literature because I primarily used the term “collaborative learning.” It was not until I broke the concept down to what it is more commonly referred to, often referred to as group work, that I began finding useful literature on collaborative learning again. Also, I should have utilized the data from the survey administered prior to the intervention to better inform said intervention. I should have utilized the same questions in order to administer a post-test after the conclusion of the intervention.

Democratic validity is "the education of both the participants and myself" (Herr & Anderson, 2005, p. 54). This study was ultimately about improving my practice to better serve my students. To that effect, it was important to me that I involved my students in decision making when it came to the project design. Before starting the intervention, I garnered feedback from my students regarding the concept I had in mind for the project design they would complete during the study. As a validation of my students' collective voice, my project's design changed based on their feedback. Fittingly, my practice will change for the better going forward as a result of what I learned from my students, and we all learned as a result of this study.

Catalytic validity is achieved when the study produces "results that are relevant to the local setting" (Herr & Anderson, 2005, p. 54). I believe that catalytic validity was achieved because, from this point forward, the local setting which served as the context of this study, can no longer remain a learning environment solely during designated class

times and tutorial sessions. The passing period, or the time between class periods, is too valuable. This time could be leveraged during my future group projects in order to maximize the possibility of achieving positive collaborative outcomes.

Lastly, an action research study achieves dialogic validity when it features "a sound and appropriate research methodology" (Herr & Anderson, 2005, p. 54). This type of validity speaks to the goodness of action research, which "uncovers what people believe - it uncovers a variety of subjective truths. Goodness is judged by the degree to which the researcher explores the full range of beliefs and presents them clearly objectively" (Marshall, 1989, pp. 7-8). There were multiple perspectives from multiple students sharing multiple truths, and goodness is embedded in this research in that I objectively and accurately portrayed what students believed to be true (Smith, 1989). This is not only true of the beliefs of my students, but also the perceptions of my committee concerning my research. Peer-review ensures that action research, or any research endeavor, is conducted in a manner that reflects goodness and is designed in a sound, appropriate manner (Anderson, Herr, & Nihlen, 2007).

The action researcher cannot engage the research endeavor without introspective self-analysis. As one who engaged in action research, the first participant or subject in my research was me (Whitehead & McNiff, 2006). The nuances of my pedagogy, my professional perceptions, my personal beliefs, and biases were reflectively brought to the forefront in order for the qualitative nature of my research to possess reflexivity (Rallis & Rossman, 2012). This contemplation is paramount if researchers are to maintain true subjectivity (Efron & Ravid, 2013), less the researcher risk "influencing the research process and compromising the credibility of the findings" (p. 57). Regarding

subjectivity, I transparently reflected on my positionality in the first and third chapters of this dissertation. Being a self-identified "gamer" never disqualified me from executing this study because the focus of the study did not concern the efficacy of DGBL in the educative context. Rather, it focused on the overlap of a collaborative learning framework with DGBL in order to augment my capacity to foster effective collaboration skills.

Cultivating a safe, ethically aligned research context was of the utmost importance. I worked to: secure my administrator's endorsement to conduct my study (Samaras, 2011); utilized pseudonyms for participants to ensure the confidentiality of all data that was collected and utilized (Efron & Ravid, 2013); made sure to not include a student in the participant group who did not want to participate (Mertler, 2014); and did not compromise my occupational duties as a practitioner (Efron & Ravid, 2013).

Limitations

Limitations of a research study "are factors, usually beyond the researcher's control, that may affect the results of the study or how the results are interpreted" (Baron, 2008, p. 4). Chapter One briefly mentioned the limitations of this study: the diversion from the initial station rotation plan; the timeframe and scope of the project design; and the inability to recover Karen's semi-structured interview when I saved the recording.

When the plan changed regarding how the students in my class would work on their projects, I believe this adjustment predetermined Groups 2 and 3 would have a greater likelihood of experiencing less success on this project than they could have had by rotating through stations. Rotating all students through the stations would have allowed me to provide more support for each of the groups. The literature would suggest

that my lack of consistent presence and support for each of these two groups likely inhibited the quality of their collaborative work (Chiriac & Granström, 2012).

Another limiting factor is the 10-day timeframe and overall scope of the project. Students had expressed concerns to me regarding the scope of the project in relation to the potentially unworkable timeframe. They raised concerns that the project requirements and the time constraints limited what ideas they could integrate into their project. With this in mind, in hindsight, I would have needed to have given students more time to complete the project, or I would have needed to change the project design more truncated in scope.

Lastly, overwriting the recording of Karen's recording cost me valuable semi-structured data. All of the semi-structured interview recordings were saved to my iPhone as "New Recording," followed by a number corresponding to the order in which the audio file was recorded. When I attempted to rename the files, I mistakenly renamed the files to where Karen's interview was overwritten and became the second copy of Ivy's interview. I made this error at the expense of losing valuable semi-structured interview data, which included Karen's perception of a breakdown in communication she was involved in towards the end of the study. In hindsight, I wish that I had approached Karen about her willingness to be interviewed again.

Delimitations

Given what this study could have looked like in scope and design, I believe it is important to discuss the delimitations of my study. According to Baron (2008), delimitations are study factors that researchers have some measure of control over that

are implemented in order to manage the scope of the study to keep it feasible, focused, and manageable.

The dissertation which inspired mine (Morgan, 2015), studied the use of Minecraft's multiplayer gameplay in developing students' 4Cs 21st-century skills, including creativity, critical thinking, communication, and collaboration (P21, 2010). Participants in her study lacked equitable access to technological infrastructure and materials in some of their primary languages, which led to the attrition of five of her participants, bringing her number of participants down from 15 to 10. In my ignorance, I initially mistook her sample size as a limiting factor in her study. With her study in mind, I wanted to implement my study to assess the use of *M:EE* in fostering all of the 4Cs skills while also allowing students from all six of my classes to participate in my study. This undertaking would have potentially led to managing data from upwards of approximately 120 participants in this research endeavor.

Per guidance from my advisor, I finally began to see the need for the implementation of delimiting factors to refine the focus, ensure the feasibility, and manage the grandiose scope (Baron, 2008) of my initial conceptual framework of this study. With this wisdom in mind, I embedded delimiting factors into my study to ensure that I would only need to collect and analyze data on only one of the 4Cs skills from a small group of student participants from only one of my classes.

Implementation Plan

As a result of this study, the problem of my practice has come into focus. Knowing what I know now, I need to address two underlying problems within my practice. From a curriculum standpoint, I need to strengthen my project designs.

Concerning my pedagogy, my classroom leadership during collaborative learning opportunities needs to be more hands-on. My projects need to be anchored in a research-based framework, such as the gold standards of PBL (Larmer, Mergendoller, & Boss, 2015). Furthermore, the projects I design need to feature process benchmarking to mitigate issues of building up at the end of projects and be smaller in scope to increase the feasibility of project completion. Future projects need to be more rigorous and feature more opportunities for reflection.

When grouping my students in the past, I would generally have groups of 3-4 students working together. In effect, I would have approximately 7-8 different groups to manage during collaborative learning. At the time, I did not realize that this likely created an equity issue in my capacity to provide more coaching and hands-on leadership for all of my student groups where I was able "to 'read' the group's needs and be accessible for consultation" (Chiriac & Granström, 2012). In the future, I will be looking to provide collaborative learning opportunities in a station rotation format, with fewer groups in order to be more available to support and coach all of my groups more consistently and equitably.

For future action research, I would want to investigate a similar question as to the RQ that drove this research but with a better design. The project design would be smaller in scope, feature process benchmarking, allow students to go through station rotations in which they would receive more teacher coaching. Regardless of whether I met with each group during class due to the station rotation order, I would seek to briefly meet with the leaders from each group after class to discuss their projects, provide coaching, and offer feedback. I would likely use the same data collection instruments and tools. However, I

would reuse the pre-intervention survey questions in the administration of a post-intervention survey to determine if the participants' experience during the intervention changed their views regarding collaboration skills.

Conclusion

Meeting the needs of 21st-century learners is inseparable from the requisite presence, influence, and guidance of educational leaders who are in tune with the demands of the 21st century (Soulé & Warrick, 2015). Before this study, I was in tune with the need, but not necessarily the knowledge on how to more effectively augment my students' 21st-century skill sets, specifically their collaboration skills. The RQ that drove this study was: To what extent can I foster effective collaboration among my middle school students through the use of an instructional planning framework for collaboration and the strategies associated with digital game-based learning? As a result of this study, I believe that I created more questions than one answer. As an educator, did I grow in my capacity to foster effective collaboration skills? I would say yes, but I cannot objectively say that I implemented this study to its potential. While the intervention was implemented with the two groups that did not participate in this study as well, I would have liked to have given their groups more support, as it proved difficult balancing the need to take notes to inform my reflections and supporting each group as equitably as possible. The data would suggest that a handful of students in the study grew in their capacity to collaborate, but I needed to do a better job in reaching my quieter students.

Despite my dissatisfaction with how my study came to fruition, overall, I was able to explore a prevalent problem of my practice being the difficulties associated with collaboration from both the teacher perspective and the student perspective. I explored

this issue through an experiential, humanistic lens. My career experiences have shown that teachers are likened to maintenance workers, except our tool kits contain ideas, strategies, and frameworks. In order to better facilitate collaborative learning, a tough job without the proper tools, I needed a new set of tools. I had already learned that DGBL by itself could not fix the problem. For this particular study, the new tool I utilized was the framework for the elements of effective collaboration (Lai, DiCerbo, & Foltz, 2017). While this helped to mitigate the issue to a certain extent, other problems have presented themselves, and I will like to further engage in professional development and action research to bring more satisfying results to fruition. I recognize the need for more tools. More research will be necessary for selecting and applying these new tools. Through this research experience, I am convinced that there will always be leaks or holes within my practice. This experience as a practitioner-researcher has helped instill within me the confidence to professionalize my craft. My dissertation equipped me to strategically and methodically isolate and address problems within my practice. This ability is vital because the real issue is not when teachers have a problem in their practice, but rather when they do nothing about problems within their practice.

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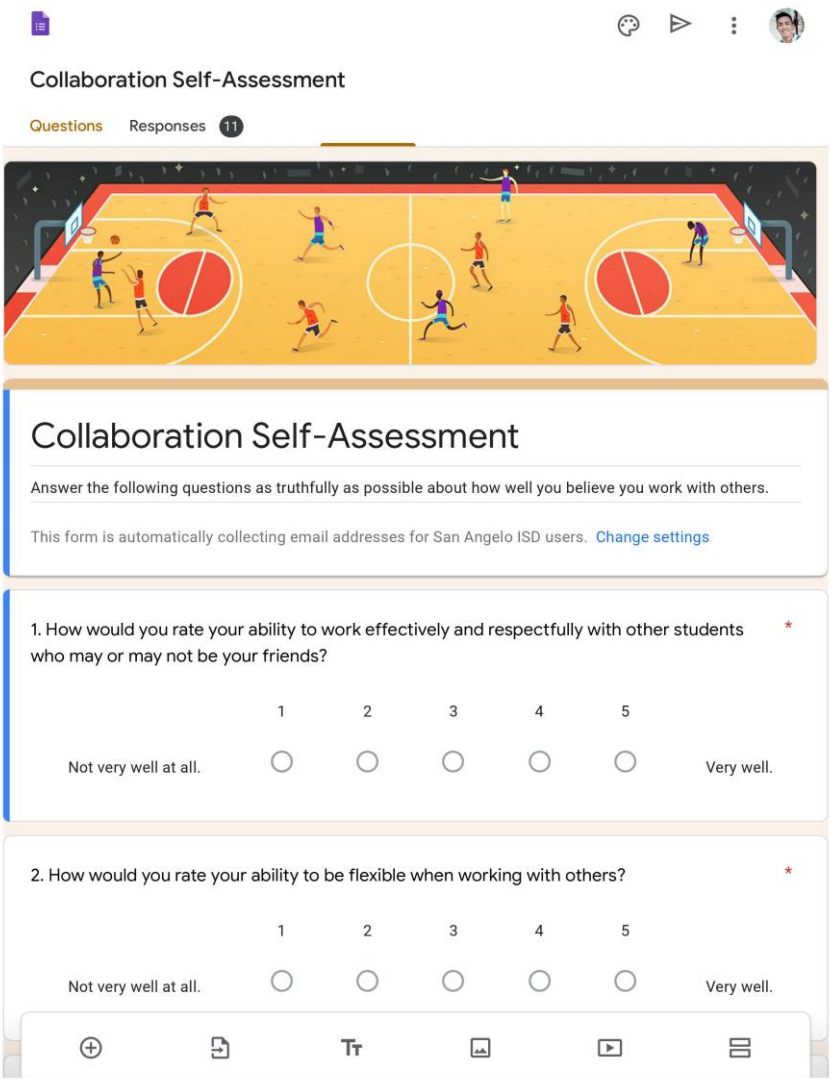
APPENDIX A

PRE-INTERVENTION SURVEY



3. How would you rate your willingness to compromise when students have ideas that are different than yours? *

	1	2	3	4	5	
Not very well at all.	○	○	○	○	○	Very well.

4. How important do you believe it is for other group members to do their fair share of work when working as a team? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

5. How important do you believe it is to plan out a project before beginning to work on a group project? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

6. How important do you believe it is think about what you say before you say it when working with others? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

7. How would you rate your willingness to help other group members understand what needs to be done when working in groups? *

I am never willing to help other group members.	○	○	○	○	○	I am always willing to help other group members.

8. How would you rate your desire to take the lead when working in with others? *

	1	2	3	4	5	
I never want to take the lead when working with others.	○	○	○	○	○	I always want to take the lead when working with others.

9. How important do you think it is to stay organized when working with others? *

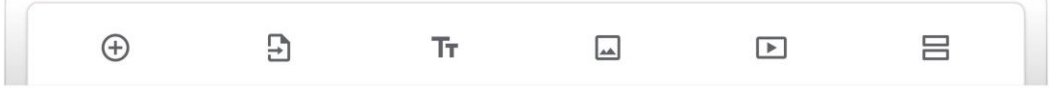
	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

10. How important is it for each group member to have certain jobs or roles when working with others? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

11. How important is to stay on task when working with others? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.



	1	2	3	4	5	
I am stay off-task.	○	○	○	○	○	I am always on-task.

13. How important is it to brainstorm and discuss everyone's ideas before beginning group work? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

14. How important do you think listening is when working with others? *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

15. How important is it to help produce high-quality work when completing group *

	1	2	3	4	5	
Not very important at all.	○	○	○	○	○	Very important.

APPENDIX B

EXIT TICKET SURVEY

Exit Ticket

Answer the following questions about your time today working with your group members. Be as truthful as possible.

* Required

1. Email address *

2. 1. On a scale from 1-5, how would you rate the progress your team made today on the group assignment? *

Mark only one oval.

	1	2	3	4	5	
We did not make any progress.	◯	◯	◯	◯	◯	We made great progress.

3. 2. Why did you answer the way you did on Question 1? *

4. 3. On a scale from 1-5, how would you rate your team's communication today on the group assignment? *

Mark only one oval.

	1	2	3	4	5	
We did not communicate well at all.	◯	◯	◯	◯	◯	We communicated very well.

5. 4. Why did you answer the way that you did on Question 3? *

_____

6. 5. On a scale from 1-5, how would you rate how your team handled disagreements or conflicts (fights) today on the group assignment? *

Mark only one oval.

- ◯ 1 - We did not handle conflict well today.
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 - We handled conflict really well today.
- ◯ We did NOT have any conflict today.

7. 6. Why did you answer the way that you did on Question 5? *

_____

_____

_____

_____

_____

APPENDIX C

PRACTITIONER-RESEARCHER REFLECTION QUESTIONS

Pre-Lesson Reflection

1. What aspect of collaboration am I focusing on today?

2. What will students be doing?

3. What will I be doing?

4. What is the rationale for this plan?

5. What predictions can I make about what will happen?

6. What am I unsure of?

Post-Lesson Curriculum Reflection

1. Given the lesson plan/curriculum design, what did I intend?

2. What actually happened?

3. What will I do next?

Post-Lesson Teacher Moves Reflection

1. How did my teacher moves (pedagogy) support students in Group 1 in meeting their objective(s)?

2. Discuss how effective your teacher moves (pedagogy) were in managing any off-task behaviors with Group 2?

3. How did my teacher moves (pedagogy)?

APPENDIX D

SEMI-STRUCTURED INTERVIEW PROTOCOL

- Here is a picture of each of the mansions. If collaboration is working with others towards a common goal, what do you think each mansion says about how each group collaborated?
    - What makes you think that?
- The elements of effective collaboration are interpersonal communication - talking with each other, task management - what needs to get done and who's working on what, and conflict management - working through the disagreements, being flexible and compromising
    - How well do you think your group communicated?
    - How well do you think your group was with task management?
    - What about with conflict management?
- This project wasn't your typical group project. You and your group had to collaborate while working on a video game:
    - How do you normally feel about collaborating on group projects?
    - How comfortable are you with playing multiplayer video games with others?
        - What games do you play with others?
        - When you play video games with others, do you normally play in person or through online gaming (i.e. XBOX Live or the Playstation Network).
        - When you play online, how do you normally communicate (i.e. emotes, text chat, or voice chat)?
        - What effect does communication have on your multiplayer gaming experiences?
- While collaborating on the project in MC:EE, what challenges did your group face?
    - How did you work through those challenges?
- Besides the resources that I posted on Google Classroom (example videos, the steps of the Engineering Design Process, etc.) what resources could I have provided to make your collaboration process better?
    - What do you think I could have done (besides encouraging you to work together, think before you speak to avoid conflict, and to make a plan to help with your task management) to make your collaboration process better?
- Overall, what do you feel are the advantages or disadvantages of using video games for school assignments?

APPENDIX E

DATA RELEVANT TO SCS

Table A.1 *Data relevant to SCS*

Data Source	Statements
Exit Interview	• [regarding task management] "...We would just like get it done...step by step. The task carrying, that was good." - Abby • [regarding task management with a blueprint] "It was pretty easy. And if all the things were taken...we saw the next - find something else to do." - Bobby • [regarding communication] "Because we did communicate and we didn't have to communicate very often because we all had our set tasks." - Claire • [regarding task management] "...everyone had their own tasks...everyone knew what they were doing...we had a game, like a main plan." - Claire • [regarding conflict resolution and their main conflict] "So then they [Ivy and Matthew] started to like, argue and it was almost gonna get to yelling, so I kind of stepped in...and got them to calm down and it worked, which was a little scary. I explained what she [Ivy] meant and how it maybe might have come across the wrong way, but she didn't mean it like that. And it solved it." - Claire • [regarding task management] "Oh yeah, we did a great job on that...we were giving jobs…" - Ivy • [regarding conflict resolution] "...the times we did have conflict, we would solve it...we would just like calm down...take a breather...open our minds a bit and just say, 'Okay, you know what, you're right.'" - Ivy • [regarding conflict resolution] "...we had different ideas but then sometimes... we would get some ideas that this person had and some of the ideas that the other person had and we would combine them." - Polly

Project Artifacts	• "Ours looked like we had it, like, some sort of plan and that like we were able to like talk to see...what theme we wanted, or like what we wanted for the house." - Polly • [regarding participant mansion compared to others] "[Ours is] more finished up." - Claire • [regarding group 3's project] "...they didn't put a lot of thought into it." - Ivy • [regarding group 2's project] "...it looks sort of half finished" - Ivy • [regarding her group's project] "We gave ideas, and we made it...different, we made it stand out, we made sure it was more than the original, we made sure it was unique, and we put a lot of effort." - Ivy • [on what the other projects say about how well they collaborated] "I think some of the groups didn't really communicate as well as others. They just did whatever they wanted to. So they didn't get as much done." - John • "We got a lot more done...a main thing that my group tried to do was we tried to stay on the same page…" - Matthew
Teacher Reflections	• [Day 1] "Of the 10 group members, all 10 group members communicated in a positive manner on at least one occasion." • [Day 2] "Group 1 was very productive with most students communicating as necessary." • [Day 3] "I know that 8/11 group 1 members engaged in respectful or positive task-related interpersonal communication." • [Day 3] "One idea that the members of group 1 came up with is that since their group is comprised of two tables that were put together for this project, and since normally our group projects have 7-8 groups formed by table groupings, this particular project group is not accustomed to working together. I talked to Claire, Matthew, and Polly yesterday after class while they plugged in my iPads. They talked to each other and to me about whether intermingling the members of the two different table groups would help to boost their communication in Group 1 overall. I think their idea was mostly successful." • [Day 3] "After class, I met with Claire, Polly, and Matthew, the de facto leaders as they helped plug in the iPads. I stressed the importance of completing the blueprint and how it would aid in their task management moving forward. They were agreeable and Polly took on the challenge of working on the blueprint." • [Day 4] "8 of the 11 members of group 1 were present to discuss ideas about the building materials for the exterior of the mansion." • [Day 4] "Of the 8 group members who were in attendance for the whole class, the only group member who didn't share an idea for

the exterior look of the mansion was Bobby, who tends to be a bit quiet anyways. Polly finished the blueprint, which will be helpful as the group starts trying to manage who will be working on what rooms when the reno transitions to the interior of the house. Matthew moved closer to Bobby and John in order to communicate with them as they started exterior demo and adding the new blocks the group discussed."

- [Day 4] "After class, Abby and Claire said that Group 1 'got a lot done today.'"
- [Day 5] "Class Feedback Slides included:
    - Reminders that the groups (specifically groups 2 and 3) need to communicate more.
    - The observation that groups (specifically 2 and 3) are demoing and building without a plan
    - Metacognitive modeling for thinking before they speak to their group members.
    - Reminder that students often get off track when they perceive they don't have anything to do - a blueprint can help with this [showed group 1's blueprint that Polly drew.]"
- [Day 5] "The groups were in awe of the progress that group 1 had made."
- [Day 5] "Group 1 - 11 out 11 members remained on task for the duration of class today."
- [Day 5] "Group one was so locked in on their plan of action and their current tasks at hand, I had difficulty tearing them away from their work to complete their exit tickets today. I heard several kids tell me ,'Nooo' or 'Hold on, I'm almost finished with X.' They did a great job."
- [Day 6] "Members of Group 1 convened and discussed ideas for the interior. While they discussed aesthetics and materials, one thing that stood out is how they used the blueprint that Polly had made to aid in the planning and task management process."
- [Day 6] "At one point, Bobby quietly communicated to Matthew that they might want to move the grand staircase from in front of the main entrance on the 1st floor to closer to the back of the first floor to open up that space. Matthew encouraged him to speak up to share the idea, and everyone was in agreement."
- [Day 6] "9/11 of the group members shared ideas. As members shared a vision for a garden on the roof, the rest of the group bought in and committed to getting it done."
- [Day 6] "Group members were highly engaged today. When I asked them about how hard it was to pull them away from their work to complete their Day 5 exit tickets, they explained that it was because they wanted to finish their tasks because they were

	anxious to see how everything would look. They were definitely highly motivated." • [Day 7] "The group shared ideas to begin formulating a plan for the upper floors." • [Day 7] "They divvied up rooms, as well as assigned some students to work on making modifications to the exterior walls and windows, and the glass dome around the rooftop garden." • [Day 7] "I enjoyed seeing the leaders step up today. Polly asked Abby for interior decoration ideas, and before long, Abby was asked for ideas from other group members. Bobby's iPad battery was running low, so he moved by the nearest wall outlet to charge his tablet. Matthew encouraged John to move with him to sit by Bobby. As Bobby was working on the stairs, Matthew was working on the library. Matthew asked Bobby for feedback and if he had any ideas for some of the design choices he needed to make to put the finishing touches on the library. Bobby quietly shared his ideas with Matthew." • [Day 7] "When it was time for the group to work on their exit tickets, Matthew, Abby, Karen, Polly, and Claire all took longer than 2 minutes to end their current tasks in order to begin their exit tickets. When Claire finally tore away, she grabbed Chromebooks for each of the group members who needed Chromebooks so that they could work on their exit tickets." • [Day 8] "Karen complied but started to shut down by being quiet for the rest of the period. As Karen filled out her exit ticket, she was typing as hard as she could on the keys. Abby and Claire cued into this and attempted to put Karen at ease through the use of humor, asking Karen to please hurt the computer. She smiled and her anger seemed to subside a bit." • [Day 9] "This group was fired up today. Ivy encouraged the group as a whole to communicate with one another since time was short." • [Day 9] "Everything seemed to be going smoothly until Ivy said that she felt that the sub group that Matthew was a part of wasn't doing anything. Matthew took offense and stood up for his partners and tension started to build. Claire stepped in to mediate the issue, explaining what she thought each student was trying to say. She took a charged situation and was able to diffuse it very effectively." • [Day 10] "Bobby brought up a conflict about the carpet and the group resolved it by agreeing to get rid of it." • [Day 10] "Claire worked to involve Amanda and Elizabeth today."
Exit Tickets	• [Day 1] "...we already brainstormed an idea and got the [tasks] we needed to do done." - Matthew

- [Day 1] “Because we talked a lot about how the project is going to go and what we are going to do.” - Matthew
- [Day 1]”We all took ideas that we had and we all pitched in.” - Abby
- [Day 1]”Because we were able to talk about every idea we...discussed it in a good manner.” - Polly
- [Day 2] “We did communicate but not much because we had set jobs.” - Claire
- [Day 2] “We were all calm and cooperative. We had no disagreements and did our tasks with no complain.” - Ivy
- [Day 2] “We did not disagree on the work we had to do and talked each other with no problem.” -Polly
- [Day 3] “We wrote down ideas for future progress.” - Ivy
- [Day 3] “We figured out a way to work much better and communicate more.” - Polly
- [Day 4] “...we got a lot more [done] and we have [a] game plan.” - Abby
- [Day 4] “Everyone had a job and we all agreed on what we want to do on the house.” - Claire
- [Day 5] “We had good communication but we didn't need to talk [much] because everyone had their own job.” - Claire
- [Day 6] “We talked about what type of roof we wanted and everyone had set jobs.” - Claire
- [Day 6] “We all communicated well with no arguments and made compromises.”
- [Day 7] “We all shared ideas.” - Claire
- [Day 7] “Everything works out well and we always make compromises.” - Ivy
- [Day 8] “We got most the walls done and have the 1st floor game plan.” - Abby
- [Day 8] “We just found out that different floors had different materials for the walls.” - Claire
- [Day 9] “As I have previously said because of the problem of communication and the stress of the dead line being tomorrow the three of us [Claire, Ivy, and Karen] were very stress[ed], but everyone seemed to be in there own world and I just had to stop a fight between Ivy and Matthew due to miscommunication.” - Claire
- [Day 10] “We all had set jobs and were focused on our tasks.” - Claire
- [Day 10] “We shared more ideas and talked more often.” - Ivy
- [Day 10] “We listened to all of each other[s] ideas.” - Abby

APPENDIX F

DATA RELEVANT TO CSC

Table A.2 *Data relevant to CSC*

Data Source	Statements
Exit Interview	• "You're showing there's more of a possibility of learning, like there's not just one way. There's like multiple, you're showing like kids there's multiple ways of doing things. Instead of that just one way and like it it makes students more engaged because instead of a textbook or like a worksheet, it's actually having fun while you're still learning. Like that's one of the good advantages. And kids would be interested more when it's game like gaming and having fun because like they're enjoying it instead of like paper and a pencil you know." - Polly • "This was honestly like a really good project. Like. I honestly did enjoy it. It was sometimes stressful at the very end because like that's when everybody was starting to get like tempered and all that...it was really fun. I liked it. It was enjoyable. Like it was more like you had to be more creative when you had to do this project. You had to think. You had to talk more and be more creative. That was really nice." - Polly • "Better? Uh - I don't know, it was pretty good. Like, I think I wouldn't have done that if I was a teacher. Like I wouldn't have like put all that stuff, I would have been like, "just get in groups and do whatever you think is best for your house."- Abby • "Well advantages is like, it's it makes it funner than doing it on paper." - John • "I mean I guess you could have tried. Like. I guess showing a video of a construction mainly building a house or something. And like the way he thought of it, like, or maybe an episode from like Fixer Upper, how they saw, like, "Oh we can turn this kitchen into like a grand kitchen with an island, you know. Just like cause like they showed the blueprints sometimes and then they show like like kind of like an animation of what they imagined the house to be." = Ivy

- “Resources - those were actually really good ideas and kind of helped, like, with some of the different ideas.” - Claire
- “Sometimes, people can get more creative in video games than they would like with the other stuff we normally do. So like, this could help like bring out the more creative stuff because you have more materials I guess.” - Claire
- “...technically everything you gave us is all we really needed.” - Bobby
- “Maybe some students won't like, like they don't like games that you have for them to play. Like some teachers, they give like to too much educational games, like you really don't do anything but add numbers.” - Bobby
- “Because if you have like paper, it would be a lot harder to draw and stuff. Like, it would be harder to make 3D things.” - Amanda
- “That it's more fun for the kids, like it's more fun because like it's modern day. Like we know what we're doing, it's like, it's like we know what this stuff is and you're trying to like incorporate it, and it's like really meaningful to us like we know what this is, we like this, we can do it.” - Abby
- “ It's just fun. It's just fun for us because sometimes they [other teachers] just stick us in front of a computer and say, "Listen to this video and hope you get something out of it." Or like, "read this book and hope you get something out of it, and like answer these questions." But then if it's like incorporating a game into it or something, it's fun for us, like we actually want to do it, we actually want to learn it and it's just better.” - Abby
- “The advantages would be that, for me it helps, like I learn quicker when I do stuff like that.” - Aaron
- “Well maybe I feel like like what a good idea would be like if you ever do this project again in the future. This would be a good idea. Like you could try showing future groups a photo of what...teamwork looks like and communication like you can show this photo and then you can ask the class, "Do you think they talked a lot? Do you think they had bigger ideas?" And then show the class something as grand or something like this. And then something as grand as this.” - Ivy
- “And then ask them, this team communicated, like this team had ideas, this team they talked about the little things, like they looked like they were having problems. You know I would suggest show that so that they had like a bigger aspect that they can reach higher heights because I know every group they were afraid of making something too big because of the deadline again. So, I feel like showing examples of what, of like what communication can do next to what like arguing can do...would be a better idea.” - Ivy

	• "The advantages most likely because like we can all relate to video games. It's something that we're going to be hands on and we're going to be active in our minds about it because if you give us a piece of paper and tell us to like make a group essay or something, then yeah we're not like [laughs] we're not going to do that like it's gonna be, we're not gonna be active in our minds but in video games it's fun. So we're like, "hey it's Minecraft. So we're going to be more active in the atrospect [< not an actual word] of the game. And another would be, I guess like we're going to be talking more which means we're going to be giving more ideas." - Ivy • "Because I know like and also it adds an entertainment. Cause I know my math teacher she did like she did - we played a game like - I forgot it was like this wizard game and like it was actually it was actually pretty fun because it was a competition and you had to like complete quests and all that like you had to do at times you would get to an objective and you would have to do math problems. And so it was pretty fun because then you were trying to figure out what the math problem is and then you'd see your score pop up and you go above someone and then your friend would try to beat you at that." - Matthew
Teacher Reflections	• [Day 1] "Today, students will begin their mansion renovation projects. I will have three groups working on this project. Group 1 will consist of my study participants. Group 2 will consist of students with some teacher presence. Group 3 will consist of students working almost completely independently with little to no teacher presence. Students will teleport to their designated mansion/build sites. They will be allowed to begin working as soon as they are in the correct area. • [Day 1] "I will show the class as a whole the following YouTube after I explain the project directions posted on Google Classroom: https://www.youtube.com/watch?v=APXfjm2qK0Y • [Day 2] "The intent was to check in more with each group to ensure that they were progressing okay. I wanted students to be productive on day two on their renovation projects. I wanted to push for students to utilize project resources that were posted on Google Classroom if they had yet to do so." • [Day 3] "I intended to push the need for the groups to have a plan for their projects going forward. Research has shown that planning, part of task-management, increases the chances of achieving successful project outcomes (University of Leicester, 2009)." • [Day 4] "One of the project requirements for the renovation is to make the mansions feel less dark; to take what's there and make it

better. The original mansion was made with cobblestone and dark oak blocks. This gave the mansions a dark, castle-like, antiquated aesthetic. The group decided to use oak, stone brick, white concrete, and quartz pillar for the exterior. They believed the use of these blocks would give the mansion a more modern, brighter look.

- [Day 5] "I want to offer the whole class feedback on the project because I want to give them guidance. I want to show them what is possible when groups develop a plan and use it to aid in task management. Also, I want to remind them of the project due date next week. The goal is to conduct and finish all renovated mansion tours before the end of next week."
- [Day 5] "Class Feedback Slides included:
    - Reminders that the groups (specifically groups 2 and 3) need to communicate more.
    - The observation that groups (specifically 2 and 3) are demoing and building without a plan
    - Metacognitive modeling for thinking before they speak to their group members.
    - Reminder that students often get off track when they perceive they don't have anything to do - a blueprint can help with this [showed group 1's blueprint that Polly drew.]"
- [Day 6] "I want to be close enough to Group 1 that I can make observations, make comments, and offer suggestions as I try guiding them towards using the effective elements of collaboration. I want the other two groups to have the independence to be autonomous in how they tackle this project. Group 1 will have autonomy in how they approach the project, but they will be held accountable to having an actual plan, which will lend itself to task management. Their leaders will be given insight as to how they can: encourage more introverted group members to communicate more; communicate with and guide their group members more effectively; to aid in their interpersonal communication. I will model for students how they can handle conflict to aid in their conflict resolution."
- [Day 8] "Given instruction about handling conflicts, students will be able to resolve their own conflicts."
- [Day 8] "I intended to aid Group 1 in resolving any conflicts that may arise, as they are fully aware that they are in crunch time now. In my experience, the last few days of projects tend to be the most stressful and, thus, I anticipate this group will have some form of conflict.

APPENDIX G

DATA RELEVANT TO CSP

Table A.3 *Data Relevant to CSP*

Data Source	Significant Statements
Exit Interview	• "I don't really think there is like anything else like you know that you could have done to like you know made it more like a bigger thing is just you had to...take those resources because I know a lot of people like Yeah I know you're giving everyone...thoughts and all that to like think about and I know more my group, we kind of took that more..." - Matthew • "...getting to talk with you and Claire after everyone else was gone, I feel like that that helps to kind of give you all just some feedback on how everything was going and get y'alls insight on what y'all think was going on and what needed to get done." - Me • "And I think that really I liked doing that because I liked getting to see you all kind of step up and trying to make sure that you're you're subgroups were on task and everyone knew what to do and I thought y'all did really well in that in those roles." - Me • "Maybe for the groups like put it more of like a circular way instead of like a square like you know how you put your groups?...So like everyone's like not out and about like they're facing one another you know and they would be able to communicate better and like know what they're trying to do much better when they're closer together." - Polly
Teacher Reflections	• [Day 2] "Two students, Claire and Matthew in particular, have stepped up as leaders in the participant group. I will talk with them after class to gauge where they think the group is and what can help improve their progress." • [Day 3] "One idea that the members of group 1 came up with is that since their group is comprised of two tables that were put together for this project, and since normally our group projects have 7-8 groups formed by table groupings, this particular project group is not accustomed to working together. I talked to

Claire, Matthew, and Polly yesterday after class while they plugged in my iPads. They talked to each other and to me about whether intermingling the members of the two different table groups would help to boost their communication in Group 1 overall. I think their idea was mostly successful. Elizabeth and Amanda were from different tables before this project and were naturally more introverted from what I had observed until they sat together today.

- [Day 3] "After class, I met with Claire, Polly, and Matthew, the de facto leaders as they helped plug in the iPads. I stressed the importance of completing the blueprint and how it would aid in their task management moving forward. They were agreeable and Polly took on the challenge of working on the blueprint."
- [Day 3] "I will follow up with the other groups to see how or if the blueprints are coming along.
- [Day 3] "The best teacher moves I make in supporting Group 1 seem to be when meeting with groups leaders after class...If I want to reach my students in this group, particularly my more introverted participants, this seems to be the most natural, effective means in helping to reach or involve them. Meeting with the leaders of this group after class I believe will prove to be fruitful given the blueprint and the communication we have about their progress now.
- [Day 4] "Being able to communicate with leaders from Group 1 after class has allowed me to know what the students are thinking, how their project is progressing from their point of view, and what is coming up in their plans. Based on their input yesterday, I know that they view the selection of materials for the exterior of their mansions is important to them.
- [Day 4] "With the rainy weather today, everyone was a bit lethargic. At the classes request, I played upbeat music to help elevate the mood in the room."
- [Day 4] "The after class meetings with the kids leading group 1's project continue to be fruitful. The leaders and I had a conversation about how they can keep everyone involved in the project and they continue to make efforts to support the members of their group who due their introverted disposition, may not have their voices heard while working on projects, normally. While Bobby may not have shared ideas for the exterior look of the mansion, Matthew saw to it to sit next to Bobby so that while they worked on swapping out materials on the exterior of the mansion, Bobby (and John) could communicate with him.
- [Day 5] "In showcasing their progress to the rest of the class, I believe I helped to affirm both their hard work and the effectiveness of their collaborative process."

- [Day 6] “When Bobby shared his idea about the 1st floor staircase with Matthew, I asked the two privately what Bobby’s idea was. I encouraged Bobby by saying that sounded like a good idea. I then proceeded to encourage the rest of the group that they might want to hear Bobby’s idea. Bobby shared and they thought it was a great idea. Polly proceeded to make the changes on the 1st floor blueprint. After class, I acknowledged that Matthew was doing a great job advocating for John and Bobby, Polly was doing job interacting with members of both subgroups that comprise their project group, and that Claire was doing well as a leader for the group as a whole.”
- [Day 7] “I will continue supporting the leaders in their efforts to guide the participant group to completing their project while developing their collaboration skills.”
- [Day 7] “After class, I made Claire, Matthew, and Polly aware that based on what I had observed, Elizabeth and Amanda were not having their voices heard and were not engaging with the rest of the group. I challenged them to get their quiet group members to get them to talk. I modeled for them a strategy to get Elizabeth and Amanda talking and/or engaged. I dramatized, “Hey [insert name here]! I’m about to work on [name of task]. What do you think I should do?” or “Hey [insert name here]! I’m about to work on [name of task]. Would you like to help me?” I also warned the leaders of this group that as we near the end of the project, the likelihood of conflict arising would increase. I explained that a lot of conflict can be resolved by being mindful of what you say before saying it, thinking first about how it might be taken, and also trying to see the situation from the other person’s perspective. I was able to model trying to find an agreeable solution to conflicts, such as saying something like “We have 20 minutes left to work. You want to work on the exterior, I want to use that time working together on the interior. How about we work together on the exterior for the first 10 minutes, and then we work the interior for the next 10?” or “You were wanting to use spruce wood for the floors. I was wanting to use birch wood. What if we use oak wood for the floors since its a shade between spruce and birch?”
- [Day 8] “As students were working on the upper floors today, a conflict arose regarding the staircase that Bobby had not only proposed be moved but had been working on. Matthew realized that the staircase would need to be moved...again and that the area the stairs took up needed to be wider to better fill the space on the 1st floor to make it look nicer, and to accommodate a storage room that could be placed underneath. I called Matthew to me when I realized there was a problem. He explained it to me, and I guided him first by telling him that politicians are

	expected to be leaders, but many times, they're better at raising awareness about issues with their rhetoric than actually helping to do something to make a difference. I told him that saying there's an issue can sometimes be lazy - that leaders need to not only say there is an issue, but offer to help fix the issue. I offered him guidance in his approach to Bobby in that he needed to not only tell Bobby what needed to be done, but also offer to help get it done. He did. He told Bobby, and at first Bobby was not happy, but when Matthew offered to help him make the change, Bobby conceded, and everything eventually smoothed out." • [Day 8] "Another conflict came up in that Abby noticed that a room that Karen had worked on was not uniform with some of the design patterns of other rooms on the same floor. It had to do with the walls and trim at the top of the walls. Karen was visibly upset. I reminded Abby of the shortened version of what I had told Matthew. She offered to help Karen make the necessary changes. • [Day 10] "I communicated with the leaders of each group to receive periodic updates on who was working on what, with reminders of the time remaining in class."
Exit Ticket	• [Day 8] "We almost did horrible [with conflict resolution] but Mr. Hooks helped us solve it." - Bobby