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Simulation Video Games as Learning Tools: An Examination of Instructor Guided Reflection on Cognitive Outcomes

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ACCEPTANCE

This dissertation, SIMULATION VIDEO GAMES AS LEARNING TOOLS: AN EXAMINATION OF INSTRUCTOR GUIDED REFLECTION ON COGNITIVE OUTCOMES, by KEVIN RICHARD WOOD, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

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ABSTRACT

SIMULATION VIDEO GAMES AS LEARNING TOOLS:
AN EXAMINATION OF INSTRUCTOR GUIDED
REFLECTION ON COGNITIVE
OUTCOMES
by
Kevin R. Wood

Simulation video games potentially offer students the opportunity to participate in activities designed to bring about higher order thinking. Gee (2005b, 2007) elucidates that without the guidance of instructors, humans involved in a simulation experience have a high probability of finding creative but spurious patterns and generalizations that send learners down miseducative paths. The focus of this study is an examination of the function of instructor guided reflection and prior participant interest and exposure to video games in promoting affective and cognitive learning during participant use of single and multiplayer simulation video games in the classroom. One hundred twenty-eight students enrolled in World History classes at a suburban high school located in the Southeastern United States participated in this research study. Participants completed a survey of their interest and prior exposure to video games, played a tutorial of the simulation video game, played a single player or multiplayer version of the game with or without instructor guided reflection, and completed a posttest of reasoning and knowledge ability. The researcher used independent samples *t* tests, analysis of variance, and descriptive statistical analysis in combination with qualitative methods outlined by Miles and Huberman (1994) to analyze the data. Thomas (2003) described the mixed methodology used to analyze and interpret the data in this research study. Quantitative analysis of the data revealed that participants who engaged in both reflection and multiplayer groups scored significantly higher on posttest of reasoning ability at the

.05 level. Furthermore, qualitative analysis revealed that participants in the multiplayer and reflection treatment groups were more likely to be engaged in the lesson, participate in more cognitive discussions, and made more connections to the large context of the lesson. Participants with a high level of prior interest in video games scored significantly higher on a posttest of reasoning ability at the .05 level of significance and were more likely to participate actively during the lesson. The findings from this study suggest the need for teaching educators to utilize reflective and collaborative practices in the incorporation of digital technology in the classroom.

SIMULATION VIDEO GAMES AS LEARNING TOOLS: AN EXAMINATION OF INSTRUCTOR GUIDED REFLECTION ON COGNITIVE OUTCOMES

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Kevin R. Wood

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CHAPTER 1

THE PROBLEM

The integration of digital technology in the life of the average resident of the industrialized world is changing how humans live, work, and play. This technological revolution has changed how people communicate, how people conduct business, and how schools operate. Because of the technological revolution, productivity has increased dramatically across the globe as the revolution has facilitated the creation of global political communities via the internet (Friedman, 2005). These new digital communities, such as Facebook and Twitter, allow people in the real world to engage in political discourse, instant social interactions, and engage in learning anywhere in the world via a digital device such as a smartphone or laptop. Knowledge of digital technology is quickly becoming an essential life skill for active participation in a society engaged with this technological revolution. The technological revolution that is taking place among the citizens of the world has changed how teachers are prepared to enter the classroom. This societal paradigm shift is forcing social studies educators to adapt their goal of preparing students to become knowledgeable active democratic citizens (National Council for the Social Studies, 1994). In this 21st century world, the goal of facilitating the education of active, knowledgeable citizens requires that social studies teachers educate students to use social studies knowledge within the paradigm of our globalized and digitize world. Students should have active experience using technology within this new paradigm if they are to become effective citizens able to participate in a digital world dominated by

the integration of computer technology into everyday life (Gee, 2005c). When faced with the technological onslaught that is life in the 21st century, many social studies teachers wonder how they can facilitate the development of an educated citizenry.

A method of teaching social studies content in light of this ongoing technological paradigm shift is instruction using simulation video games. Well designed simulation video games potentially offer educators an instructional method that can promote authentic learning. Authentic learning involves the student in real and meaningful learning experiences that expand learning beyond the four walls of the classroom (Dewey, 1916). The use of simulation video games to facilitate authentic learning can motivate students to learn by engaging learners with the critical technological skills essential to becoming active knowledgeable citizens consistent with the purpose of social studies education as outlined by the National Council for the Social Studies (NCSS).

According to NCSS, the purpose of social studies education is "to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world" (NCSS, 1994). This mission statement for NCSS lacks specificity as to how social studies teachers should accomplish this laudable goal of facilitating the education of democratic citizens. This lack of specificity is no doubt an artifact of the often contentious nature of the definition of social studies education. Social studies educators face the daunting task of making decisions about what is the appropriate skill set students need to become democratic citizens. One aspect of this daunting task is that social studies educators must facilitate the learning of higher order thinking tasks that involve students in real world problems and real world tasks that create meaningful student experiences. In applying

this mission statement for the technologically driven modern world, social studies educators must incorporate the use of technology and technological problem solving into their teaching methodologies so that students can be prepared to meet the challenges of the 21st century. The residents of the physical world must be able to engage in this virtual world so that they can become fully functional global citizens engaged in improving their lives and the human condition. Simulation video games potentially offer teachers and students an avenue to facilitate the learning of the skills required of 21st century citizens.

Citizens in the digitized and globalized world of today must be able to analyze and interpret data from a myriad of divergent sources. A variety of informational access devices such as smart cellular phones, laptop computers, portable video game systems, and advanced desktop computers provided users with access to a vast amount of social knowledge that is unedited and created by regular citizens with little formal training in journalism or scholarly skills. In order to participate in a modern digital society, citizens must be able to analyze and interpret information gathered from this vast informational network. Considering the vast amount of propaganda available on the digital networks of today, social studies teachers need to teach students how to find good data sources, how to analyze data, and how to contribute to a digital society. Without training in managing information, citizens are likely to fall victim to propaganda, get rich quick schemes, or any number of informational fallacies available on the unedited virtual world of the internet. With analysis, synthesis, and evaluation skills, citizens can participate in political discourse, fact check informational claims, and build their own virtual communities. Without experience with digital technologies students will not have the ability to navigate today's digital world.

Specific examples of why social studies teachers need to develop students' digital skills are the numerous revolutionary and political movements over the last several years. Twitter and Facebook played important roles in revolutionary movements in Iran, Tunisia, Egypt, and several other nations undergoing various stages of revolutionary movements. A telling indicator of the importance of the internet and especially social media sites in modern day society is that several authoritarian regimes have attempted to curtail internet use in their countries. Revolutionaries in Egypt extensively used Facebook, Twitter, and Google during the revolution. These digital social websites allowed revolutionaries to communicate, plan, and spread their messages to their fellow citizens and the outside world. Digital social websites served the revolutionaries in the Middle Eastern countries much as Thomas Paine's book *Common Sense* served the revolutionaries during the American Revolution. Revolutionaries and politicians have discovered the power of the digital medium and unless students are prepared they will not be able actively participate in society. If social studies teachers are not incorporating digital technologies into their lessons students will be unprepared to experience the digitized world of today. Social studies teachers should provide students with digital learning experiences to facilitate the development of critical digital thinkers capable of separating the fact from the opinion in the digital world of the internet. In a classroom focused on higher order thinking skills, the learner solves complex social problems and is open to collaboration with others from different backgrounds. Today's globalized economy requires workers to be skillful collaborators and effective at higher order thinking tasks. The new paradigm created by the digital revolution required educators to

teach with a focus on higher order thinking skills that enhance the chances of positive learning outcomes for students.

This new paradigm stands in sharp contrast to the technological understanding required of students almost 20 years ago. Consider a typical high school student in 1992, the year before the privatization of the internet. A typical student in 1992 conducting research had to be proficient in using the card catalog system, proficient in finding books or periodicals related to his or her subject, and understand how to synthesize the information collected. The typical secondary student in today, must understand how to use the internet as a resources tool, how to use email, how to determine what sources are legitimate sources, how to participate in internet based communities, and a myriad of other technology related tasks in addition to the critical thinking skill set required of the student in 1992. The technological revolution has exponentially increased the availability of knowledge as well as avenues of political participation. The Presidential candidates in the 2008 election and many other candidates for political office in the 21st century heavily incorporated technology into their campaigns for office. An active democratic citizen in the 21st century must understand how to use and analyze technology in order to succeed in this technologically driven world. The incorporation of lessons using digital technologies is essential to prepare students to navigate the globalized world of today. The use of simulation video games may be an instructional tool that would allow social studies teachers to facilitate the development of higher order thinking skills within a digital medium. The purpose of this study was to investigate how the use of instructor guided reflection during a simulation video game affects cognitive and affective learning among secondary social studies students.

A Brief Examination of Social Studies Education Methods

The NCSS mission statement is the ideal outcome for a social studies classroom, the reality is that many students view social studies as the class where the teacher lectures and the student receives the authoritative information via direct knowledge transmission. Worksheets, overhead notes, teacher lecture, and a reliance on the textbook as an authoritative source of historical and other social studies information are the features of the social studies classroom focused on maintenance of the current social paradigm (Downey & Levstik, 1991; Hood, 1994; Kornfeld, 2005; Kornfeld & Goodman, 1998; Parker, 2003). The traditional social studies classroom discourages critical thinking and reinforces the idea that knowledge is unchangeable and not open to interpretation or criticism. Students trapped in this type of social studies classroom quickly find that they are powerless, bored, and instilled with the viewpoint that social studies is simply a collection of useless trivial knowledge about the gross domestic product or some obscure historical factoid. Students taught in this method develop few skills essential for the empowerment of democratic citizens. Traditional social studies students learn in isolation, spend little time debating the impact and importance of their learning, and do not learn to question the nature of the material they are taught. In short, the traditional social studies classroom is the antithesis of the goal of social studies education as outlined by NCSS and antithetical to the skill set required to facilitate the education of a 21st century citizen.

Since the inception of social studies as a separate subject area of education, there has been an epistemological battle between educators who believe that the public schools should reinforce the dominant traditional cultural paradigm, as typified by the traditional

social studies classroom, and educators who believe that the role of social studies is to facilitate the development of democratic citizens (Bohan, 2003; Bohan, 2005; Ross & Marker 2005; Thornton, 1996; Whelan, 1994). These debates over the nature of social studies education have lead researchers to attempt to ascertain how students learn and understand history (Barton & Levstik 2005; Wertsch, 2000; Wineberg, 2000). While the differences among the various advocates espousing their competing understanding of social studies education is still ongoing and strong, a research based understanding of how students make sense of history and other social studies has led many social studies theorists to advocate teaching for understanding. In order to teach for understanding, social studies teachers must facilitate the education of a democratic citizenry by engaging students in active learning that promotes higher order thinking (Hood, 1994; Newmann, 1992; Thornton 2005). Furthermore, in the 21st century, facilitating the learning of modern participatory citizens requires the authentic learning of technological skills (Prensky, 2001). Educational simulation video games potentially offer teachers a vehicle for authentic 21st century social studies education.

As social studies teachers struggle with their efforts to agree on what skills and knowledge are necessary for the maintenance of a democracy, Thornton (2005), highlights negative educational gatekeeping as a very real threat to the development of authentic learning experiences for students. According to Thornton, teachers can be gatekeepers for good, keeping the bad out of the classroom, or gatekeepers for bad, keeping information from students. Thornton focused on the dichotomy that has existed between those who advocate the social sciences and those who advocate the social studies. The dichotomy that exists between educational theorists of social sciences and

social studies helps us to understand the difficulties involved in changing how educators teach. The classroom teacher controls the transmission of information in the teacher's classroom. Furthermore, the teacher controls the prism through which students acquire knowledge. If a teacher does not understand technology or is outright hostile to the incorporation of technology into the classroom, then that teacher will not utilize digital technology in the classroom and will act as a de facto digital gatekeeper excluding technology from the classroom. A digital gatekeeper, however well interentioned, will prevent their students form experiencing lessons using the digital world of today. Without effective teacher preparation programs that incorporate digital technology, social studies educators may be facing an epistemological battle over the need to incorporate technological skills into the classroom.

Social Studies Education and Technology

A historical truism is that every scientific formulation to date has failed only to be replaced by a better theory (McClellan and Dorn, 1999). During the era of the enlightenment, scientific thinkers popularized the idea of a secular, progressive direction to history, but history demonstrates that technological progress is not a given. In today's world, where technology has reduced the barriers that separate the inhabitants of the world, it is easy to believe that the incorporation of technology into the classroom will be a magic bullet that will cure numerous educational ills. The reality is that technology is merely one aspect of our complex understanding of the world and the use of technology alone in the classroom will not educate children alone. Social studies educators must adapt to the varied and nuanced implications of incorporating technology into the classroom during the ongoing digital revolution while resisting the urge to believe that

the use of digital technology alone will solve the problems faced by educators and students today. Social studies teachers need a sound pedagogical basis for the inclusion of technology into the classroom. Without a pedagogical basis, teachers will be foundering in the dark with their new high tech toys.

Doolittle and Hicks (2003) create a theoretical framework for the incorporation of technology into the social studies classroom. According to constructivism, knowledge is constructed based on personal and social experiences. Truth, as defined by a constructivist, is dependent upon the personal, cultural, or historical perspectives experienced by an individual (Fosnot, 1996). Constructivism happens within socio cultural contexts as individuals create and modify their thoughts, ideas, and understandings of the world through their struggles with the conflict between existing personal models of the world and the new understandings developed through cultural interactions. Constructivism puts the individual learner in a place of primacy in the active construction of knowledge through their individual and social experiences. Doolittle and Hicks (2003) make the point that teachers should serve not as dispensers of knowledge but as guides and facilitators of knowledge. The implication in constructivist theory for the incorporation of technology into the classroom is that teachers must move beyond the use of computers as transmitters of knowledge and move to an instructional paradigm utilizing technology as a stimulus for inquiry, perspective taking, meaning creation, and synthesis.

Papert (1991) describes how computers provide students and teachers with an excellent platform for constructivist learning. Used effectively, computers allow students and teachers to move about in a nearly endless virtual space where they can create

meaning through their virtual interactions. Social studies instruction utilizing digital mediums, in which students are provided the opportunity to engage in experiences allowing students to manipulate their world, facilitates the development of lifelong learners who have learned technology by doing technology. Papert (1998) writes that students disengage from school not because it is too hard but because they believe school is boring. According to Papert (1991), children enjoy computer games because they are challenging and because computer games force the child to engage in meaningful learning experiences. The point, according to Papert (1991), is that students are not afraid of challenges, but they hate boring and school for most children is boring. Papert's (1991, 1998) assertions are echoed by Resnick (2007) who writes that digital mediums provide students with an instructional environment that is more dynamic and interactive than the traditional classroom allowing students to create powerful and lasting meanings out of their learning. According to educational theorists like Resnick (2007) and Papert (1991), video games provide teachers and students with the opportunity to engage in the meaningful creation of knowledge in the classroom that is authentic and lasting.

Why should social studies teachers care about incorporating technology in the classroom? The United States Department of Commerce reported that in 1998, 42.1% of American households owned a computer. By 2003, this number had risen to 61.8%. Furthermore, the number of households with an internet connection jumped from 54.6% in 2001 to 61.5% in 2003. Sixty-one and a half percent of boys and 55.6% of girls use their home computers to play computer video games for fun (National Center for Education Statistics, 2005). People all over the world are increasing their use of digital technology (Friedman, 2005). The world has become a much smaller place, in a virtual

sense, over the last 20 years thus increasing the need for the education of democratic citizens able to operate in our increasingly interconnected world. If teachers do not incorporate the use of modern technology such as smart phones, computers, and tablet notebooks into their lessons, then students will be woefully unprepared to face the challenges of the modern world. Educators utilizing instructional practices that incorporate instructional mechanisms that students enjoy such as video games are speaking the native language of the many students that enjoy playing video games at home (Prensky, 2001). Simulation video games are a potential avenue for the incorporation of authentic technological integration into the social studies classroom that provides students with meaningful learning experiences because they allow students to construct meaning during their learning.

The dramatic increase in the use of computer technology across the globe has led researchers to examine how teachers incorporate technology into their classrooms. Teacher education instructors now consider technological resources as an invaluable part of social studies instruction. Bolick, Berson, Friedman, & Porfeli (2007) found that social studies professors, who prepare preservice teachers, are incorporating technology into their instructional practices. Furthermore, the results of the study conducted by Bolick et al. (2007) indicate that the type of technology incorporated by social studies teachers has changed to reflect the incorporation of new technologies such as computers and presentation software programs. Furthermore, the researchers found that institutional barriers to the incorporation of technology by social studies teachers have decreased.

While researchers such as Bolick, Berson, Friedman, & Porfeli (2007) examined how preservice teachers were taught to integrate technology, other educational theorists

examined how practicing teachers incorporated technology into the classroom. According to Burns (2006), educators at secondary schools have not engaged students in the use of computers that promote higher order thinking. Burns found that schools have confused the simple use of technology with instructional quality. Furthermore, Burns showed that teachers predominantly used technology to reinforce traditional educational practices focused on engaging students in lower order thinking tasks. Burns highlighted that schools must engage students in the use of technology thus requiring students to work with data analysis and interpretation that encourages students to develop meaningful solutions to difficult problems.

In addition to the lack of teaching of higher order thinking skills reported by Burns (2006), research has also shown that students from lower socioeconomic status households who were bound for college spent far less time using computers in school than non college bound lower and higher socioeconomic students from all diploma tracks (Dewitt, 2007). The beliefs of the social studies teacher regarding what college bound lower socioeconomic status students need to be successful in college influenced how the teacher used computers to educate students from different socioeconomic groups. Furthermore, Dewitt (2007) found that secondary social studies teachers believed that college professors do not incorporate technology into their lessons, consequently the social studies teachers did not utilize computers with lower socioeconomic status students that the teacher believed were college bound. Dewitt (2007) also established that educators in more affluent schools provided more access to higher status knowledge than teachers provided students in lower socioeconomic status schools. The study conducted by Dewitt (2007) highlighted the fact that many first generation college students from

lower socioeconomic status demographic groups had little experience using computers during the course of their learning. Consequently, first generation college students from lower socioeconomic groups faced a steep learning curve during their initial college experience. The conclusion reached by Dewitt is that teaching practices replicate societal practices because of the inherent beliefs of the teachers, thus demonstrating that how students use computers in the classroom is more important than simple exposure to computers. According to Dewitt's research, the incorporation of technology into meaningful learning experiences is essential for social studies educators to provide access to digital literacy for all students.

Simulation Video Games

A diversity of categories of video games is available to the gamer and student of today. Massive multiplayer online games, action, fighter, shooting, sports, music, strategy, puzzle, role-playing games, and simulation games are all categories of games offered to the current gamer. Each of these categories has the potential to produce video games with educational value. In fact, there is a wide variety of games within each category designed specifically for educational purposes. In this study, the participants played Making History 2.0: The Calm and the Storm. Instructional simulation games like Making History are replications of real world events, both historical and current, brought to life inside the classroom (Berson, 1996). According to Gee (2007), when people learn to play video games, they are learning a new type of literacy. Literacy is not just the ability to read and write; literacy is more broadly defined as the images, symbols, graphs, diagrams, artifacts, and other visual symbols as well as an understanding of the rules for how to interpret each of these objects. Educational simulation video games are

instructional tools where the student becomes the participant in a virtual world that represents a real world event. This allows the student to experience a cognitive domain where students learn knowledge through virtual experience (Gee, 2005a; Rice, 2007b). Gee states that when a person learns to play a video game he or she is learning a "semiotic" domain. In other words, the gamer/player is becoming literate in the rules, requirements, symbols, images, graphs, diagrams, artifacts, language, and culture of the game involved. Furthermore, the learning of one semiotic domain connects the students learning to other semiotic domains, which permit the learner to construct meaningful understandings of the new domain. The learning of a semiotic domain enables learners to connect their new understanding to their perception of the physical and virtual world. Gee (2007) compares this type of semiotic literacy learning with the traditional education view of "content" learning where content is often taught without meaningful context thus confusing the learner and creating a fragmented understanding of the subject. In an educational simulation video game, the player is engaged in an experience that will facilitate the learning of the games rules, choices, and moves that incorporate the structure of the game as well as any relevant content required to navigate within the simulation. The learner is constructing his or her understanding of the video game through his experiences because his or her experiences encompass knowledge construction within the semiotic domain of the game much as the learner would construct his or her understanding of the physical world through his experiences thus the learner is engaged in authentic learning.

In an educational simulation video game, the participant or learner has the opportunity to immerse him or herself in the role constructed by the video game

designers, but not all video games are ideally suited to take on the role of educational video games. Rice (2007a) created the Video Game Cognitive Viability Index (VGCVI) to measure the ability of a video game to facilitate the development of higher order thinking. This scale allows an educator to evaluate a video game on a scale of one to twenty in order to determine the likelihood that a video game will engage students in higher order thinking tasks. Further, Gee (2007) lists thirty-six principles associated with good video games that educators need to be cognizant of when selecting educational video games to use in the classroom. Among the principles outlined by Gee, are that well designed video games encourage active participation, collaboration, and cognition. Scales such as the VGCVI and the principles outlined by Gee will help educators to select video games that can facilitate an authentic learning experience in which students can learn by creating meaning.

The teaching of a lesson using an educational simulation video game that scores high on the VGCVI does not mean that the instructor can turn students loose in the video game and expect meaningful learning to take place. Scaffolding is essential to instructional practice. The producers of many video games make broad claims that their video games provide the educational scaffolding and students will learn as long as they play the game. However, humans involved in a simulation, or any experience, have a high probability of finding creative but spurious patterns and generalizations that send learners down miseducative paths if no learning structure exists (Gee, 2007, 2005c). According to Gee, the responsibility of the instructor in a lesson incorporating the use of educational video games is to provide a pathway for students to be able to navigate the many variables that make up the semiotic domain encapsulated by the video game.

Furthermore, instructors use scaffolding in the lesson to point out the links to other semiotic domains thus engaging the learners in meaningful learning experiences. In short, teachers matter and instruction matters even in our technology driven ever changing world.

Multiplayer vs. Single Player Video Games

According to Malone (1981), games intrinsically motivate players by providing challenge, curiosity, control, and fantasy as well as opportunity for social interaction, competition, and collaborative play. When players are engaged in a multiplayer game, they are engaged in intensive social learning as the other players and the player him or herself struggle to make meaning out of the space provided by the video game (Squire, 2005). Players are learning to make social sense out of their collective virtual world and learning how to navigate in the semiotic domain crafted by the game designers. Educational video games that incorporate the thirty-six learning practices, as outlined by Gee (2007), and that score well on the VGCVI, create an environment where learners experience a semiotic domain where they become critical thinkers about the virtual world that they inhabit. Well designed multiplayer simulation video games compel players to navigate in the virtual world, to become literate in the semiotic domains of social practice, and to solve social problems (Shaffer, Halverson, Squire, & Gee, 2004). In addition to the learning opportunities that take place in the virtual world, multiplayer video games encourage participants to involve themselves in online chat rooms and messages boards maintained by their fellow video game players. Participation in these online video game communities fosters the civic engagement that many pundits believe is lacking in our society (Steinkuehler, 2008). Steinkuehler believes that multiplayer games

foster the development of online communities, that much like bars, coffee shops, and other real world hangouts, encourage civic participation.

Video games foster the development of community learning among video gamers according to Squire and Steinkuehler (2005). Furthermore, video gamers involved in multiplayer video games share information, blur the distinction between the production and consumption of knowledge, and promote international communities. According to Gee (2007), gamers often prefer to play single player video games in groups and take turns playing the game and sharing knowledge of how to play the game. Single and multiplayer video games provide areas of shared community interest among the gamers that lead to the development of authentic communities. Students participating in a shared semiotic domain develop a shared understanding of that experience that typifies authentic classroom communities. Gee speculates that if educators use a video game as a classroom learning tool then the students' shared experience of playing the video game will help to create an authentic classroom community.

Single player video games foster the development of community practice among their players as illustrated in mediums such as player created "FAQS" (Squire 2006). FAQS, or frequently asked questions, are online spaces where players engage in online social practice in order to assist one another with the playing of a particular game. Games also allow players to adopt different identities in the game and coerce the player to think critically about identity including gender roles (Hayes, 2005). Hayes examined how women experience a single player video game and reached the conclusion that traditional gender stereotypes of men and women and video game play are simplistic and incorrect. Hayes reaches the conclusion that video games can potentially allow players of

both genders to explore their identity in a critical format enhancing their ability to understand the social underpinnings of the real world. Multiplayer and single player games can inspire the player to engage in challenging acts of cognition that inspire the participants to create social networks to problem solve. According to NCSS, a good citizen needs training in how to solve problems within society. Well designed video games potentially offer players the opportunity to participate meaningfully in virtual social networks that are essential for 21st century citizens. In a world where Twitter, Facebook, political blogs, and numerous other digital media environments are as important as the traditional print or broadcast media for tech savvy citizens, education via videogames offer social studies teachers a method to link content, meaningful learning, and the technological skills essential for modern day political involvement. This study will examine how both single player and multiplayer participation in a simulation video game in an educational setting affects students' motivation, higher order thinking skills, and content retention.

Reflection and Learning within Video Games

The progressive philosophy of John Dewey (1938) created the theoretical groundwork for using video games in the classroom. Dewey theorized that traditional schooling techniques treat knowledge as a monolithic commodity that is immutable. Dewey concluded that because of traditional educators' belief in the absolute truth of the facts, traditional educators taught knowledge through lecture and other methods that encourage rote memorization of the so-called, "facts" or "truth." According to Dewey (1916), traditional educational techniques created an artificial separation between school and real life that stifled students' creativity and any possibility of real learning. Dewey

believed that if educators approached education with a focus on the experience and capacity of the learners then the artificial separation between school and life would be bridged. With the rise in use of technology, video games are an excellent vehicle to bridge the gap between students' experiences and the domain of the school. Simulation video games offer students the opportunity to experience history through the familiar context of a video game. Dewey advocated learning that required students to engage content in an active format that allowed learners to be reflective of their learning, and he supposed that learning should be an active and personal experience relevant to the students' experiences and capacities. Furthermore, Dewey theorized that experiential investigations fostered the learning of content via personal involvement of the learner. Educational simulation video games offer learners the chance to engage in experiential investigations by placing the learner in a virtual world learning content via active participation in a familiar context.

Using Dewey as inspiration, Kolb (1984) asserted that reflection is a necessary process for engaging the learner. Kolb (1984) posited a four-step process where the learner first engages in concrete experience, then reflective observation, next abstract conceptualization, and finally active experimentation. Hubbs and Brand (2005) described how a learner could use reflective journaling to progress through the four stages of Kolb's (1984) reflective learning process. Hubbs and Brand (2005) theorized that learners in stages one and two described their progress through the experience of the lesson and with the help of the instructor reflected upon their experiences. In stage three, learners attempted to explore questions related to the meaning of the experience. Finally, in stage four, reflective journaling provided learners with the opportunity to develop new

meanings, interpretations, or understandings of the experience. In a lesson incorporating a simulation video game, learners using the reflection process described by Hubbs and Brand (2005) would begin writing reflective journals to describe the game activities/actions and the content examined via the simulated reality. Next, learners attempt to ascertain meaning from the experience of the simulation. Last, learners attempt to make sense of their experience by connecting their learning to other semiotic domains and interpretations of the reality simulated. Reflective journaling guided by the instructor will help focus learners on a critical understanding of their role in the simulated environment. Reflective journaling is a type of scaffolding designed to facilitate reflection among students as they engage in their educational activity. Without reflective journaling or another sort of teacher facilitated scaffolding, the learners may fumble to make sense of their gaming experience and are likely to take mental paths that lead to miseducative experiences (Gee, 2005a, 2007).

As found in the research of Hubbs and Brand (2005), Gee (2005b) stated that the use of guided reflection was an essential element of integrating video games into the classroom. Research into the use of video games as instructional tools supports Gee's premise about the need for incorporating reflection into lessons using video games. Squire, Barnett, Grant, and Higginbotham (2004) reported that reflective journaling added focus to students' play and allowed the teacher to prompt deeper reflection on the game play. Squire et al. (2004) had participants create log sheets to record their actions and make predictions, thus reinforcing the purpose of the video game and encouraging students to detect patterns in their play. The researchers then had the students advance through deeper reflective journaling practices that allowed the students to reflect upon

their play and to make connections about their play to other semiotic domains. Journaling provides shy students a voice if they choose not to participate in the verbal discourse of the lesson. Reflective journaling provides scaffolding to learners so that they can have deep and meaningful focus during or immediately after the lesson. In addition, reflective journaling fosters the development of metacognitive skills that are essential to democratic citizenship.

Higher Order Thinking Skills

Bloom (1956, 1976) identified synthesis, evaluation, and analysis as the highest levels of cognition in his educational taxonomy. Bloom and his colleges identified three distinct domains of educational activities and labeled them affective, psychomotor, and cognitive. The affective domain deals with emotions, feelings, or attitudes such as interpersonal relationships. The psychomotor domain deals with physical or manual skills that basketball players or a carpenters possess. The cognitive domain deals with knowledge skills and the manipulation of knowledge such as how to write a dissertation. Bloom organized the domains from simplest to most complex. Mastery of the highest levels of the cognitive and affective domains is essential to gaining the skill set needed to fulfill NCSS's goal of democratic citizenship. Newmann (1990, 1992) used Bloom's classification structure to create an educational theory designed to promote authentic student achievement and student learning. According to Newmann (1991), "higher order thinking is defined broadly as challenge and expanded use of the mind." Limited uses of the mind such as recall or simple comprehension demonstrate applications of lower order thinking skills. Synthesis, analysis, or manipulation of knowledge demonstrates applications of higher order thinking skills. The use of higher order thinking includes the

use of lower order thinking skills. Thus, when students engage in higher order thinking tasks, they are required to engage and apply their lower order thinking skills, as well. Cochran, Conklin, and Modin (2007) describe how a modernized version of Bloom's taxonomy created by Anderson and Krathwohl (2001) can be used to help facilitate the use of higher order thinking skills in the classroom. Using the updated version of Bloom's taxonomy through the prism of technology can facilitate the use of higher order thinking thus promoting the skill set needed to facilitate the education of democratic citizens. An education focused on promoting higher order thinking will produce a citizenry capable of being democratic citizens but in the technologically driven world of today, students must practice higher order thinking skills within technology driven activities. Combined with instructional scaffolding that incorporates reflective practices, educational simulation video games theoretically are an instructional tools that can facilitate the learning of higher order thinking skills required of the democratic citizens in the modern world.

The Educational Simulation Video Game

The educational simulation video game used in this study is Making History 2.0: The Calm and the Storm. The participants who played Making History 2.0 were immersed in digital simulation of Europe in 1938 that enabled the participant to become the virtual dictator of a either France, Germany, Italy, Russia, or the United Kingdom. The other nations of the globe were controlled by the artificial intelligence inherent in the video game. Historically, World War II served as one of the seminal historical events of the 20th century and an understanding of the complexities that lead to the war is essential to an understanding of the current sociopolitical framework of the world today. Each of

the nation states that students could potentially control in the video game was a complex society that entered World War II for a variety of reasons. One danger inherent in using Making History 2.0 is the potential for players to develop a false belief that each of the nations entered World War II for very simple reasons. Gee (2007) writes that the role of the instructor is to focus learners on meaningful cognitive outcomes during the course of the learner's play. The producers of Making History 2.0 advertise the software as an educational simulation video game that will stimulate students' interest in learning.

Can students learn by playing Making History 2.0 or any other video game? Gee (2007), Papert (1998), and Resnick (2007 indicate that students can learn during the course of video game play. This study sought to further understanding of using video games as instructional tools by examining participants' learning by focusing on the role of reflection, cooperative play, and participants' prior interest and exposure on participants' cognitive outcomes during participant play of Making History 2.0.

Definitions

The following definitions are provided to ensure a clear understanding of the terms included in this research study. Reflective scaffolding is any instructional practice during the course of a lesson that requires students to either write reflectively or engage in a reflective discussion about their learning experiences. Higher order thinking is any activity that requires the student to engage in analysis, synthesis, or evaluation. Video game forums are internet sites where players can post questions, find answers, or participate in community activities focused on how to play a specific video game. FAQS or frequently asked questions are longer versions of instruction manuals, which the

producers or video game players create to help players with technical or game play questions.

Overview of Methods

The focus of this study is an examination of how the use of reflective scaffolding, collaborative play, and prior interest and exposure to video games affects participants' cognitive skills during a lesson incorporating a simulation video game. The researcher conducted an examination of what, if any, differences exist between the cognitive outcomes of using reflective scaffolding as an instruction tool and simply allowing participants to play the game without instructor guidance. The researcher also conducted an analysis of participant engagement in multiplayer vs. single player video during the lesson. In addition, the researcher examined how students' prior interest in video games affect the cognitive learning that takes place during the course of a lesson using an instructional video game. The participants in the study were enrolled at a suburban high school in the Southeastern region of the United States. Participants were enrolled in college preparatory level World History courses. The World History course is a tenth grade course. Convenience sampling was used to select the participants in this study and participants were randomly assigned to one of four treatment groups using a four-sided dice. The four treatment groups were; multiplayer reflection, single player reflection, multiplayer no reflection, single player no reflection.

The researcher used mixed methods to collect and analyze the data. The use of both qualitative and quantitative data analysis enhanced understanding of the data gathered and provided a richer and more descriptive understanding of the data analyzed (Collins, Onwuegbuzie, & Sutton, 2006; Thomas, 2003). During the course of the study,

the researcher gathered data from a pre survey of participants' familiarity and attitude towards video game play (see Appendix A), participant reflective writing, researcher observation, digital audio recordings of the participants' game play, and a posttest of higher order and lower thinking skills (see Appendix C). The researcher, to analyze the data quantitatively, used statistical tests such as independent samples *t* tests, analysis of variance, and descriptive statistics. The quantitative data was analyzed and reported using the software analysis program SPSS for Windows. Using qualitative methods outlined by Miles and Huberman (1994), the researcher analyzed participants' reflective writings, researcher observations, participants' voice recordings, and posttest answers.

Specific Research Questions

While there are many case studies examining the role of various types of games in the classroom, much of the research has focused on how the students make meaning out of the use of the video game and very little research has been conducted on how video games affect students' higher order thinking ability. Furthermore, few researchers have studied the combination of reflective scaffolding, instructional simulation video games, and higher order thinking skills. Through a delineated approach to instructional simulation gaming, the researcher examined the following research questions.

1. How does reflective scaffolding during the use of instructional simulation video games influence higher order thinking and lower order thinking?

2. How does the use of multiplayer games influence higher order thinking and lower order thinking?

3. How does the use of single player games influence higher order thinking?

4. How does prior interest/exposure to video games influence higher order thinking?

CHAPTER 2

REVIEW OF THE LITERATURE ON SIMULATION VIDEO GAMES IN THE CLASSROOM

This research review will address the following questions:

1. What do we know and need to learn about instructional simulation video games in the classroom?
2. What do we know and need to learn about reflective journaling in the classroom?
3. What conditions influence the outcomes of cognitive learning and interest in instructional simulation video games? How are the outcomes defined, operationalized, and measured?

The starting point for this research review was keyword searches of several research databases including but not limited to EBSCOhost, Education Abstracts and Educational Resources Information Center (ERIC). Utilizing the research databases, the researcher conducted keyword searches for the phrases instructional video game, simulation video game, simulation game, computer simulation, and computer simulation game. The results from the keyword searches were reviewed for their relevance to the study. Further keyword searches of the databases were performed using the keywords reflection, reflective journal, reflective journaling, reflection simulation game, reflection simulation video game, and reflection video game. The researcher reviewed the abstracts found in the keyword searches for their relevance to the research study.

An examination of the citations contained in the initial literature uncovered through the database searches expanded the search opportunities to other peer reviewed literature related to the educative value of video games and reflective journaling. Research into how educators use instructional video games in the classroom is still in its early stages. The infancy of the field resulted in a limited number of research studies closely corresponding with the research questions examined, as a result, the author will first examine how educators have introduced technology into social studies classrooms. The next step will involve an examination of higher order thinking skills (HOTS) with a focus on how to define, measure, and create environments that facilitate student learning of HOTS. Next, the author will examine how video games affect cognition. Finally, the researcher will examine the pertinent literature on the affect of using video games in the classroom with an emphasis placed on original research that combines the use of reflective scaffolding and instructional video games.

The Incorporation of Technology in the 21st Century Social Studies Classroom

The developed world has changed a great deal with the invention of the personal computer. Computers have affected the lives of individuals, communities and corporations across the globe as people bank, pay bills, order books, make travel reservations, and read the newspaper with their personal computer. The people of the industrialized world have been quick to embrace the technological revolution that has changed the way humans communicate and do business. Citizens of the less developed countries are beginning to experience the impact of the digital revolution as well, as highlighted by digital cafes in India, the regulation of the internet in rural China, and the use of social networking sites during revolutions in Asia and Africa. While the general

population has been quick to embrace this technological revolution, many education professionals in the United States have been slow to embrace this revolution. Consider how much American society changed with the integration of computers into our everyday lives. In the 1950's it was very difficult and very expensive to place a telephone call to China. Today, any American can log into the internet and talk to different people around the world nearly instantly from their own home. However, when it comes to educational practices, the instructional practices of the 1950's are still in use in many classrooms today.

Students learning through a traditional educational paradigm where teachers convey information through lecture and rote memorization activities will not acquire the required skills necessary to become democratic citizens in the 21st century. Friedman (2005) described the global system of nearly instantaneous communication across the globe in *The World is Flat*. Education researchers are beginning to study how the new technological paradigm influences teaching and learning. The declared goal of social studies education as stated by NCSS is to foster the development of active democratic citizens. Social studies researchers are attempting to ascertain the most effective way to use the fantastic technology of computers in the classroom to promote the goal of social studies education.

The incorporation of the digital technology into everyday life has increased exponentially over the last three decades. Prensky (2001) writes that this rapid infusion of digital technology into everyday life has created a discontinuity between the students and teachers of today. Students who grew up in the informational age experience technology as a way of life and are "digital natives" according to Prensky. In contrast are

the teachers of the digital natives who learned to use digital technology as an adult. People born prior to the widespread immersion of digital technology in the world are "digital immigrants." Digital immigrants learned the integration of technology as a second language and may find it more difficult to adapt to new technologies. The discontinuity between digital immigrants and digital natives, according to Prensky, is that they are speaking a different language. The difference is comparable to people who learn a foreign language as an adult. They will be able to communicate in the foreign language but it will take longer to learn the second language as an adult than it would have as a child. Digital natives are experienced at adapting to the ever changing world of technology while digital immigrants are experienced at learning one set of knowledge and using that knowledge for a very long period. Digital immigrants become frustrated when they finally master a new piece of technology and that technology becomes obsolete and replace with a new technology that they have to learn anew. Digital natives view the ever changing world of technological integration as a normal part of their lives because they are experienced at adapting and incorporating new technology into their lives. Prensky believes that digital immigrants can learn to be proficient in the technological medium of the modern world. Teacher education and the integration of digital technology into classroom instruction are necessary to bridge the discontinuity highlighted by Prensky.

The learning theory known as constructivism provides a theoretical framework for the integration of technology into the classroom, constructivism is a theory of learning where the learner has a self regulated process of inner cognitive conflicts that often become apparent through concrete experience, collaborative discourse, and reflection.

According to constructivists, learning is a human meaning making venture with culturally developed symbols where humans negotiate meaning through cooperative social activities and debates (Fosnot, 1996). Constructivists reject the notion of passive knowledge acquisition and instead focus on utilizing active cognitive activities for human knowledge acquisition. Doolittle and Hicks (2003) create an epistemological argument for using constructivism as a theoretical framework for the incorporation of technology in the classroom by asserting that technology provides learners with the opportunity to construct meaning through active learning experiences. Digital technology, such as computers and video games, allow the learner to create his or her own meaning and to manage his or her own learning experiences. Digital technology provides an avenue for learners to experience learning when used a tool to promote student inquiry, perspective taking, and meaning making in the classroom. Doolittle and Hicks declare that digital technology is tailor made to provide a framework to teachers and students to engage in authentic learning experiences such as inquiries using a historical pictures, diaries, maps, and writings. The constructivist classroom starts with a problem or a project to be undertaken and digital technology can take the teacher and students beyond the four walls of the classroom to assist in the resolution of that problem.

Zhao (2007) found that teachers had variegated ideas about how best to incorporate technology in the classroom. Seventeen teachers participated in Zhao's qualitative analysis of the integration of technology into the social studies classroom. The study took place in Georgia, where teachers were required to receive instruction in how to incorporate technology into the classroom as part of initial teacher certification. Additionally, current teachers are required to receive the instruction in technological

integration as professional development courses prior to their next teaching certification renewal or must demonstrate knowledge on a computer literacy test. Each of the participants in the study enrolled in a technology class known as Intech that is designed to teach educators how to incorporate technology in their classrooms. Zhao found that teachers' ideas varied from a belief that the computer only served as an aid to traditional social studies education techniques to the idea that the use of the computer can lead to new social studies techniques, thus increasing student interest and motivation for the subject. In Zhao's study, teachers reported a varying number of computers in their classrooms. Teachers reported that the demands of the curriculum, the demands of standardized testing, and the demands of administrators that teachers use traditional teaching methods were barriers to the integration of technology in the classroom. Zhao reported that the social studies instructor can create four types of technology environments; teacher centered, structured inquiry, teacher student negotiation, and student centered. Zhao found that teachers reported the greatest amount of student interest when they used student centered activities such as the creation of websites. Zhao concluded that the more comfortable a teacher was with technology, the more technology that teacher used in the classroom.

While Zhao asserted that teachers will use more technology in the classroom when they are more comfortable with technology, Burns (2006) found that students and teachers primarily use digital technology in the classroom as word processors or presentation platforms thus only engaging students in lower order thinking tasks. Burns described these activities as focusing on the lowest levels of Bloom's taxonomy of cognition. The implication in Burn's research is that educators are under prepared and

afraid to use technology that they do not understand completely. In addition, Burns recommended that all educators receive education in a technology course. After partaking in classes designed to teach teachers how to incorporate technology in their classroom, Burns elucidated that teachers would be able to create interdisciplinary projects that incorporate material from a diverse group of sources not available on the physical grounds of the school, to use computers to foster communication and understanding between diverse groups of people, and to expand the students' knowledge by taking classes on virtual field trips that explore areas inaccessible to the school or student's budget. Burns advocated that schools educate teachers in how to create higher order lessons for their students in order to facilitate the use of digital technology that requires students and educators to access higher order thinking.

While researchers such as Burns (2006) and Zhao (2007) demonstrated some of the difficulties that occur during the integration of computer technology in the classroom, Lee and Clark (2004) demonstrated how teachers could effectively integrate technology with instruction. Lee and Clark described how by using digital history in the classroom, learning can be expanded far beyond the bounds of the school. Digital history is the process of using primary source research with documents available via the internet. Lee and his students created resources on the web where anyone can access primary source documents about a particular person, place, or event. Lee created a web site devoted to the life of one common person who was a barber/pharmaceutical salesperson from the late 1800's and early 1900's. The family of the man donated all of his personal belongings to a historical society after his death and Lee and his students cataloged these items and placed them on the web in a virtual museum. The items ranged from diaries

and letters to everyday personal items such as pictures. The students in the class researched the man's hometown, his profession, his relatives, and his personal history. The digital history project allowed the students to conduct actual primary source research on many different types of documents without leaving the classroom. The researchers observed an increase in student motivation as the students broke the bounds of a traditional lecture based history course. Lee and Clark's (2004) study is an excellent illumination of the potential of digital history to become the type of educational practice that leads to development of active democratic citizens, but the researchers included neither specific descriptions of students' work nor an examination of the work the students produced. Lee and Clark's example of a digital history lesson facilitated the development of student learning and the skills set required to become a 21st century democratic citizen by facilitating the development of technological literacy. Without an examination of students' work and evaluating students' cognitive understanding the question of what students gained cognitively from the experience is still an open question.

While Lee and Clark (2004) described how to create an active social studies lesson using digital history, Shaunessy and Page (2006) described how to promote student interest and inquiry using technology. The Global Positioning System (GPS) is a series of satellites orbiting the Earth that allow users to find their location anywhere on the Earth. A Geographic Information Systems (GIS) is a very useful computer mapping tool, GIS allows the user manipulate a map in many different layers. Using GIS and GPS together, the participants in the study completed an active lesson where they were to find their exact location and uncover a great deal of information about their surroundings such

as the height above sea level and other relevant geographic information. The students in the study were all gifted students. Using the GIS software, the students became extremely interested in the technology and the geographic identity of their communities. The students quickly branched out and followed several different trails of information in a very active and meaningful learning experience. The conclusion of Shaunessy and Page was that the series of lessons using GIS and GPS technologies created an environment that promoted student inquiry and fostered the highest levels of cognitive action. Page and Shaunessy used their observations of their own students to reach their conclusions about the use of GIS and GPS in the classroom. Only gifted students participated in this study and researchers focused their findings on the applicability of technology lessons incorporating GIS and GPS in gifted classrooms. The researchers only included their perceptions of what the students were doing and thinking as they participated in the lesson.

Another example of how social studies educators are incorporating technology into classroom lessons is the research of Britt, Perfetti, Van Dyke, and Gabrys (2000). Britt et al. (2000) found that computers could be used to increase students' interest and motivation through the u of a digital primary source documents known as the Sorcerer's Apprentice, an interactive computer program designed to foster students primary source research abilities, and problem solving abilities. The program appeared as a bookshelf and guided the students through a series of puzzles the students had to solve using the primary source material provided in the program. The experimental and control group were tested for their ability to interpret primary source documents. While the experimental group was engaged in using the Sorcerer's Apprentice software, the control

group was engaged in "normal classroom activities." The researchers concluded that the experimental group demonstrated a statistically significant increase over the control group in ability to analyze primary source documents. The researchers, in a separate study, reported that students rated the Sorcerer's Apprentice easy to use and useful. Britt et al. concluded that students across all demographic lines showed increased interest in researching primary source documents when they were included in the context of a computer game. The use of The Sorcerer's Apprentice engaged the student in problem solving in a more expanded student centered approach because the student had control of the computer program. The researchers concluded that The Sorcerer's Apprentice was an effective method of primary source instruction via the computer because it increased student interest in learning through primary source materials.

One common theme that emerges after a review of research on the incorporation of digital technology in the classroom is that students are more engaged and more motivated during lessons involving digital technology. In *Teaching Social Studies with Technology: New Research on Collaborative Approaches*, Taylor and Duran (2006) described how collaborative approaches to social studies education increased student interest and participation. Taylor and Duran's study consisted of 257 educators who participated in a program designed to improve teachers' understanding of technology. The researchers conducted the study between 2001 and 2005. The participants in the program engaged in an eight-month class designed to increase educators' technological literacy. In this mixed methods study, the researchers used observations, teacher journals, surveys, and teacher created electronic portfolios. The researchers found that the teachers participating in this study reported that their students demonstrated more

interest for school and learning when they were able to use technology in the classroom. The instructors in the technological literacy program stated that the participants of the program produced better work and demonstrated more enthusiasm for their work when using technology. The researchers did not detail any of their statistical findings but concluded that student and teacher interest increased when students used technology during educational activities. Furthermore, the researchers found that the main barrier to the incorporation of technology in the classroom was the absence of computers at home for many students.

Social Studies Teachers Incorporation of Digital Technology in the Classroom

If researchers have concluded that the integration of technology in the social studies classroom will increase student interest and student engagement, will social studies teachers incorporate technology into their lessons? Bolick, Berson, Friedman, and Porfeli (2007) studied the incorporation of technology instruction in preservice social studies programs in *Diffusion of Technology in the Preservice Social Studies Experience: Results of a National Survey*. The researchers concluded that preservice social studies instructors consider technological resources an invaluable part of social studies instruction and have incorporated technology in their instructional practices. Furthermore, the results of the study indicated that the type of technology social studies teachers incorporated changed to reflect the integration of new technologies. Finally, the researchers found that institutional barriers to the incorporation of technology have decreased.

Bolick, Berson, Friedman, and Porfeli (2007) based their conclusions and findings on an email survey of 88 members of the College and University Faculty Assembly

(CUFA) who were involved in the preservice education of social studies educators. This survey was a follow up of a longitudinal national survey of social studies teacher education faculty that took place in 1999 and 2001. The study was an extension of the previous longitudinal survey and the researchers designed the study to illustrate how preservice educators' views of the incorporation of technology in social studies education have changed over time. While the researchers highlighted that preservice educators who participated in this survey indicated that they incorporate technology in their programs, the study does not show that teachers are effectively incorporating technology into these social studies programs nor do the researchers find that social studies programs in general incorporate technology into their programs. The study is limited because the researchers cited potentially biased sources, the fact that the study was conducted via email only with members of CUFA, and the researchers did not collect data from the students in the social studies programs. The effectiveness of preservice social studies programs in preparing educators to incorporate digital technology into the classroom is still an open question.

In another examination of how social studies teacher incorporate technology in their classroom, Dewitt (2007) found that students from the lower socioeconomic classes who were on a college bound track spent far less time engaged with computers than non college bound lower status students and higher status students from all tracks. The author established that the difference in time that students spent engaged with direct instruction using computers is a result of the beliefs of the social studies teachers. The researcher highlighted that secondary social studies teachers believed that college professors do not incorporate technology in their lessons. Therefore, the teachers believed that the inclusion of technology into the lessons of lower social class college bound students was

a waste of valuable teaching time. The researcher illustrated that the social studies teachers believed that lower class college bound students need more traditional lessons than their higher class peers in order to be prepared for the rigors of the college experience. Dewitt found that the beliefs of the social studies teachers regarding what knowledge students need greatly influenced how and to what degree the teacher integrated technology in the classroom.

Another finding of Dewitt's (2007) research, was that educators in higher social class schools provided students with more access to higher status knowledge with technology than students in lower social class settings who were college bound. Dewitt stated that teaching practices replicated societal practices because of the inherent traditional beliefs of the teachers. Understanding how educational practices replicate societal practices led Dewitt to the conclusion that how students use computers is more important than simple exposure to computers. Dewitt's study is an excellent examination of how four specific social studies teachers make pedagogical decisions regarding the use of technology in their classrooms.

A limitation of Dewitt's (2007) study is that all of the teachers used in the study were European American males. Three of the teachers involved in the study attended the same graduate school at the nearby Jesuit University. Two of the teachers had master degrees and one teacher was working on his master degree from the same university. The fourth teacher was working on his master degree in comparative religion at the nearby local state university campus. The educational background of the teachers indicates that all of the teachers participating in the study share similar educational experiences. The teachers used in Dewitt's study are not representative of average social studies teachers

and Dewitt's conclusions about the use of higher level knowledge could be explained by curriculum restrictions rather than by a difference in teachers views on what knowledge high and low income students need for college. Dewitt's research does provide a cautionary tale about how teachers' well intentioned but nevertheless misguided understanding of the needs of students from differing socioeconomic status groups can cause deleterious effects in the classroom. Students from all social groups need access to instruction using technology.

Dewitt' (2007) findings are especially important given the results of the Pew Internet and American Life Project (2010). According to the Pew (2010) survey, only 57% of households with incomes below $30,000 use the internet on a daily basis while 95% of households with incomes above $75,000 use the internet on a daily basis. Furthermore, people from higher income households are also more likely to have a broadband connection to the internet than people from lower income households. By 95% to 75% higher incomes households are more likely to own a cell phone. In addition, lower income households are more likely to access the internet via a cell phone whereas higher income households are more likely to access the internet via a desktop computer given the higher status household more options in navigating the internet. According to the results of the Pew study, there exists a digital divide between lower income and higher income households. Teachers need to be cognizant of this digital divide and provide for instruction so that students from all income levels have access to experiences using digital technology.

The incorporation of 21st century technology is an ongoing affair and in many ways is still in its infancy. Social studies educators face the daunting task of evolving to

meet the demands of the technology driven society Friedman (2005) described. The more familiar social studies teachers are with technology, the more social studies teachers will incorporate technology in their classrooms and lessons (Dewitt, 2007; Zhao, 2007). While some educators will be resistant, or even fearful, of the technological revolution that has changed the world, they should not fret because research has uncovered that with education social studies teachers will become more comfortable with using technology in the classroom (Taylor & Duran, 2006). Future teachers will have a greater comfort level with technology because preservice social studies programs are incorporating the use of technology in the instruction of future social studies educators and future educators will be more versed in technology as they will be digital natives as opposed to digital immigrants (Bolick, Berson, Friedman, & Porfeli, 2007; Prensky, 2001). The fundamental goal of social studies remains the instruction of students so that they may become active knowledgeable democratic citizens capable of functioning within a democratic system. The technological revolution simply means that teachers should incorporate technology as one of the tools of social studies instruction. The literature demonstrates that it is possible to integrate technology in the classroom, but social studies teachers must use the technology to facilitate the development of higher order thinking skills. Lessons involving students as active participants in their learning while using computer technology will facilitate student interest and motivation (Britt, Perfetti, Van Dyke, & Gabrys, 2000; Clark & Lee, 2004). When the students become actively engaged learners participating in lessons involving 21st century technology such as GPS and GIS systems, learners will not only become more interested but will engage in inquiry beyond the scope of the lesson (Page & Shaunessy, 2006). Using advanced technology in the

classroom has increased student motivation and promoted student inquiry. Teachers need training to incorporate these technological strategies to their instructional practices and preservice programs are incorporating the use of technology into their preparation programs. As Burns (2006) points out, simply including technology in schools will not facilitate the learning of 21st century learning skills. While students may be digital natives as Prensky (2001) described, students may not be critical thinkers or problems solvers. Schools must facilitate the learning of technology through a paradigm of higher order thinking skills. One possible use of technology in the classroom that will combine the goals of integrating technology with a focus on higher order thinking is the use of instructional simulation games and reflective journaling.

Review of the Research on Higher Order Thinking Skills (HOTS)

A discussion of what constitutes higher order thinking is necessary to gain an understanding of what learning teachers should facilitate when students use digital technology in the classroom. Newmann (1991) stated that higher order thinking skills are cognitive skills that deal with expanding the use of the mind to solve problems using multiple sources of information. Higher order thinking happens when the student synthesizes, evaluates, or analyzes information because a question to be answered or a problem to be solved cannot be resolved through the routine application of previously learned knowledge. Furthermore, higher order thinking is relative to the person's prior experiences. Newmann wrote that lower order thinking takes place when a student memorizes information or simply comprehends knowledge gleaned from one source and narrowly interprets data. Newmann argued that when the student uses higher order thinking skills, then the student must use also use lower order thinking skills inclusively.

In other words, to evaluate, synthesize, or analyze a topic the thinker must be able to memorize and use data. Newmann stated that higher order thinking moves the learner beyond the bounds of subject areas and exposes the learning to authentic problems (Newmann, 1991b). Newmann emphasized that higher order thinking skills are essential for the development of democratic citizens as outlined by NCSS. Newmann listed six main dimensions of classroom thoughtfulness that facilitate the development of higher order thinking:

1. There was sustained examination of a few topics rather than superficial coverage of many.
2. The lesson displayed substantive coherence and continuity.
3. Students were given an appropriate amount of time to think, that is, to prepare responses to questions.
4. The teacher asked challenging questions and/or structured challenging tasks (given the ability level and preparation of the students).
5. The teacher was a model of thoughtfulness.
6. Students offered explanations and reasons for their conclusions.

Using these dimensions of classroom thoughtfulness, Newmann (1991) and his colleagues conducted observations of 160 lessons in five selected social studies departments involving 70 different educators in order to determine the amount of higher order thinking facilitated in social studies classrooms. The researchers observed the classrooms and rated the degree to which each of the principles of classroom thoughtfulness was apparent on a one to five point scale. Each of the researchers were tested for inter-rater reliability, with the raters agreeing 64% of the time and differing by

less than a point 96% of the time. Furthermore, the students completed a posttest to assess their higher order thinking ability. The posttest consisted of students analyzing a scenario and writing about whether or not the constitutional rights of the person involved in the scenario were violated. The researchers graded the papers on a scale of one to five depending on the persuasiveness of the students' arguments. The researchers grouped the students based on scores on a pretest of social studies content knowledge and writing ability. The results were that 65% of students scored a one or two, 11% scored a four, and only 1% scored a five on the posttest of persuasive writing ability. Newmann (1991) concluded that these results support the hypothesis that most students have difficulty writing about complicated problems. The result Newmann uncovered are partially explained by the fact that the researchers found 72% of the classes observed in the study scored less than three and a half on the one to five scale of classroom thoughtfulness. This result is surprising because the researchers sought out teachers and departments known for their focus on higher order thinking. Newmann and his colleagues concluded that the greatest indicator of success on the posttest was success on the pretest. The researchers hypothesized that classroom instruction in higher order thinking tends to reinforce students already predisposed to higher order thinking with little demonstrated affect on other students.

The ideas of educational theorist such as Newmann (1991, 1992) and others who advocate instruction in higher order thinking have their philosophical roots in the writings of John Dewey (1916). In *Democracy and Education: An Introduction to the Philosophy of John Dewey,* the philosopher explained how education should be about authentic learning that expands learning beyond the walls of the classroom that involves

real and meaningful student experiences. Dewey theorized that there are three types of educational experiences. Non-educative are experiences where the learner gains nothing because there is nothing to be learned. An example would be shaving for the 1,000th time the same way. There are "mis-educative experiences" were the learner learns the information incorrectly or is taught incorrect information. Dewey stated that mis-educative experiences are very dangerous because once a person learns a subject for good or ill, it is difficult to change a person's thinking. An example is the Christopher Columbus mythos referenced by Loewen (1996). Many Americans still recall the heroic tale of Christopher Columbus discovering that the Earth is round or braving terrible weather conditions for months on end while starving. Even though these Americans probably heard some version of a corrected Columbus history, they will often remember the version they learned first.

In a classroom focused on higher order thinking skills, the students would be less likely to have mis-educative experiences because they would reach their answers by thoughtful analysis of the facts or materials as presented. According to Newmann (1990), students would be more amenable to altering their previous understanding of an event because they would have an understanding of how that knowledge is constructed. The last educational experience according to Dewey (1916) is the "educative experience." In order to have an educative experience, the learner must be able to connect the material the student learned to a meaningful experience. Without meaningful attachment to the material, the student will have a non-educative experience or, even worse, a mis-educative experience.

The dangers of not learning higher order thinking skills, as Dewey (1916) and Newmann (1990) illustrated, is exemplified by Wertsch's (2000) study of how Estonians understood their history. Wertsch explained how Estonians, after the fall of the Soviet Union, understood two different histories of their land. Estonians could recount to the researchers the lecture history that glorified the Soviet Union taught under Soviet domination. At the same time, the Estonians could recount the popular history of Estonia that Estonians had passed down person to person. The Soviet history classes were effective at having Estonians memorize important names, dates, and places in the heroic Soviet history, but did not allow the Estonians to question this version. Wertsch's work points out that authoritarian regimes can attempt to impose control though drill and kill history lessons, but people can still construct their own historical knowledge. If the Estonians were allowed to have classrooms focused on higher order thinking, the "official history" would have even less validity as students could analyze and critique the knowledge presented in class. The use of higher order thinking skills provides the student with the ability to create authentic social studies knowledge based on the student's own reasoning, not the authoritarian gatekeeping of a power broker in the classroom such as an omniscient teacher or a textbook.

In order to understand Newmann's (1991) theory of higher order thinking skills, the Newmann's theory must examined within the framework of other educational theorists. Bloom (1956) described a learning taxonomy resembling a pyramid with lower order thinking tasks like memorization on the bottom and the highest levels analysis at the top, such as synthesis, and evaluation. Bloom believed that the lower order thinking skills are included when an individual uses higher levels of the cognition.

Newmann theorized that educators facilitate the development of lifelong learners when they foster understanding of the highest levels of Bloom's taxonomy of learning. Anderson and Krathwohl (2001) adapted Bloom's taxonomy of learning to incorporate modern theories of cognition. Anderson and Krathwohl created new verbs for the taxonomy and new dimensions to measure the verbs of the taxonomy. Figure 1 displays the modernization of Bloom's taxonomy by Anderson and Krathwohl.

Cochran, Conklin, and Modin (2007) point out that the modernization of Bloom's taxonomy will help teachers promote and evaluate students' learning during lessons incorporating technology because the new taxonomy creates a framework where educators focus on the process of learning and not simply on the outcome of students learning. The processes of learning at the highest levels of cognition are essential to creating authentic learning experiences (Newmann, 1991). Utilizing the modernized version of Bloom's taxonomy will help educators to delineate lower order thinking skills from higher order thinking skills with respect to classroom activities.

Knowledge Dimension	Cognitive Process Dimensions					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Figure 1. Anderson and Krathwohl's (2001) Taxonomy of Learning

Piaget's (1970) theory of cognitive development lends support to Newmann's ideas regarding higher order thinking skills in the classroom. The theory of cognition Piaget espoused was one of biological adaptation of a complex organism to a complex environment. According to Piaget's theory, the mind is constantly building knowledge structures interpreting those structures and reorganizing them to make sense of the world. Everyone moves through four stages of cognitive development according to Piaget, the sensorimotor from around age 0 to 2, the preoperational from 2 to 7, the concrete-operational from 7 to 11 and the formal-operational from 11 to 15. Piaget adapted his theory in his later years to incorporate research indicating that very young children were far more adept than Piaget first thought. The core of Piaget's theory is that children learn from their own experiences and construct their view of the world to fit their experiences while incorporating their new experiences to adapt their understanding of the world. An understanding of Piaget's theories helps teachers to create lessons that build on students' construction of their worldview.

While Piaget (1970) was focused on how an individual child interprets the world, Vygotsky (1987) focused on how the development of cognition was influenced by social experiences. Vygotsky examined how social interactions and internalization of experiences influences cognition. Children develop their habits of mind through social interactions with important people in their life. Speech, written language, and cultural interactions are all examples of knowledge constructed by the learner through interactions with others, according to Vygotsky. Furthermore, Vygotsky developed the theory of the zone of proximal development. According to the theory of the zone of proximal development, there exists a space of development that children can achieve on

their own without assistance from others, but in order to develop to higher levels of cognitive development children require assistance from others. Scaffolding or providing a framework during learning activities for students to make associations between what they already know and what they are trying to learn is essential to achieving higher levels of cognition. An understanding of the works of Piaget and Vygotsky are essential to educational theorists such as Newmann (1991) who wish to incorporate higher order thinking in the classroom. When viewed through the lens of understanding created by Bloom (1956), Piaget, and Vygotsky the importance of teachers facilitating higher order thinking in the classroom becomes apparent. Without the inclusion of higher order cognitive development in the classroom, students will simply become automatons unable to understand the complex interactions of their world.

A common criticism of educational theorists that focus on the development of cognitive skills is that students do not learn the basics when teachers focus on higher order thinking. Ives and Obenchain (2006) found that even then the classroom activities focused on higher order thinking strategies, there was no diminishing of a student's ability to demonstrate lower order thinking skills. Obenchain and Ives's conclusions supported Bloom and Newmann's assertions that to support higher order thinking, the student also must use lower order thinking skills. Obenchain and Ives study focused on higher order thinking skills and involved one teacher with two classes based on experiential education, while two other teachers taught four classes with traditional educational methods. The experiential education consisted of opportunities for student direction during learning, curriculum connections to the real world, and the opportunity for critical reflection (Druian, Owens, & Owens, 1980; Rahm, 2002; Dewey, 1938). The

HOTS instrument allowed for open-ended questions and the student responses were scored on a zero, one, or two based on the students writing. The lower order thinking instrument was a multiple-choice test based on the National Assessment of Educational Progress. The experimental group reported a mean of 3.81 on the HOTS pretest and a 3.44 on the HOTS posttest. The experimental group scored a mean of 18.06 on the lower order thinking skills (LOTS) pretest and a mean of 18.50 on the posttests. The control group scored a mean of 3.5 on the HOTS pretest and a mean of 1.8 on the posttest. The control group scored a mean of 15.4 on the LOTS pretest and a mean of 16.65 on the posttest. The researchers concluded that LOTS were unaffected from the experimental treatment while the experimental group demonstrated a statistically significant increase in HOTS versus the control group.

While lecture based social studies has the potential to stifle the creation of an effective citizenry, a focus on higher order thinking will help to facilitate the creation of knowledgeable, active, and effective democratic citizens (Suarez-Oronzco, 2007). According to Suarez-Oronzco, higher order thinking skills are exactly the skills needed to succeed in an increasingly globalized world. Suarez-Oronzco pointed out that in the modern world workers and citizens are expected to be educated on a number of technical, scientific, and social issues to fully function in society. In a traditional social studies classroom, students are passive learners and develop little problem solving ability. In a classroom focused on higher order thinking skills, the learner solves complex social problems and is open to collaboration with others from different backgrounds. Today's globalized American economy requires workers to be skillful collaborators and effective at higher order thinking tasks. The new paradigm created by

the digital revolution required educators to teach with a focus on higher order thinking skills that enhance the chances of positive learning outcomes for students.

What are the skills necessary for the maintenance of democracy? Citizens of a democracy must be able to analyze information, make evaluations about that information, synthesize data from multiple diverse sources, and create solutions for individual and community problems. The ability of citizens to engage in higher order thinking is a prerequisite for citizens to master the skills needed for the maintenance of a democracy (Friedman, 2005; Newmann 1991). Unfortunately, Newmann discovered that even in classes known for a focus on higher order thinking, many students did not attain an ability to demonstrate higher order thinking. In contrast, Ives and Obenchain (2006) found that teaching for higher order thinking using experiential educational techniques could foster the development of higher order thinking without a loss in lower order thinking skills. Suarez-Oronzco (2007) elucidated that the development of a functioning democratic society is predicated on the ability of citizens to engage in higher order thinking tasks such as collaboration, problem solving, and analysis of diverse information sources to maintain a democratic system. Theoretical support for a focus on higher order thinking skills can be found in the ideas of Bloom (1956), Piaget (1970, Vygotsky (1987) and Dewey (1916). On the other hand, dictatorial and authoritarian regimes foster the development of schools that use drill and kill lower order thinking social studies because it fosters the creation of a citizenry that is unable to analyze and interpret social data. The purpose of social studies in the United States, according to the National Council for the Social Studies, is to foster the creation of democratic citizens. If schools focus on enabling students to have meaningful learning experiences where the

student is the problem solver who can analyze, synthesize, and evaluate information, then schools will be preparing students for the challenges of maintaining a republic in the twenty-first century.

Research on Cognition and Video Games

While educational theorists such as Newmann, Dewey, and Bloom believe that that higher order thinking skills are essential for the development of lifelong learners, the context for learning higher order thinking skills has changed with the technological revolution currently taking place. As Friedman (2005) points out in *The World is Flat*, technological literacy is quickly becoming an essential life skill that schools must teach. One method to of incorporating technology in the classroom is by using video games as instructional tools. Gee (2007) is an advocate for the use of video games as educational tools for the modern world. In *What Video Games Have to Teach Us about Learning and Literacy*, Gee examined how video games facilitate real and meaningful learning experience:

> They (video games) situate meaning in a multimodal space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships and identities in the modern world (p. 40).

Gee thinks of video games as semiotic domains or the way a person makes sense of an area of knowledge. For example, the rules, movement, strategy, social aspects, maps, graphics, and websites associated with a video game would all be a part of the semiotic domain of the game. Furthermore, Gee emphasized that video games facilitate learning of higher order thinking skills that can enable learning of other semiotic domains. A

student who learns one semiotic domain, such as a video game, will be prepared to learn other related semiotic domains such as incorporating technology at work, according to Gee. The author also proposed that good video games, following his learning principles, could foster the learning of a semiotic content domain within the context of the video game semiotic domain. As learners become involved with a video game in a reflective and thoughtful way, they are required to learn the social content of the game in order to succeed. If the learning required by the video game coincides with educationally valuable content, then school learning will take place in the context of playing a video game. Thus, learning the semiotic domain of the game leads to the learning of the semiotic domain of school content learning.

Gee's (2007) assertions about the creation of video game knowledge are echoed by the constructivist views of Papert (1996). Gee describes the learning of semiotic domains within video games. According to Papert's views of constructivism, Gee is describing video game players' knowledge acquisition from a constructivist point of view. Video games provide learners with practice in the skill of learning. Specifically, Papert (1998) asserts that video games engage players with a demarcated learning project taking place in a limited time period where the learner has control over the learning process. Video game learning stands in sharp contrast to school learning where the teacher or curriculum designer is in control of the curriculum and learners are expected to do as they are told. Papert writes of three strategies that will help to create learning experiences from video game play. The first strategy is for students to talk about their learning and video game play. Reflective metacognitive practice will foster the development of authentic learning. Another strategy Papert identified to facilitate

meaningful learning from video game play is for students to become video game designers themselves. The creation of knowledge accesses the highest levels of cognition and creates meaningful learning experiences within and between students. Papert also asserts that video game designers should design games as platforms to foster the development of independent learners.

Gee (2007) found that most people preferred to play video games with others instead of playing video games alone. Gee determined that players preferred multiplayer games where they could hook multiple controllers into one video game platform, could network a number of computers into a local area network to play against each other, or log into special internet sites to play online only games against thousands of players. Gee studied players of several online games by observation and through interviews and concluded that play is inherently social and active. Second, Gee concluded that knowledge and skills to play video games is distributed across the player base and in many tools and technologies that reside in player created forums and FAQS. Finally, Gee learned that the attitude of the players involved in the game is highly meta-reflective. Through the course of game play, players greatly extended their knowledge and social connections by interacting with each other to problem solve their encounters in the video game. Multiplayer video games and, to a lesser degree, single player games became social experiences for young people that force students to expand their knowledge base by fostering learning of other semiotic domains that are relevant to good game play. This type of social reflective learning is an essential element of higher order thinking and is rarely found in traditional based school education. Gee postulated that video games can

facilitate real and meaningful reflective learning that will prepare students to become citizens who can fully and meaningfully participate in our technology driven world.

One major issue missing from Gee's (2007) work is a discussion of students who are not proficient in playing video games or whether students, who do not like video games, learn at the same or different levels as those who enjoyed video games. Squire (2006) found that students who are not proficient or interested in video games are not motivated to participate in lessons involving video games. How can teachers use video games in the classroom if students do not want to play video games? A research question Gee did not ask is how students unfamiliar with or uninterested in video games learn from video games. An examination into the impact of students prior interest in video games is necessary to gain a broader understand of the effects of using video games as instructional tools.

While Gee (2007) offers an overview of how people make sense and learn from video games, other researchers are examining how video games can facilitate the learning of higher order thinking skills. In *Assessing Higher Order Thinking in Video Games*, Rice (2007a) theorized that the use of video games could facilitate students' higher order thinking. Rice studied how different types of computer games affected cognition and developed a scale to rate the level of cognitive ability required by a video game. In an analysis of how students played the computer game Civilization III, Rice found that game players utilized higher order thought to solve complex problems. According to Rice, computer games that stimulated the highest cognitive activity immersed students in a 3D environment, and the game required problem solving with other participants in a multiplayer environment. If Rice's research is accurate, social studies professionals

should foster the creation of video games using 3D and multiplayer environments with a subject matter focus. Rice's conclusions about what types of video games would inspire the greatest level of cognition provides a road map to analyze how the use of video games in the classroom affects higher order thinking.

Whereas Gee (2007) and Rice (2007a) are concerned about the use of video games as learning devices, other researchers are concerned about how different genres of games facilitate the creation of communal learning. One class of game that researchers have begun to analyze is Massively Multiplayer Online Games (MMOG). MMOG's are becoming a major mechanism of socialization for young and old alike (Steinkuehler, 2008). MMOG's are games that involve literally thousands of players participating in a shared gaming experience via the internet. In a typical MMOG, players can team up to fight artificial intelligence (AI) monsters, complete quests, or fight other players. Steinkuehler undertook a qualitative case study of participants of the MMOG Lineage. Lineage is a game that is set during medieval times with various human participants in the game vying for control of castles within the virtual kingdom. Through her research involving the participants in Lineage, Steinkuehler concluded that players in MMOG's learned through full participation in genuine game play with more knowledgeable/skilled others. Players had to play with others in order become fully literate in their game play. The multiplayer game play forced players to learn at the outer edge of cognitive competency. Off screen, in the real world, players built spreadsheets of game information and communally developed FAQ's to help them better understand and play the game. In short, the research found that MMOGs facilitated the development of communities of video game literate learners. The researcher found that participants in

MMOG's reflected on their play away from the game by engaging in the use of electronic forums and internet based research to further their game play activities.

Steinkuehler (2005, 2008) emphasized that further research needs to be conducted into the areas of MMOGs in order to understand how to effectively build learning communities modeled upon online games. Steinkuehler found that MMOG players became very literate with their gaming community by literally spending thousands of hours on their game play to become hard-core gamers. Hard-core gamers are gamers who typically spend more than 15 hours a week or more playing video games. Steinkuehler did not investigate if the literacy created by hard-core gamers could be transferred or expanded to other learning environments. Steinkuehler studied literacy only within the video game community, and she did not examine if players were learning any other type of knowledge. Furthermore, the researcher did not examine if playing an MMOG facilitated higher order thinking.

Rieber, Smith, and Noah (1998) provide examples of instructional practices that utilize video games and provide students with the opportunity to engage in meaningful learning experiences. Rieber et al. (1998) advocate the idea of serious play or play that encourages children or adults to engage in creative higher order thinking coupled with intense personal commitment and involvement. Tens of millions of people play video games each day and often spend more than 50 hours playing a single game over the course of a few weeks. Playing video games is a serious learning experience requiring purposeful concentration and motivation on the part of the player. Rieber et al. sought to develop a framework by which the world of education could meet this intense world of self-motivated video game learners. The researchers make the point that the use of video

games in the classroom cannot be a reward but a part of an instructor guided meaningful learning experience. Rieber et al. describe a lesson utilizing the popular game SimCity as an instructional video game allowing students to control their own learning. Students remained engaged in the lesson and worked cooperatively to solve the socioeconomic problems of their model cities.

Gee (2007), Rice (2007a), and Steinkuehler (2008) demonstrated the potential of video games that follow Gee's learning principles and Rice's cognitive skills to promote higher order thinking, reflection, and social learning. Steinkuehler used qualitative methods to demonstrate that multiplayer video games promote community and video game literacy, which according to Gee can lead to the learning of skills essential for success in the 21st century world, however, she did not make any specific analysis of what was being learned or how educational content could be learned from video games. Gee outlined principles of good video games and made the case that learning the semiotic domain of video games would lead to learning of other meaningful real world skills such as the ability to analyze and interpret information from multiple and varied sources, but Gee did not elaborate on how teachers could incorporate video games effectively in the classroom. Rice outlined the principles of video games that would lead to high levels of cognitive learning, but Rice did not test his ideas about cognition in video games in real world experiences. Missing from Rice, Gee, and Steinkuehler's analysis is what happens when video games enter the classroom and what measurable learning is taking place during the use of video games. Right or wrong, our schools are currently designed around the paradigm of standardized testing with students involved in high stakes test that determine their educational future. Lessons that facilitate real and meaningful higher

order thinking skills, at the cost of the knowledge to pass these high stakes tests, are simply not options in our current educational establishment. Rieber, Smith, and Noah (1998) describe attempts by educators to incorporate meaningful positive learning experiences using video games. Educational researchers should examine lessons like the one described by Rieber et al. (1998) that incorporate video games which affect students' ability to learn both higher order and lower order thinking skills that are essential for the creation of an active and knowledgeable citizenry.

Research on the Instructional Use of Video Games in the Classroom

Watson, Mong, and Harris (2011) researched how students and a teacher experienced the use of Making History 2.0: The Calm and the Storm, an educational simulation video game, in the classroom. The researchers observed four lessons of a social studies teacher using Making History in the classroom. The study by Watson et al. (2011) utilized qualitative methods such as observations using video cameras, focus groups, and individual interviews. During the course of the study, Watson et al. observed a regular class characterized by teacher lecture and three lessons utilizing Making History 2.0. The research team also spent a day conducting follow up interviews. Watson et al. concluded that students were more engaged during the lessons using the simulation video game. During the typical teacher lesson, the researchers noted that several students had their heads down or were not paying attention. During the lesson utilizing the simulation video game, students were more engaged and focused on "winning" the game. Watson et al. did collect post assessments of student understanding after the video game lessons, but the researchers did not indicate if the posttest revealed student learning during the video game experience. Watson et al. concluded that students' verbal comments and interview

responses did indicate that students were relating their video game experiences to prior learning. The research of Watson et al. demonstrated the possibility that using Making History 2.0 as an instructional tool in the classroom can potentially led to the greater student engagement.

Another relevant aspect of Watson, Mong, and Harris's (2011) research is the teacher's perspective on using video games as classroom tools. A teacher who had used Making History 2.0 in the classroom for four years taught the classes used in the study of Watson et al. (2011). The teacher interviewed believes that the use of video games in the classroom encourages student engagement, allows students to participate in active lessons, and provides students with problem solving experiences. When the teacher began to use Making History 2.0 in the classroom, the teacher had student play the single player version of the game, but realized that some students had difficulty with a single player version of the game. The teacher refined the use of Making History 2.0 by incorporating collaborative opportunities for the students by pairing students during their game play. Based on the data analysis generated from the interview with the teacher and the class observations, Watson et al. concluded that a lesson utilizing video games in the classroom must be collaborative in nature and have instructional support in place. Based on the teacher's instructional experiences, a teacher using a video game as a lesson cannot simply put the students in front of the computer and expect students to learn and be engaged. According to Watson et al., teachers must design instructional lessons using video games that create opportunities for student reflection and collaborative problem solving. What Watson et al. do not address in their study is if students experience a

positive cognitive outcome because of their experience using a video game in the classroom.

McDonald and Hannafin (2003) examined if the use of web based video games helped students prepare for a high stakes standardized test. In McDonald and Hannafin's study, 22 students were given the opportunity to play online video games to study for an upcoming state administered standardized test. The standardized test results of the experimental group students were used as data in the study. The results of a control group of 21 students in a "traditional" class were also used to compare the data of the experimental group. McDonald and Hannifin found that the test scores of the experimental group were higher than the control group but not statistically higher. Based on the observation of the students in each of the treatment groups, McDonald and Hannafin concluded that while there was no statistically significant increase in students' test scores, students were more engaged in groups playing the video games. According to McDonald and Hannafin, the use of the video games changed the classroom from a teacher centered classroom a student centered classroom. While McDonald and Hannafin's study provides observations to support to the claim that students are more engaged while playing video games the researchers did not provide any statistically significant evidence to support their claims that students are experiencing cognitive gains because of video game play. The research of McDonald and Hannifin demonstrate the need for more research regarding cognition and the use of video games as instructional tools.

In another study of the impact of using video games in the classroom, Tuzun, Yilmaz-Soylu, Karakus, Inal, and Kizilkaya (2009) studied the effect of using a 3-

dimensional video game with primary school students. Tuzun et al. (2009) conducted the research study at a primary school in Turkey. The school's administration selected the 24 participants in the research study from volunteers. Each participant played the video game for one hour each week over the course of three weeks. Only 13 students completed each of the lessons and participated in all aspects of the research study. The participants were given a pretests and a posttest to determine if they experienced cognitive gains because of their game play. Tuzun et al. reported that the participants did experience a statistically increase in the scores between the pretest and posttest. The researchers also collected qualitative data and utilized a mixed methods approach. After a review of the quantitative and qualitative data gathered, Tuzun et al. concluded that the use of the video game led to an increase in students' intrinsic motivation for classroom participating in class and led to a decrease in extrinsic motivation. The video game also provided students with a student centered learning environment transitioning away from the teacher lecture dominated classroom. The conclusion of Tuzun et al. is that the increase in intrinsic motivation and student center aspect of the lesson led to the cognitive gains demonstrated by the students. While the research of Tuzun et al. fits within the prior literature findings, the small sample size and method the researchers used to select the participants limit the generalizability of the research study to the group studied.

While McDonald and Hannafin (2003) and Tuzun, Yilmaz-Soylu, Karakus, Inal, and Kizilkaya (2009) were focused on primary students and the use of video games as instructional tools, Egenfeldt-Nielsen (2005) studied the use of the video game Europa Universalis II as an instructional tool. Egenfeldt-Nielsen utilized the video game as an instructional tool in a Danish high school with 72 students. The students involved in the

study struggled to understand the game and to connect their understanding of history to their video game play. Egenfeldt-Nielson found that students in the study did gain experiences in their understanding of history through their video game struggles. The researcher postulated the difficulties encountered by the students during their game play were an instructional design issue. Egenfeldt-Nielson concluded that the use of video games as instructional tool requires specific educational goals.

Review of Research on Video Games and Reflection in the Classroom

Saye and Brush (2007) examined how students responded to a lesson involving student analysis of the Civil Rights Movement using an online database. Saye and Brush had students examine what strategies civil rights activist were justified in using to achieve social justice by accessing an online database of over 1,000 multimedia articles related to the Civil Rights Movement. The researchers conducted the study in four different classrooms with three regular level classes and one remedial class. The students were required to participate in the lesson and then present their views and findings to the class in the form of a presentation. The researchers found that the teachers involved with the study were reluctant to provide more than minimal scaffolding to the students. According to Saye and Bruch, the teachers in the study seemed to believe that the software program provided the scaffolding. The reluctance of the teachers to use scaffolding allowed the researchers to examine how little or no scaffolding influences student learning when the database is used. Saye and Brush found that constant scaffolding increased students' ability to think critically about the lesson. The researchers' conclusions suggest that removing scaffolding from progressive lessons may be detrimental when the lesson requires higher order thinking skills. Saye and Brush's

results imply that when incorporating digital technological affordances such as databases in the classroom it is essential to provide constant teacher facilitated instructional support to ensure student reflection. In addition, Saye and Brush's findings lead to the conclusion that when using video games in the classroom, teachers should provide instructional support, such as mandatory reflective sessions, to facilitate student reflection and learning.

The findings of Squire, Barnett, Grant, and Higginbotham (2004) support the conclusions of Saye and Brush (2007) about the value of scaffolding during a lesson using technology. Squire et al. (2004) conducted a study that examined the instructional value of the computer game Supercharged. Researchers at the Massachusetts Institute of Technology developed the game known as Supercharged that is designed to teach students the properties of electromagnetism and physics. The study used four middle school classrooms, with three classrooms playing Supercharged and one classroom acting as the control group. Squire et al. discovered that the students were playing the game without critical reflection, so the researchers changed the study midstream. The researchers had the students reflect in the form of notes, charts, and verbal reflections about their gaming experience. Students were encouraged to make predictions and plan their future strategies about game play. The researchers noted that this scaffolding provided the students with the means to critically analyze and reflect upon their game play. The researchers did not examine the effects of this scaffolding on game play nor did they offer the control group the chance to reflect except through traditional educational practices. The researchers found that the experimental group and the control group both performed at higher levels on the posttest than the pretest, but the quality of

written analysis was superior in the case of the experimental group. While both groups scored at a high level on the lower order assessments, the experimental group offered detailed explanations using language from the video game as to qualities of electromagnetism. The control group only offered limited and nonspecific explanations for how electromagnetism worked. The researchers hypothesized that participation and active engagement in the lesson fostered the ability of the experimental group to understand electromagnetism. The video game provided a context for student learning that is absent from most traditional education methods, and this context gave students an anchor to learn the material.

In *Changing the Game: What Happens When Video Games Enter the Classroom,* Squire (2005) engaged in one of the few studies that examined the educational possibilities of video games in the classroom. Squire noted that completion rates for online courses barely reach 50%, while yet millions of gamers spend hundreds of hours playing and mastering video game literacy. Squire's argument is that while e-learning is dull and ineffective, games have developed a reputation for being fun, engaging, and immersive. Video games facilitate behaviors that could potentially foster higher order thinking. Squire designed case studies to examine what happens when video games enter the classroom. Squire selected two sites to introduce Civilization III in the classroom. One case study was a class in an urban high school with a diverse population that, according to teachers' reports, had little interest in learning history. The second case study was an after school program in an urban middle school. The study encompassed 18, 50 minute class periods in the urban high school and 8, 2 hour 30 minute sessions in the after school program.

Squire (2005) hypothesized that the introduction of video games in the classroom would increase students' motivation to learn, would cause players to participate in new identities, and better understand the world from a professional perspective. The researcher conducted student interviews, observations, teacher interviews and collected field notes during his case study. Squire immediately found that in the actual school setting about twenty-five percent of the students were resistant to the introduction of the game in the classroom. The students resistant to the video game asked about the purpose of the lesson repeatedly. These resistant students stopped playing the game and elected to participate in reading groups, while the rest of the class played the game. Twenty-five percent of the students, typically the underachievers, loved playing the game. The underachievers who loved the game reported that they were replaying history and considering hypothetical historical scenarios. Squire reported that the motivated students developed new vocabularies, better understandings of geography, and more robust concepts of world history. The students had the choice of participating in a multiplayer or single player version of the game. Squire concluded that students were more motivated when playing each other in a multiplayer game, but students could also effectively learn from a single player version of Civilization III.

While Squire (2005) demonstrated that the use of video games in the classroom can foster learning, the study is limited because of the massive investment in time required for the lesson, because a full quarter of the students involved chose not to participate, and the fact that Squire reported no quantitative data supporting his claims that students developed greater historical understanding. In the modern classroom, no teacher can justify using 18 hours of classroom instruction on one lesson. Eighteen hours

is nearly a month of instruction time. Educators can use video games as instructional tools, but video games should not become the only avenue of instruction. Squire observed that real and meaningful student learning has taken place. Squire reported that 25% of the students in the classroom were very excited and involved meaningfully in the lesson leaving 75% of the class as not meaningfully involved or not participating. A lesson that leaves out the majority of the class is a failure. Squire's study holds promise that multiplayer and single player gaming can facilitate the development of higher order thinking, but in this study, the video game became the classroom to the detriment of a large number of students.

Why Study Video Games in the Classroom?

Social studies teachers face a daunting challenge. They are required to facilitate the learning of skills that will lead students to become democratic citizens. Citizens must be able to analyze, synthesis, and evaluate a plethora of divergent data from a wide variety of sources and be proficient in digital technologies to be successful citizens in the 21st century (Friedman, 2005). According to Prensky (2001), one issue facing educators in the early 21st century is that teachers are digital immigrants and students are digital natives. The challenge is for teachers, who are digital immigrants, to educate students who speak a different technological language. Teachers are now using technology in the classroom, but are not using technology to facilitate the development of higher order thinking that citizens need to participate in a democratic society (Burns, 2006). One technique that can possibly help social studies teachers to face this difficult challenge is to place students in video game simulations requiring students to become active learners of meaningful content such as immersing the students in a simulated political crisis.

Educational researchers such as Gee (2005a, 2007), Squire (2005) Rice (2007a), and Steinkuehler (2008) have begun to study the efficacy of using video games to facilitate real and meaningful learning. Gee and Rice outlined learning and cognitive principles that video games should incorporate if they are to be included in the classroom. Squire, Barnett, Grant, and Higginbotham (2004) found that using instructional video games in the classroom in concert with scaffolding increased student performance on written and verbal higher order thinking tasks. Saye and Brush's (2007), as well as Squire et al. (2004), researched the use of scaffolding during the course of technology lessons. The results of Saye and Brush's study indicates that when technology is incorporated as an instructional device then continuous scaffolding is needed to ensure student comprehension. To expand upon the research of Saye and Bruch, research into how scaffolding designed to create reflective opportunities for learners was undertaken. Gee, Steinkuehler, and Squire reported that students are more motivated and engaged when playing video games in groups. Furthermore, according to these researchers, this high level of involvement leads to higher order thinking regarding the video game and the content of the video game. To test the conclusions of Gee, Steinkuehler, and Squire, additional research needed to be conducted on the impact of multiplayer games and single player games on student learning. Squire's examination of the use of Civilization III in the classroom raised questions about how players who are unfamiliar with or uncomfortable playing video games were impacted by the inclusion of video games in the classroom. Squire highlighted that students who enjoyed playing the video game learned new approaches to history, learned how to analyze history, and developed new language schemas to describe history. To explore Squire's conclusions, an analysis of how the

attitudes of students and familiarity of students towards video games influenced students' learning was required.

Video game producers have made broad sweeping claims of educational nirvana provided by educational video games. A review of the literature indicates support for the theory that video games can facilitate the development of higher order thinking skills when learners play video games in a collaborative setting that allows for reflective opportunities. Furthermore, research indicates that learners who enjoy playing video games are more apt to enjoy participating during with lessons incorporating video games. No study reviewed in this literature review incorporated an analysis of the role of reflection, collaboration, and prior learner interest on the cognitive outcomes of learners participating in a lesson utilizing a simulation video game. An investigation into the effectiveness of the use of simulation video games as an instructional method is a timely research subject whose results will help further our understanding and test the claims of the video game producers. Using the information obtained from a review of the literature, the researcher analyzed the impact of instructor guided reflection on learners' cognitive outcomes, explored impact of multiplayer and single player groups on learners' cognitive outcomes, and evaluated the impact of learners' prior interest and exposure to video games on learners' cognitive outcomes during the use of an instructional simulation video game.

CHAPTER 3

METHODOLOGY

Research Hypothesis

The purpose of this study is to examine the impact of using educational simulation video games in the secondary social studies classroom. Specifically, this study will focus how the use of instructor guided reflection affects the learning of higher order thinking. Additionally, the impact of prior student interest and familiarity with video games on student learning with an educational simulation video game will be evaluated. The research hypotheses are as follows:

1. Participants in an educational simulation video game with reflective journaling will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no reflective journaling.

2. Participants in an educational simulation video game with reflective journaling will exhibit greater levels of lower order thinking tasks on posttests than participants in the same simulation with no reflective journaling.

3. Participants who participate in a multiplayer version of an educational simulation video game will exhibit greater levels of higher order thinking skills on posttests than participants involved in a single player version of the same educational simulation video game.

4. Participants in an educational simulation video game with prior interest in video games will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no prior interest in video games.

Participants and Sample Characteristics

The researcher used a convenience sampling of World History secondary classes in one suburban Southeastern school located in a major metropolitan area to answer the research questions. Five secondary classes at the high school participated in the study. The principal researcher was a teacher at the high school where the research was conducted. None of the researcher's classes were involved in the study. The participant classes range in size from 25 students to 32 students. The classes involved in the study were all college preparatory world history classes. College preparatory classes include general and technical level students and are considered the on track "normal" level of students. The school also has "honors" and "advanced placement" World History courses. The original sample included 154 participants of which 128 completed all aspects of the research project. The researcher obtained IRB approval and all participants and their parents signed informed consent documents prior to the inclusion of their results in the study. The high school reports that 58% of the students are identified as White, 24% are identified as Black, 12% are identified as Hispanic, 4% are identified as Asian, and 3% are identified as Multiracial. Furthermore, 37% of the students at the high school used in the study were on free or reduced lunch. The classes involved in study reflected the overall demographics of the school.

The researcher randomly assigned participants to the four treatment groups. The four different treatments were multiplayer simulation game with reflective scaffolding,

single player simulation game with reflective scaffolding, multiplayer simulation game with no reflective scaffolding, and single player simulation game with no reflective scaffolding. The researcher randomly assigned the participants by rolling a four-sided die for each student. A number was assigned to each treatment group: 1 = multiplayer reflective scaffolding, 2 = single player reflective scaffolding, 3 = multiplayer no reflective scaffolding, 4 = single player no reflective scaffolding. The school followed a modified block schedule during the administration of the study. The full research study involving the pre survey, treatment, and posttests took place over one normal 60 minute class period and two 120 minute block class periods or 300 minutes. Due to absences during the course of the study, 18 participants did not complete all aspects of the study. Eight participants did not complete the necessary IRB paperwork to participate in the study. The researcher administered the simulation game described below to reduce the influence of the differing teaching styles of the regular classroom instructors. The regular classroom teacher remained in the computer lab to monitor his or her class. The researcher obtained permission to conduct the research study from the school system, teachers, and the principal of the school involved in the study.

The participants participated in the study in the last month of the school year after the unit of World War II. All of the participants in the lesson had participated in lessons involving World War II and the prewar period used in the simulation of Making History 2.0. The high school used in the study had 14 computer labs, each with 32 computers. Each classroom was equipped with a student desktop and all teachers were provided laptop computers. Teachers at this suburban high school regularly hold classes in the computer labs and most students are experienced at using the school's computers. The

teachers whose classes participated in this study had class in the computer lab regularly ranging from one teacher taking their classes to the computer lab on a weekly basis and one teacher taking their classes on a monthly basis. Most of participants in this study had prior exposure to the school's computers. All participants already had student computer login codes.

Alignment with Performance Standards Curriculum

The state has set statewide curriculum standards for all content areas. The standards are known as the Performance Standards. The standards for World History indicate that the course will provide students with a comprehensive, intensive study of the major events and themes in world history. The video game used in this study provided a simulation of the geo-political state of the world directly prior to the beginning of World War II. The content in the video game aligns with standards SSWH 17 and SSWH 18. The curriculum standard SSWH 17 states that students will be able to identify the major political and economic factors that shaped the world between World War I and World War II. Standard SSWH 18 states that, students demonstrate and understanding of the global political, economic, and social impact of World War II. Participating in a simulation of the period will give students the opportunity to meet these curriculum expectations.

The Educational Simulation Game: Making History 2.0

The study required a computer lab equipped with 32 computers. No regular classroom in the school contains 32 computers, thus the researcher conducted the study in one of the many computer labs located in the school. The policy of the school is that all

computer programs installed on school computers must be approved and installed by the county technology personnel. The school system granted permission to install the computer software and the county technical staff installed the program in a computer lab that was centrally located near all of the teachers' classrooms involved in the study. The program requires Windows XP or 2000, a Pentium III or Athlon 1.0Ghz processor, at least 512 MB of memory, 32 MB of video memory, and the installation of Direct X 9.0c. A sound card was required, as well. The school's computers met these technical requirements for the game and each of the computers was wired for an internet connection making the multiplayer game possible.

Making History 2.0: The Calm and the Storm produced by Muzzy Lane was the educational simulation video game utilized in the study. Muzzy Lane granted permission to use Making History for this research study and granted the researcher site licenses to install the video game on the school's computers. Making History is a simulation of the world from the years of 1936 to 1945. In effect, the game is a simulation of the geo-political setting of the world prior to and during World War II. The players of the game assume the role of one country in the world. The player controls the country's production of goods and services, finances, military, diplomacy, and international trade. The game is a turn-based game, where each player decides all of his or her country's actions for a turn, then proceeds with the turn by clicking on the next turn button that implements his or her actions at the same time as all of the other players of the game. The countries of the world not controlled by a human player are controlled by the software's artificial intelligence program. The computer controlled artificial intelligence (AI) program attempts to run the country according to the geo-political situation of the time period.

Figure 2. Making history 2.0 user interface with victory conditions.

The version of Making History used in this study is specifically designed for the classroom and has been classified by Muzzy Lane as the "educational version" (Muzzy Lane Software, 2007). The education version allows the instructor to observe multiplayer games, set the turn time limits, set victory conditions, and receive reports on students' game decisions. Making History grants the instructor several options for how players can "win" the game. Figure 2 displays a screen shot from Making History. Players can win on alliance scoring, world power scoring, or ideology scoring. In Figure 2, the scoring method is alliance scoring which is the default scoring system for the game. Alliance scoring aggregates the score of all the nations allied and the alliance with the highest point total "wins". This study utilized the alliance scoring method. Players' scores are

measured by the nation's manpower, industry, resources, and financial outlook found along the top bar of Figure 2. The player is measured on how much "manpower" or labor his or her country can produce, how much the county actually produces, how many resources the county collects, and how fiscally sound the player is with the country's budget. Victory is only achieved if the player manages his or her nation well. Making History offers the player a choice of six separate scenarios encompassing different time periods prior to and during World War II. Figure 3 displays the scenario used in this simulation that places the players in the time period from September 1, 1938 and lasts 30 game turns until March 30, 1939. Each game turn approximates about one real time week. The players can choose to represent the United Kingdom, France, Soviet Union, Italy, or Germany. At the beginning of the scenario, Germany demands that Czechoslovakia give up the Sudetenland. The player faces the same challenges as the world leaders of the time with the major exception that the player is in the role of total dictator. While players in the game can choose to participate in commerce and diplomacy, the artificial intelligence (AI) in the game normally forces players to engage in warfare. While no participants in this study expressed a concern regarding the prevalence of warfare in the game, there exists the potential for players to feel alienated due to the central role of conflict inherent in the game. The geopolitical situation of each of the nations involved in this scenario force the player to make decisions about what products to produce, how to spend their money, and how to deal with their neighbors. Making History forces the players to make their own country's history.

In accordance with good instructional video game practices, Making History offers players a tutorial that facilitates the learning of game play. The tutorial engages

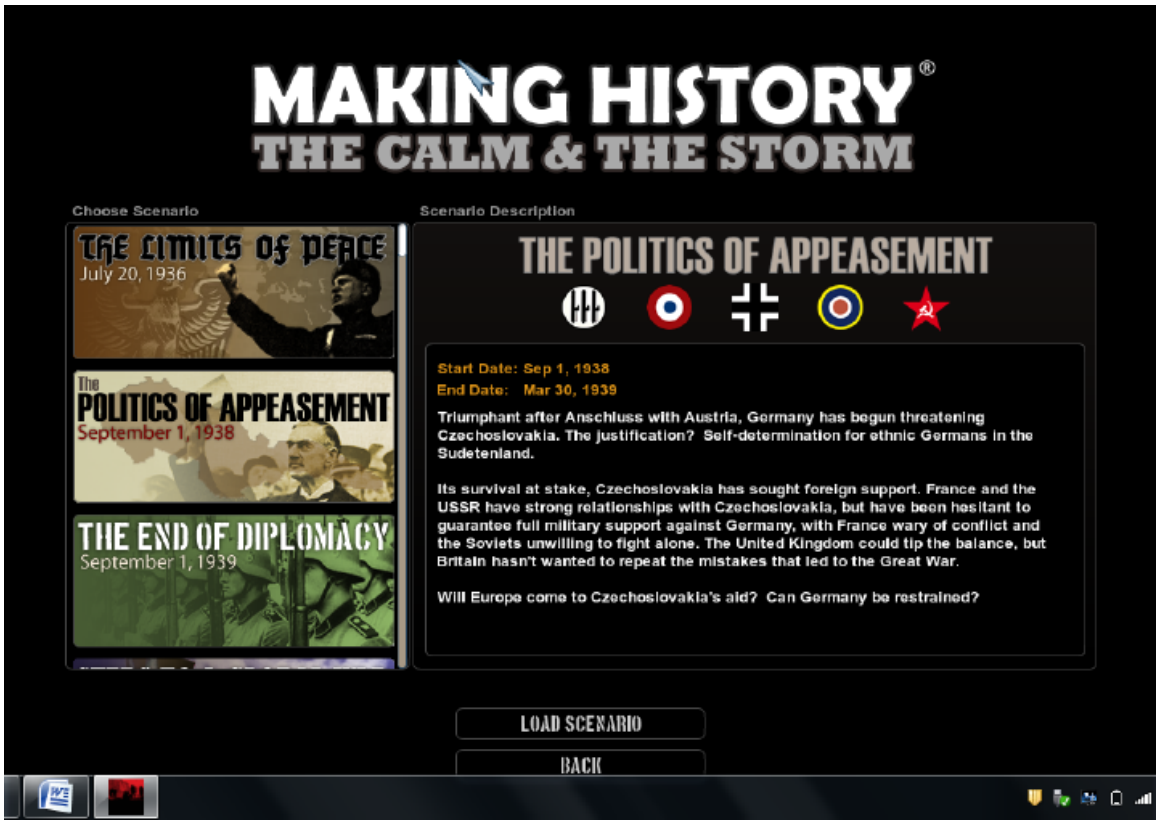

Figure 3. Making history 2.0 scenario information.

the player with the game controls and teaches the individual how to engage in economic, military, industrial, diplomatic, and trade activities. The tutorial acts as a digital sandbox, a safe haven for players to learn how to play the game without negative in-game consequences (Gee, 2007). Digital sandboxes are essential parts of educational video games as they give players a chance to learn how to use the software program. Without the digital sandbox, the player would spend more time during the simulation learning the controls of the game instead of engaging in thinking about the simulation.

After participating in the tutorial, the game begins with the player in charge of one of the principle nations of Europe on September 1, 1938. The player views a map of the entire world and can zoom in and out of the map. The player can zoom in to see a close-up of a city or can zoom out as far as a map of the globe. The political borders of

Figure 4. Making history 2.0 primary map.

the countries are displayed on the map, with the individual regions of the nations outlined as well. The player can toggle between different maps of the world. Figure 4 displays the primary map that shows the placement of armies, cities, resources, naval units, air units, and political boundaries. Additional maps show individual conflicts between armies, the current alliance system, the different ideologies of the nations of the world, the regions of the world a participant's nation can supply, or the current world naval embargos. The different political ideologies in the game are Democracy, Fascism, Communism, and Authoritarianism.

The players can issue orders by using the mouse to click on the different cities or regions. Alternatively, the player can use the menu bar on the right hand side of the screen to select regions or cities. The player can order cities to produce arms, goods for

trade, land army units, naval units (if a port city), or air force units. The player can also choose to upgrade the city's industry or conduct research into new technologies to improve the infrastructure or military technology. Each city has a certain number of manpower units depending on the city's population and level of technology. If the city is well managed and not damaged, the city will produce at its maximum capacity. During wartime, if the city is not supplied with resources, the city will produce less than its maximum output. If players click on the regions outside the cities, they can choose to delegate resources to increasing food output, increasing the fortifications of the region, or increasing the transportation of the region. All of these actions will improve the player's nation power points.

The challenge is that each of the preceding actions has a cost and will take differing amounts of time depending on the resources available to the region. Players must also manage their nation's production of coal, oil, steel, and food. If any of these resources were not adequately produced, the nation and consequently the nation's output would be diminished. Players quickly realize that one of the most difficult tasks in the game is to keep a nation's budget under control. Furthermore, if a player chooses to build a large military force, then he or she must also produce enough arms to supply their military. An army that is not sufficiently supplied in the game will quickly be defeated. As in the real world, armies in Making History are very expensive to build, operate, and maintain.

Players will often find that their nation is lacking in some critical resource. Just as in real life, nations controlled by players will turn to international trade to make up their resource shortcomings. They can negotiate trade treaties requesting foreign aid,

negotiate trades of one resource for another, or simply buy or sell resources on the world market. The players must become adept and ascertain which nation will trade with them, which nations have the resources they need, and which nations desire the player's surplus resources. The diplomatic aspect of the game confounds international trade. Allied nations can react negatively if a player trades with their enemies. Wars and embargos can hamper international trade.

The game allows the player to engage in diplomacy with all of the nations of the earth. Players can make alliances, military access treaties, declare an embargo, demand a territorial secession, grant independence to a colony, and declare war. The computer artificial intelligence (AI) is programmed to respond as if it was a world leader during the time period. The AI in Making History is predisposed towards conflict. For example, if a player is playing the part of France and the AI controls Germany, Germany will typically invade France within a few turns of the start of the game. Furthermore, the AI is not apt to form alliances unless that alliance was also formed in real life. Nations with similar forms of government are more apt to form alliances, while nations with differing political systems are apt to go to war. Nations controlled by the computer will act in their nations' own best interest.

In the scenario selected for this study, the player had 30 turns with each turn lasting three minutes. Nations were scored based on manpower, resources, industry, and financial information. There were several possible ways for a player to win. A player could attempt to conquer the world by taking over as much territory as possible, but the player will quickly find that this is a very expensive proposition. Conquered territories increase a nation's resources, manpower, and industry, but the conquered regions produce

at a reduced output and the soldiers lost in taking the region count against the nation's points. Players could also attempt an economic victory by building up their nation's infrastructure and industry and forming alliances to keep themselves safe from invasion. In addition, a player could attempt to dominate world trade and become an economic power. A player could try some combination of these three paths to victory. Victory in Making History requires a player to successfully manage his or her nation's finances, diplomacy, industry, and military.

After 30 turns are completed, the game ends and one alliance is granted the "victory" based on alliance power points. Figure 5 is an example of the game reports produced for the researcher and each student of each nation's manpower, alliances, industry, resources, and finances at the conclusion of the game. Muzzy Lane designed

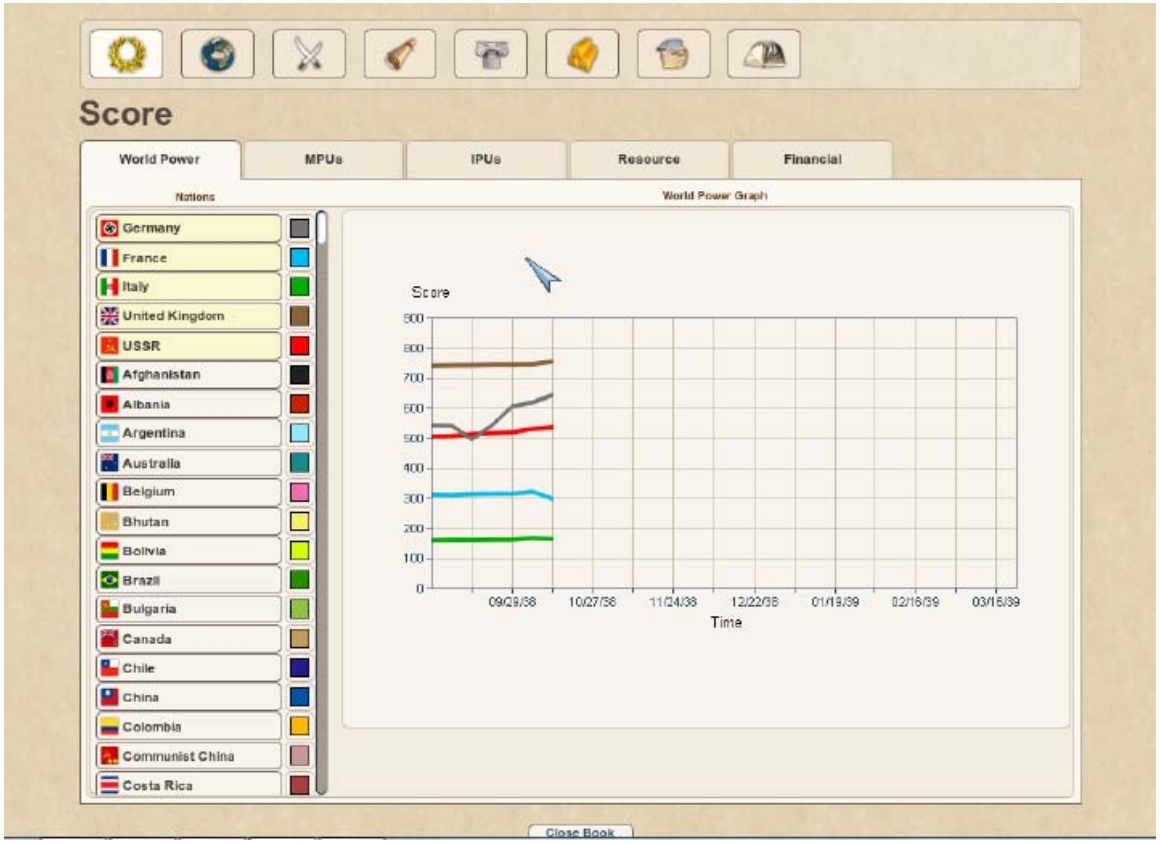

Figure 5. Making history 2.0 game report.

Making History 2.0 to be used after students have already learned about World War II. In the classes that participated in this study, the students previously learned about World War II in their world history classes. Handouts are provided by Muzzy Lane to help students understand their country's situation during each of the scenarios of the game. At the start of the lesson, participants received handouts explaining the scenario and their nation's geo-political position. The lesson began with a short 5 minute teacher centered discussion of 1938-1939 and Making History 2.0. The students played the tutorial of the game, which lasted approximately 30 minutes. The researcher randomly assigned each participant to one of the five countries in the game by using an online random number generator prior to the start of the lesson. Participants played the thirty turns of the scenario with a time limit of three minutes per turn. The simulation itself took between 130 and 180 minutes depending on the individual participants. The total time taken by the lesson, including the instruction and tutorial was between 190 and 240 minutes.

Making History 2.0: The Calm and the Storm was selected as the instructional simulation video game to be used in this study because the game uses the learning principles of good video games by facilitating student learning of a semiotic domain that correlates with many other semiotic domains (Gee, 2007). The game also scores 18 out of 20 on the Video Game Cognitive Viability Index (VGCVI) demonstrating that Making History holds several positive characteristics that facilitate higher order thinking (Rice, 2007b). Furthermore, Muzzy Lane markets Making History as an educational video game that can potential teach students about World War II. Finally, in order to successfully play Making History 2.0, the player must engage in higher order thinking.

Treatments

The researcher randomly assigned each participant to one of four alternative treatments: multiplayer reflective scaffolding, single player reflective scaffolding, multiplayer no reflective scaffolding, and single player no reflective scaffolding. The primary focus of this study was how the different treatments affect students' cognitive learning.

Multiplayer Reflective Scaffolding

The multiplayer reflective scaffolding treatment group participated in a multiplayer version of Making History. Five players participated in each multiplayer group. The students were randomly assigned to play the Soviet Union, Germany, Italy, France, or the United Kingdom. The players competed against one another in the multiplayer game. The game allowed participants to chat during game play with the other players over an open channel or via private chat. The computer game's artificial intelligence played the other nations of the world. Players could form alliances, make treaties, engage in international trade, or make war upon other players. At the end of every five turns, the players stopped to write reflections about their game experience on paper. Participants were given prompts (See Appendix B) to facilitate the writing of their reflections. The researcher designed the prompts to encourage the participant to write about the decisions they made during the game experience, and to reflect upon how their decisions influenced the results. Participants had five minutes to write each reflection and discuss with their classmates and the teacher about their reflections. The players participated in six reflection sessions totaling a maximum of 30 minutes, five during the

course of the game and one at the end of the game. All participants completed posttests designed to elicit the players' knowledge and reasoning abilities.

Single Player Reflective Scaffolding

Participants in the single player reflective scaffolding treatment group had the same experiences as the multiplayer reflective scaffolding group except the participants played a single player version of Making History 2.0. The players competed against the other nations of the world controlled by the computer AI. As in the multiplayer group, participants engaged in reflective sessions after ever five turns, played a 30-turn game, participated in the tutorial, the survey of prior interest and exposure to video games, and completed the posttest.

Multiplayer No Reflective Scaffolding

The multiplayer no reflective scaffolding treatment group participated in a multiplayer version of Making History without any teacher provided scaffolding during video game play. This treatment group was set up according to the same guidelines as the multiplayer reflective journaling group. The players participated in the same simulation game as the players in the multiplayer reflective scaffolding group, but did not participate in any scaffolding activities. Once participants in non reflection groups completed their game they participated in a reading of an economics article concerning gas prices while the other players completed their game play and/or reflections.

Single Player No Reflective Scaffolding

The single player no reflective scaffolding treatment group participated in a single player version of Making History with no instructor guided reflective practices. As in the other treatment groups, participants completed the tutorial, played the 30-turn game of

Making History, and completed the posttest. The players participated in the same simulation game as the other treatment groups but without any reflective scaffolding practices. Once students in non reflection groups completed their game they participated in a reading of an economics article concerning gas prices while the other players completed their game play or reflections.

Data Collection Procedures

Educational theorists begin studies with a problem that needs to be understood. From this problem, researchers develop theories and hypothesis to test the validity of the theory. In this research study, the researcher's problem is how to integrate technology into the social studies classroom to facilitate the development of higher order thinking skills. From this problem, the researcher developed a theory that by the use of lessons incorporating collaborative, reflective instructional practices participants can develop higher order thinking skills during play of an educational simulation video game.

While this study utilized tests of statistical significance, this study was not a quantitative study, nor was this a qualitative study. The researcher incorporated a mixed methods approach to triangulate and provide a more robust understanding of the data. The qualitative and quantitative data analysis was blended together to produce a deeper and more meaningful understanding of the participants experiences during the simulation using methods outlined by Murray (2003). The researcher attempted to ascertain if a positive cognitive outcome existed for participants in the study and how the participants' cognitive outcome was created. A quantitative study alone would only answer if the hypothesis was supported or not supported. In such a study, it would be up to the researcher to develop conclusions based on how the statistical results fit within the

researcher's prior understanding of the problem. In such a quantitative study, there would be little data that helped the researcher to understand how statistical results were achieved. In a solely qualitative study, hard statistical data would not exist and the researcher would have to interpret data to extrapolate results. A mixed methods approach provides the researcher with the best of both worlds, a way to analyze the hard learning outcomes utilizing quantitative data sets and an understanding of the process of participants' knowledge creation during the course of study. Each of the differing types of data supports each other and helps the researcher to build a more robust understanding of participants' experiences than could be provided by either a qualitative or a quantitative study alone.

The researcher used a variety of measures to analyze the cognitive learning and interest of each participant. Participants were assigned a random number that was recorded on their pre survey, written reflections, and posttests to enable the researcher to match individual results on all data instruments anonymously. The researcher noted the location of each participant in the computer lab, as well.

A survey was given to all participants to measure student interest and familiarity with video games. An online survey maker known as Survey Monkey was used to disseminate the survey. Survey Monkey allowed the designer to create multiple types of questions, create a link to the survey on a website, and to compile the survey data. The students took the survey on the computers in the computer lab prior to embarking upon the Making History tutorial. The survey measured students' familiarity with video games, students' attitudes towards video games, student demographics, and students' attitudes towards learning with video games. The survey instrument was an adaptation of

the U.S. census bureau's survey of computer use and attitudes of students (U.S. Census Bureau, 2005). The survey was designed in accordance with the guidelines for internet and mail surveys set forth by Dillman (2007). The survey consists of twelve questions designed to elicit an understanding of the participants' familiarity and attitude towards video games. Two questions were included to gather demographic data on ethnicity and gender. Five questions were Likert scale questions designed to determine the participants' attitude towards video games. The Likert scale questions allowed participants the choice of answering strongly agree, agree, neutral, disagree, or strongly disagree. In accordance with Dillman's criteria, all questions occupied their own page with minimal distractions on the internet page. The survey contained questions about participants' preference for single player or multiplayer games and if participants played video games. The survey asked how much and what type of video games the participants play to determine the participants' familiarity with video games.

The researcher examined the participants' written reflections to ascertain the level of student cognitive learning. The reflections were scored using a rubric designed to measure both higher order and lower order thinking on a scale of one to six (Nelson & Drake, 1997). The rubric developed by Nelson and Drake is designed to quantify participants' writings into a score that can be measured statistically. The rubric is divided into two rubrics, one rubric measured knowledge or the lower levels of Bloom's taxonomy, the second rubric measured how participants analyzed, evaluated, and synthesized the evidence in their writing. Participants would be awarded the lowest score on each of the rubrics if the writing was unclear or the information was inaccurate. On the knowledge rubric, a six, the highest score possible, would be achieved if a written

response identified key concepts, themes, issues, and ideas thoroughly with no factual inaccuracies. A participant could achieve a six on the reasoning rubric if the written response used appropriate and comprehensive critical thinking skills to analyze, evaluate, and synthesize the evidence (see Appendix D).

In addition to the reflective writings, the researcher administered a posttest that tested both lower order and higher order thinking skills directly after the completion of the simulation. The posttest consisted of four multipart open-ended questions designed to evaluate both lower order and higher order thinking. The posttest was scored using the rubric set forth by Nelson and Drake (1997) that was used to analyze the participants' reflective writings.

The reflection prompts, the survey, the posttest, and the rubrics all produced quantitative data. The quantitative data was analyzed using a variety of quantitative methods including descriptive statistics, one-way analysis of variance (ANOVA) and independent sample *t* tests to test the hypothesis. An ANOVA was used to determine the relationship between the means of the posttest scores of the participants in the differing treatment groups. Independent sample *t* tests were used to examine the differences in the posttest means of the participants in each of individual treatment groups once it was revealed that there existed a statistically significant difference in the means of the treatments groups from the ANOVA analysis.

In addition to the quantitative data analysis, the researcher observed the participants during the study, audio recorded the participants, and examined the participants' writings. The qualitative data was analyzed using methods outlined by Miles and Huberman (1994). The researcher began with an analysis of the writings of the

participants, from both the reflective sessions and the posttest answers. The researcher coded by hand common themes, ideas, and keywords that emerged from several readings of the participants' writings. The researcher then moved to an examination of the transcripts of the digital audio recordings from the four audio recorders used during the course of the study. The researcher noted the location of the digital recorders and the treatment group membership of the participants near each audio recorder. Common themes, ideas, and keywords were identified from the researcher's examination of the transcripts. The next piece of qualitative data analysis the researcher conducted was an examination of the researcher's observation notes collected during the course of the study. As in the other qualitative analysis, the researcher coded the field notes in a search for common themes, experiences, and ideas. Throughout the qualitative data analysis, the researcher grouped the common themes, experiences, ideas, and keywords of the participants by the treatment group membership of the participant.

The researcher used the qualitative data analysis results to generate effects matrixes for each of the treatment groups by the type of data collected and the research question explored. The effects matrixes organized the qualitative data analysis of the research into a visual form representing the researcher's intellectual journey of analysis. The use of the effect matrixes allowed the researcher to cross the different dimensions of the variables to highlight the interactions of the variables in a visual display that aided the researcher's understanding.

Measurement Quality

One of the researcher's classes was used to conduct a pilot study when the school followed a modified schedule. The pilot used 28 participants. The pilot study helped the

researcher examine the sequencing and timing of the lesson and research measurements. The pilot also helped the researcher to understand the technical limitations of the school's computer lab. Because of the experience gained from the pilot study, the researcher turned down the graphic settings of Making History 2.0 to facilitate smooth game play. The results of the pilot study were used as a field test to evaluate the instruments used in the study.

Time Line for the Research

The pilot study was conducted during the month of March. The research study took place in early May towards the end of the school year and after the participants had engaged in lessons involving World War II in the classroom.

Internal Validity

Internal validity refers to the extent the researcher can accurately state that the independent variable produced the observed effect. This study faced internal validity threats such as selection of participants, mortality of the subjects, and testing. Since participants were not randomly selected but selected through a convenience sample of available classes the study is not generalizable to a larger population, but this study can be part of a larger body of research about the incorporation of video games in the classroom. This study took place over three class periods and 18 participants did not participate in the full study due to absences from school. No partial data was used in the study. The study faced only limited threats from maturation because of the limited time required for the data collection. The design of this study ensured that any internal validity issues that arose influenced all four-treatment groups similarly.

External Validity

The limited number of participants and absence of random selection for participant classes inhibited generalizations from this study to the population of secondary students at large. The study used participants from only one high school in an area in the Southeastern United States, and the participants were assumed to be randomly assigned to the classes participating in the study. However, the participants in the study were tracked into on level college prep classes. This study excluded students in Advanced Placement and honors classes because of logistical issues involved in their incorporation into the study. Further replication will be necessary to increase the possibility of generalizing to a larger population.

CHAPTER 4

RESULTS

Introduction

As indicated in chapter 1, this study examines the impact of using an instructional simulation video game in the classroom on participants' cognitive outcomes. This chapter is organized in terms of the four specific research questions postulated in chapter 1. The chapter begins with an overview of the participants, group means, and overall statistical analysis of between group statistical variations. Next, the impact of using reflective journaling during a lesson incorporating an instructional video game will be reported. Subsequently, in this chapter the researcher details the results of single player and multiplayer versions of the instructional video game on participants' cognitive abilities. Finally, the study reveals how participants' prior exposure/interest to video games influences their cognitive abilities during the use of an instructional video game. The researcher used Statistical Package for the Social Studies or SPSS 12.0 for Windows to analyze all of the quantitative data. Independent samples *t* tests, analysis of variance and descriptive statistics were statistical measures used to analyze the data. The researcher coded, analyzed, and organized into effects matrixes the qualitative data using methods described by Miles and Huberman (1994). All participant names are protected. Pseudonyms of the researcher's creation are used in lieu of all participants' true names. This mixed methodological approach allowed for triangulation and interpretation of both the qualitative and quantitative data. Separately, quantitative and qualitative data

analysis cannot provide the researcher with a complete understanding of the data collected. This mixed methods approach helped to interpret the data gathered from this study.

Statisticians at the University of Georgia Center for Statistical Consulting Center (SCC) reviewed the quantitative data analysis included in this research study and deemed the statistical analysis statistically sound.

Participant Information and Treatment Group Means

As indicated in Table 1, the participants were divided into four groups. Participants who played the game in the single player mode with no reflective instructional pauses provided by the instructor participated in the single player no reflection group. Participants, who were provided instructional pauses and participated in the single player game, were placed in the single player reflection group. Participants that played the multiplayer version of the game without reflective instructional pauses were placed in the multiplayer no reflection group. Participants who were provided with

Table 1

Treatment Group Assignment by Gender

Group Assignment	Male	Female	Total
Single Player No Reflection	10	20	30
Single Player Reflection	6	22	28
Multiplayer No Reflection	20	22	42
Multiplayer Reflection	18	10	28
Total	54	74	128

reflective instructional pauses and played the multiplayer version of the game were place in the multiplayer reflection group.

Results were gathered from five World History classes at a suburban high school in the Southeastern region of the United States. The World History classes included a total of 154 participants. Of the 154 participants in the five classes, 146 participants completed all of the informed consent forms and participated in the research study. As indicated in Table 1, 128 participants participated in all aspects of this research study. The seeming large difference in the numbers of males and females who participated in the study can be explained by the fact that a large number of male participants were absent from school due to a basketball tournament and by the fact that the classes in the study comprised a majority of females. Of the 146 participants, data for 18 participants was lost due to absences during the course of the study.

Each participant in the four treatment groups was given a posttest for both knowledge and reasoning ability. The posttests were scored on a 1-6 score for both knowledge and reasoning ability (Appendix D). As indicated in Table 2, the reasoning ability mean for all participants was 1.586; the knowledge ability mean for all participants was 1.46. The lowest mean score for reasoning ability was reported by the single player reflection group 1.43. The single player no reflection group reported the lowest mean score for knowledge ability at 1.33. This analysis of means reveals that the multiplayer reflection group reported the highest mean for reasoning ability 2.07 and knowledge ability 1.64. All of the treatment group means for both knowledge and reasoning ability scored in the lower range of the scoring rubric indicating that participants demonstrated lower levels of cognitive abilities on the posttest.

Table 2

Means of Treatment Groups on Posttests of Knowledge and Reasoning Ability

Group Assignment	Knowledge Ability Mean	Reasoning Ability Mean
Single Player No Reflection	1.33	1.43
Single Player Reflection	1.39	1.36
Multiplayer No Reflection	1.48	1.52
Multiplayer Reflection	1.62	2.07
Total	1.46	1.59

Overview of Statistical Analysis for Treatment Groups

The researcher performed an analysis of variance (ANOVA) test to compare the means of each of the treatment groups on the posttest of knowledge ability and reasoning ability. The ANOVA test measures if the differences in the means of the treatment groups are significantly different from one another. A statistically significant result from an ANOVA tests indicates that the difference in the means of the treatment groups is not a result of chance alone. As revealed in Table 3, the ANOVA test indicates that there is no significant difference between the treatment groups on the posttest of knowledge ability. Conversely, the ANOVA test reveals that there is a statistically significant difference between the means of the treatment groups on the posttest of reasoning ability. The F statistic for between groups variation is 7.36, which is statistically significant at the .05 level. The result of this statistical analysis implies there is a difference in the means of the different treatment groups that would not occur because of normal variation. The

Table 3

Analysis of Variance for Treatment Groups on Posttests of Reasoning Ability and Knowledge Ability

Source	df	Mean Square	F	p
		Between subjects		
Knowledge Ability	3	.52	1.88	.14
Reasoning Ability	3	2.98	7.36**	.00
		Within groups		
Knowledge Ability	124	.28		
Reasoning Ability	124	.40		

*Note. *p<.05, **p<.01*

ANOVA test does not reveal which of the treatment groups are statistically different nor does the test indicate why the treatment groups are different.

The statistically significant difference between the treatment groups reasoning ability posttest means found in the ANOVA are supported by calculating the effect size for the between group variation of the treatment groups. Eta squared, the measure of effect size for an ANOVA, is measured by calculating the treatment groups sum of squares by the total sum of squares. For the above ANOVA, the treatment sum of squares is 8.93 and the total sum of squares is 59.06. The calculation produces an eta squared of .15, which represents a large effect according to Cohen's (1988) guidelines for effect size. More than 15% of the change in the treatment groups reasoning ability posttest means score is attributable to the participants' inclusion in one of the treatment groups.

While the ANOVA statistical test demonstrates a statically significant difference between the treatment groups on the posttest of reasoning ability, it does not indicate which groups are statistically different nor does it reveal why there is not a statistically significant difference between the treatment groups means on posttest of knowledge ability. A mixed methodological approach provided greater understanding of the differences experienced by the participants in each of the treatment groups.

Research Question #1

The first research question explored in the course of this study is how does reflective journaling during the use of instructional simulation video games influence higher order thinking and lower order thinking? This research question provided the framework to test two research hypotheses. The first research hypothesis tested is that participants in an educational simulation video game who participate in reflective journaling will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no reflective journaling. The second research hypothesis tested is that participants in an educational simulation video game with reflective journaling will exhibit greater levels of lower order thinking skills on posttests than participants in the same simulation with no reflective journaling.

Quantitative Data of Research Question # 1

In order to test the first two hypotheses, the participants in the multiplayer reflection and single player reflection group were asked to complete reflective journal entries during the course of their game play. The researcher gave the participants prompts after every five turns and asked the participants to reflect upon their game play

Table 4

Posttest Means for No Reflections and Reflection Treatment Groups

Knowledge or Reasoning Ability	Treatment Group	N	Mean	Standard Deviation
Knowledge	No Reflection	72	1.42	.55
Ability	Reflection	56	1.52	.50
Reasoning	No Reflection	72	1.49	.61
Ability	Reflection	56	1.71	.76

orally and on paper (Appendix B). Furthermore, the participants engaged in reflective discussion about their game play and the history associated with their game play. At the end of the research study, all participants were asked to complete posttests (Appendix C). The posttests were scored using a rubric designed to analyze participants' reasoning and knowledge ability (Appendix D).

Table 4 displays the means on posttest of knowledge ability and reasoning ability for participants from each of the treatment groups that experienced no reflection activities and participants who engaged in reflection activities. The single player no reflection and multiplayer no reflection groups make up the no reflection group. The single player reflection and multiplayer reflection group make up the reflection group. The mean for the reflection group is greater in both reasoning ability and knowledge ability, but an independent sample *t* test is required to determine if the difference between the means is statistically significant.

The ANOVA test revealed that the participants' means on posttest were statistically different but the ANOVA did not indicate which treatment groups were statistically different. An independent samples *t* test was conducted to determine if there existed any statistically significant difference between the means on posttests of knowledge and reasoning ability for the participants who engaged in reflection and the participants who did not engage in reflection. The *t* test results reported in Table 5 reveal that there exists no statistically significant difference between the two group means for knowledge ability and reasoning ability. The difference between the treatment group means on posttest analysis of reasoning ability is statistically significant at the .07 level, which is close to the .05 level for statistical significance used in this study. According to the independent samples *t* test, there is no statistical data demonstrating a meaningful difference in the means of participants engaged in reflection verses non reflection.

An independent samples *t* test was conducted to compare the means of the single player no reflection group and the single player reflection group. As indicated in Table 6, the *t* test between the single player treatment groups indicates that there is no statistically

Table 5

Independent Samples T Test for Posttest Means for Reflection and No Reflection Treatment Groups

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.07	126	.29	-.10
Reasoning Ability	-1.85	103	.07	-.23

*Note. *p<.05, **p<.01*

Table 6

Independent Samples T Test for Posttest Means for Single Player Reflection and Single Player No Reflection Treatment Groups

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-4.64	56	.64	-.06
Reasoning Ability	.51	56	.61	.08

*Note. *p<.05, **p<.01*

significance between the two treatment groups on a posttest of knowledge ability. The 2-tailed significance is .64 for the knowledge ability, indicating no significant difference between the two treatment groups. Neither is there a statistically significant difference between the two single player treatment groups on the posttest of reasoning ability. For reasoning ability, the difference between the single player group mean achieved is .08, which is not significant at the .05 level. There is no statistically significant difference between the posttest means of the single player groups. Thus, for the single player treatment groups the research hypotheses remain unproven.

As it was conducted for the single player treatment groups, an independent samples *t* test was conducted of the multiplayer treatment groups. As Table 7 displays, the results of the statistical test uncover that the difference between the means on the knowledge ability posttest is -.17, which is only significant on a 2-tailed test at the .22 level below the .05 threshold for statistical significance. The *t* test demonstrates that there is no statistically significant difference between the multiplayer treatment groups on the posttest analysis of knowledge ability. On the other hand, the independent samples *t*

Table 7

Independent Samples T Test for Posttest Means for Multiplayer reflection and Multiplayer No Reflection Treatment Groups

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.23	68	.22	-.17
Reasoning Ability	-3.26	68	.01**	-.55

*Note. *p<.05, **p<.01*

test of posttest reasoning ability reveals that there is a statistically significant difference between the multiplayer treatment groups at the .01 level. The difference between the posttest of reasoning ability between the multiplayer reflection and multiplayer no reflection treatment groups was .55. This result indicates that there is a statistically significant difference between the means of the multiplayer treatment groups. The treatment group practicing reflective journaling and playing a multiplayer game score, on average, one-half point higher on the posttest analysis of reasoning ability. However, the mean for the multiplayer reflection group on reasoning ability was 2.07, which indicates that even though there is a statistically significant difference between the multiplayer treatment groups, the mean score of the participants in the multiplayer reflective journaling treatment group does not demonstrate higher order thinking ability on the posttest of reasoning ability. A mean of three or higher would be indicative of the participants displaying higher order thinking on the posttest.

Qualitative Data Reporting of Research Question # 1

The quantitative analysis of the first research question reveals that participants engaged in reflective scaffolding in a multiplayer treatment group score statistically higher on a posttest designed to elicit their reasoning skills. While there is no statistically significant result for the single player group from a quantitative analysis, a qualitative examination of the participants' experiences during the study provides a deeper understanding of how the participants were experiencing the simulation. For instance, while the participants score statistically higher on reasoning ability, the participants did not score in a range that would indicate higher order thinking. A mixed methods analysis was undertaken to illuminate the quantitative data for a more complete understanding of the phenomena presented during the research study.

The participants engaged in the research study completed all of their activities in a computer lab near their classroom. Since random assignment to the different treatment groups was the goal of the research, in each room multiple groups existed. The organization of the computer lab enhanced the ability of the researcher to separate the

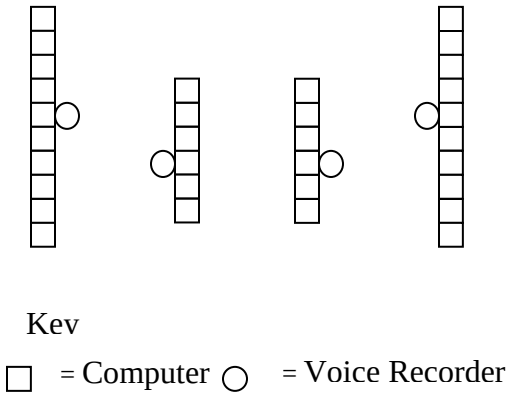

Figure 6. Classroom layout.

reflection and non reflection groups. The computer lab consisted of 32 computers. Figure 6 demonstrates the layout of the computer lab used in the research study.

In each of the four treatment groups, the participants were separated into different parts of the computer lab based on the random number of participants in the classroom as determined by the roll of a four-sided die. The design of the computer lab enabled a total of four digital audio recorders to be placed strategically around the room to pick up the conversation of participants engaged in each of the treatment groups.

After five turns of game play, the participants involved in the reflection groups would stop and discuss what the participants learned from their game play. As the treatment groups participated in the research study, it became readily apparent to the researcher that there were differences in experiences between the participants in each treatment group. Table 8 reports the qualitative data gleaned from participants' written artifacts. Table 9 outlines the data gathered from the voice recordings of the participants. Table 10 reports the qualitative data observed by the researcher. As the results reported in Tables 8, 9, and 10 indicate, participants involved in reflective journaling engaged in higher order thinking, wrote more about their game experiences in the posttest, asked more questions of their peers, and engaged in fewer off task behaviors than their peers in non reflective groups.

The participant assigned the name of Rebecca during the course of this study exemplifies higher order thinking by evaluating her nation's political and military position in the game with her prior knowledge. Rebecca, a participant in a single player reflective scaffolding group, indicated that no other nation would form an alliance with her nation, France, to check the invasion of the Germany into her territory. Mike, another

participant, asked Rebecca why no one would ally with her nation France. Rebecca responded that no one would ally with her because the Germans had a "stronger military", that every other nation was "afraid to irritate Germany", and that "I (France) have nothing to offer any other nation in an alliance except getting them killed by the Germans." Rebecca explained that she would "try to bribe the other nations with resources and alliances in other conflicts in exchange for help against the Germans." Rebecca then indicated that she believed that she would not be successful because France "did not have the resources to hold off the Germans." Rebecca went on to state "maybe this is why the French surrendered so quickly to the Germans during World War II, they could not do anything except get destroyed and what good would that do anyone?" Rebecca's dialogue indicates that she is connecting her prior knowledge of the events of World War II to France's relatively quick surrender to the Germans during her game play. Rebecca developed a theory based on her game play and prior knowledge of World War II. Rebecca then evaluated her prior knowledge that France surrendered quickly to Germany with her game play experience and developed a new more detailed personal theory as to why France surrendered to Germany. Rebecca synthesized information from prior knowledge and her game play experiences. Rebecca's recorded words exemplify higher order thinking discussion in a single player reflection treatment group.

While Rebecca's words are indicative of higher order thinking in a single player reflection treatment group, participants' talk from multiplayer reflection groups are needed to gain a thorough understanding of the experiences of the participants. Harold, John, Bill, Bob, and Ralph demonstrate the impact of reflective journaling on higher order thinking in a multiplayer treatment group. During a reflective session, Harold

Table 8

Qualitative Analysis Effects Matrix Reflective Journaling and No Reflection Groups

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Written Artifacts of Participants	Instructor Guided reflection	Identification with country played. Desire to play the game further. Longer and more descriptive responses to questions.	Frustration with lack of alliances. Frustration with lack of resources for nation. Technical issues.	Some Synthesis of previous learned information and game play. Understanding as to why nations struggled.	Some instances of I don't know. Limited connections to game play experiences and the actual outcomes of the war.	Moderate use of prior historical facts.	Incorrect use of historical facts.

(table continues)

Table 8 (continued)

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Written Artifacts of Participants	No Reflection	Identification with County played. Some desire to play the game further.	Frustration with technical issues. Frustration with limited alliances. Numerous blank responses or I don't know.	A few instances of synthesis about why countries went to war or created alliances.	Many instances of I don't know and/or not sure. Only two instances of connecting game play experiences to history.	A few instances of use of prior historical facts to make game play decisions.	Incorrect use of historical facts. Very limited use of historical facts. Short responses.

Table 9

Qualitative Analysis Effects Matrix Reflective Journaling and No Reflection Groups

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Voice Recordings of Participants	Instructor Guided reflection	Participants engaged in game play talk. Participants asked numerous questions. Participants discussed how to best "win" the game.	Participants engaged in off task talk. Several utterances of I don't want to play. Frustration with technical issues.	Instances of participants using historical understanding to make informed game play decisions.	Non-engaged and participants encountering technical issues had few utterances indicating higher order thinking.	Participants stated several historical facts. Evidence of learner knowledge applied to game play.	Several instances of incorrect historical facts. Facts limited to "major" nations.

(table continues)

Table 9 (continued)

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Voice Recordings of Participants	No Reflective Journaling	Identification with nation played by participants. Some instances of participants desire to play the game further.	Less game play talk by participants. Stretches of silence during game play. Large amounts of off task talk.	Some instances of synthesis of prior knowledge to game play. Participants use of historical knowledge during play.	Fewer instances of higher order thinking talk among participants than the reflection group.	Some use of prior historical knowledge. Instances of learned historical knowledge during game play.	Use of incorrect facts. Game play did not facilitate learning.

Table 10

Qualitative Analysis Effects Matrix Reflective Journaling and No Reflection Groups

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Observations by Researcher	Reflective Journaling	Few instances of off task behavior. Participants helped each other. Reflection refocused the participants.	Instances of off task behavior. Technical issues lead to off task talk. Participants only wanted to "fight."	Participants synthesized their historical and economics knowledge with their game play.	Limited historical knowledge lead to frustration. Unengaged participants exhibited little higher order thinking.	Participants exhibited some understanding of history. Participants taught each other how to play the game.	Many historical facts used were simplistic. Focused only on game play.

(table continues)

Table 10 (continued)

Data Sources	Treatment Groups	Participant Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Observations by Researcher	No Reflective Journaling	Participants asked numerous questions about how to play the game. Participants identified with their nation.	The room was quieter in the non reflective treatment groups. Non-engaged participants remained unengaged.	Some participants used prior knowledge to created alliances. Some participants used their and historical knowledge.	Few participants shared learning. Unengaged participants exhibited little higher order thinking.	Participants exhibited some understanding of historical facts. Participants learned technical game play skills.	Few instances of lower order thinking with unengaged players.

(France) and John (United Kingdom) were overheard discussing the best strategy to lure Bob (Germany) into an alliance so they could later betray him. Harold and John use conspiratorially low voices during this reflective session that took place near a voice recorder placed to pick up the participants' dialogue as they played the simulation. During the course of their discussion, Harold and John indicated that the reason they wanted to trick Bob into an alliance was that they would never beat Germany without a trick because "Germany had all the best weapons" and that "France and England would have been beat with the US and Russia's help." Harold and John also tried to recruit Ralph (Soviet Union) into their alliance without revealing their true plans. Bob rebuffed all of the pleas of alliance and told Harold and John "why should I ally with you when I can beat you?" The talk during this reflection session indicates that participants were strategizing based on their knowledge of history and their nations' position during the game play.

Broad themes emerged from the recorded words of the participants. The researcher listened to and read the transcripts of over 30 hours of recordings. The themes from the recordings are reported in Table 9. The reflection groups engaged in more talk and more on task conversations than the non reflection groups. The non reflection groups, especially the multiplayer group, often engaged in off task conversations ranging from weekend activities to sports to other class assignments. As indicated in Table 9, the reflection groups asked more questions than the non reflection groups. The reflective sessions granted participants the opportunity to pause, reflect, and ask questions. The participants in the reflection multiplayer group would become refocused on the game and purpose of the simulation after every reflection session. The reflective sessions acted as a

reminder that the participants were engaged in a learning activity. The use of reflective journaling encouraged the participants to engage in more on task behaviors, thus students took the simulation more seriously which lead to more higher order thinking.

While the recorded words illuminate the participants' critical thinking, the participants' written words also offer qualitative insight into how reflective journaling influences higher order thinking. The participants' posttests offer valuable insight into the different experiences of the treatment group participants. As reported in Table 8, the posttest of participants involved in the reflection groups contained longer answers than participants from a non reflection group. Among the posttest responses of the participants in the reflective journaling treatment groups, only three participants left a blank response or wrote, "I don't know." Among the non reflective journaling treatment groups, participants left an answer blank or wrote, "I don't know" on nine occasions. While the participants in the reflective journaling treatment groups wrote more than their counterparts in the non reflective journaling groups, the responses did not indicate higher order thinking by most participants. The responses of Blondie from a single player non reflective journaling treatment group and Patrick from a multiplayer reflective journaling treatment group are indicative of the differences between the groups. Blondie wrote in response to question two of the posttest (Appendix C), "-Form alliances – so that a war could proceed." Blondie's response is a sentence fragment and does not clearly answer the question. Blondie's response indicates that she believes the nations wanted war to begin in Europe and offers no support for her assertions. On the same response Patrick wrote, "Most countries tried not to get involved, we destroyed them. Both France and the USSR were afraid of the German war machine. Many countries wanted to practice

appeasement." While Patrick's response is more descriptive, it lacks support for his assertions just as in Blondie's response. There were few instances of higher order thinking skills evident in the participants' written responses on the posttest.

In addition to the reporting of the qualitative data generated from the participants' written and verbal responses, an account of the researcher's observations is essential to gain a complete understanding of the participants' experiences. As indicated in Table 10, the researcher observed that participants in reflective journaling groups were more engaged in their game play than participants in non reflective journaling groups. An examination of the researcher's field notes reveal that participants in the non reflection groups were more likely to discuss topics other than the lesson, engage in tasks not related to the game play, and become frustrated with the game play. The interplay between Valery and Connie from a single player non reflective journaling group highlight this disconnect from the lesson. Valery and Connie began the game with quiet participation but very soon, they became disengaged. The participants played the game tutorial and encountered technical difficulties due to their lack of technical expertise with computers and computer games. Neither Valery nor Connie asked for any assistance, instead, Valery expressed her frustration to Connie and stated, "This game is stupid. I don't want to play anymore." Connie and Valery then began to discuss their weekend plans and played only sporadically during their game play session. The behavior of Connie and Valery is typical of participants from non reflection groups who became disinterested. Without a scheduled interlude to stop and refocuses the participants, off task participants continued their off task behaviors.

In contrast to the experiences of Connie and Valery, the experiences of Tony and Wilma highlight how the reflective sessions created a framework for participants to refocus on the lesson. Wilma began her game play session much as Connie and Valery. Wilma began her session by silently playing the game but within 5 minutes, Wilma encountered technical difficulties because she did not understand how to play the game. It was apparent that Wilma did not pay attention to the game play tutorial and was not technically proficient at playing computer games. In contrast to Valery and Connie's experience, Wilma was provided with opportunities to ask questions during the reflective sessions and through the interplay of her group. At the first reflective journaling interlude, Wilma asked how to set up her nation's manufacturing. Tony, a member of her group, graciously walked her through how to set up her cities. During the tutoring of how to play the game, Tony asked Wilma to form an alliance in the game. Wilma formed the alliance with Tony and they went on to fight many battles, manufacture resources, and form other collaborative alliances in their game play. The ability to stop and reflect upon her game play allowed Wilma to become refocused on the lesson and allowed her to create a collaborative partnership with Tony. The interactions of Wilma and Tony are indicative of the experiences of participants involved in reflective journaling groups. The experiences of participants involved in reflective journaling and non reflective journaling groups were also impacted by their placement in multiplayer or single player groups. The next section of this chapter states the results of participants involved in multiplayer and single player treatment groups.

Summary of Findings for Research Question # 1

Quantitative analysis of the question, "How does reflective journaling during the use of instructional simulation video games influence higher order thinking and lower order thinking?" reveals that there is no statistically significant difference between the means of the reflection and non reflection treatment groups on the participants means of posttests of reasoning ability and knowledge ability. Likewise, there is no statistically significant difference between the means of the single player reflection and the single player non reflection treatment groups on the means of posttest of knowledge ability and reasoning ability. When performing quantitative analysis of the posttest means designed to elicit the participants' knowledge and reasoning ability, participants in multiplayer reflective groups had a statistically significantly higher mean score on posttests of reasoning ability than those participants who were in a multiplayer non reflective group. There was no statistically significant difference between the knowledge ability posttests means of the multiplayer reflection and multiplayer non reflection group.

Qualitative analysis indicates that participants in the reflective journaling groups were more involved, wrote more in reflective entries, and on posttests asked more questions, and participated in more higher order thinking discussions than their peers in non reflective treatment groups. While the qualitative analysis reveals increased higher order thinking discussion, the talk did not translate into written examples of higher order thinking in the participants' reflective entries or posttests. Qualitative and quantitative analysis demonstrate limited support for the hypothesis that participants in an educational simulation video game who participate in reflective journaling will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with

no reflective journaling. There exists no qualitative or quantitative support for the hypothesis that participants in an educational simulation video game with reflective journaling will exhibit greater levels of lower order thinking skills on posttests than participants in the same simulation with no reflective journaling.

Research Questions # 2 & # 3

The second and third research questions provided a framework of analysis for the researcher to examine the effect of single player and multiplayer video game play on the cognitive outcomes of participants. The second research question is "How does the use of multiplayer games influence higher order thinking and lower order thinking?" The third research question is "How does the use of a single player instructional video game influence higher order and lower order thinking?" The researcher attempted to answer the research questions by testing the hypothesis that participants who engaged in a multiplayer version of an educational simulation video game would exhibit greater levels of higher order thinking skills on posttests than participants involved in a single player version of the same educational simulation video game. The second hypothesis tested was that participants in a multiplayer version of an educational simulation video game would exhibit greater levels of lower order thinking skills on posttests than participants in the same simulation with no reflective scaffolding.

Quantitative Results of Research Questions # 2 & # 3

Table 11 reports, the means for the multiplayer and the single player treatment groups on reasoning ability posttest were less than three, which indicates that the mean is below the level indicating the demonstration of higher order thinking responses. The

means for knowledge ability among the multiplayer and single player treatment groups also indicated that participants did not demonstrate mastery of historical facts on their posttests.

Table 12 reports the results of independent samples *t* test of the means of the multiplayer and single player treatment groups within the study. An examination of the results reveals that means of the multiplayer and single player groups are not statistically different on posttests of knowledge ability at the .05 level of significance. Table 12 reveals that the means of the multiplayer and single player treatment groups are significantly statistically different at the .05 level of significance on the independent samples *t* test on posttests of reasoning ability. This statistical analysis does not reveal the reasons why the group means are statistically different.

Table 13 reports the results of independent samples *t t*est comparing the means of the no reflection multiplayer and single player treatment groups. There exists no statistically significant difference in the means of the single player and multiplayer no reflection treatment groups on posttests of reasoning ability or knowledge ability. This result stands in contrast to the statistically significant finding that there are significant statistical differences at the .05 level in the reasoning ability posttest means of

Table 11

Posttest Means for Multiplayer and Single Player Treatment Groups

Group Assignment	N	Knowledge Ability Mean	Reasoning Ability Mean
Multiplayer	70	1.55	1.74
Single Player	58	1.36	1.40

Table 12

Independent Samples T Test for Posttest Means for Multiplayer and Single Player

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	1.96	126	.06	.18
Reasoning Ability	3.02	125	.01**	.35

*Note. *p<.05, **p<.01*

Table 13

Independent Samples T Test for Posttest Means for Single Player No Reflection and Multiplayer No Reflection

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.13	69	.26	-.14
Reasoning Ability	-.62	70	.54	-.09

*Note. *p<.05, **p<.01*

Table 14

Independent Samples T Test for Posttest Means for Single Player Reflection and Multiplayer Reflection

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.899	54	.063	-.250
Reasoning Ability	3.985	54	.000**	-.714

*Note. *p<.05, **p<.01*

participants between multiplayer and single player groups found in the information reported in Table 12.

Table 14 reveals the results of an independent samples *t* test of the means on posttest of knowledge ability and reasoning ability between the reflective journaling multiplayer and single player groups. There exist no statistically significant differences between the means of the reflective journaling single player and multiplayer treatment groups on posttests of knowledge ability. There is a statistically significant difference between the means of the multiplayer and single player reflective journaling groups on the posttest of reasoning ability. The means of the groups shared a statistically significant difference below the .05 level on the posttest of reasoning ability. The mean score of the multiplayer reflective scaffolding group is greater than the mean score of the single player reflective scaffolding group. The statistically significant difference between the multiplayer and single player reflection treatment groups are the source of the statistically significant difference between the overall single player and multiplayer groups as indicated in Table 12.

A quantitative analysis alone leaves out important information regarding why a statistically significant difference exists between the multiplayer and single player groups. A qualitative analysis in concert with the quantitative data provides more insight into possible explanations to the research questions. Tables 15, 16 and 17 report the qualitative data collected from participants written artifacts, voice recordings and researcher observation.

As revealed by the qualitative data reported in Tables 15, 16, and 17, there are differences in the lessons experienced by the participants of the different treatment

groups. Participants in the single player groups spoke less frequently, were not as engaged in the lesson, and were less apt to demonstrate both higher order and lower order thinking than their peers in the multiplayer groups. According to the gathered qualitative data, the difference in experiences between the single player and multiplayer treatment groups is exacerbated by the differences in the reflective and non reflective treatment groups. Participants in the multiplayer reflective journaling group were far more likely to engage in discussions demonstrating higher order thinking, produce written answers that were more robust and indicative of higher order thinking, and were less likely to become disengaged than participants engaged in a single player non reflection treatment group.

Participants given the names Dean, Mike, Sean, Sara, and Ariel typify participant discussions that represent higher order thinking. These participants engaged in a multiplayer game of Making History 2.0 with reflective journaling. While each of these participants could have played independent games in isolation, each of the players chose to help each other a great deal. At the outset of the game, Dean (France), Mike (Italy), and Sean (Germany) chose to form and alliance. In response, Sara (USSR) and Ariel (Great Britain) formed an alliance. Recordings of the participants' conversation and the researcher's notes both revealed that Dean, Mike and Sean were proficient at playing computer based video games, while Sara and Ariel were not accomplished. Even though they were opponents in the multiplayer game, Dean and Sean repeatedly helped Ariel and Sara overcome technical issues with their game play. During the course of their play, all of the participants constantly compared their nations' positions in the game with the historical place of their nation. For instance, Dean was incredulous that France would ever be allied with Germany. Dean stated, "Germany would never allow France as an

Table 15

Qualitative Analysis Effects Matrix Multiplayer and Single Player Groups

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Written Artifacts of Participants	Multiplayer Group	Participant desire to play more. Participants helped each other play the game. Longer participant responses.	Fewer instances of blank responses. A few negative responses about the difficulty of the game.	Participants synthesized prior knowledge and game play. Participants used prior knowledge to "win."	Participant writings were limited in their analysis, instead focusing on one aspect of the conflict.	References to historical knowledge of the time period. Numerous instances of understanding of the major events.	Many of the historical facts used by participants are wrong or only focus on military or political events.

(*table continues)*

Table 15 (continued)

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Written Artifacts of Participants	Single Player Group	Participant writings indicating that playing games is better than "normal" classroom lessons.	A majority of participants wrote short one sentence passages or left blanks, more prevalent among the non reflective journaling groups.	Some instances of connecting historical understanding to game events.	Most participants did not engage in higher order thinking. Very limited responses among non reflective groups.	References to the political and military big events of the time period. Incorporation of historical knowledge into participants' responses.	Many responses contained historical errors. Few responses dealing with social causes of conflict.

Table 16

Qualitative Analysis Effects Matrix Multiplayer and Single Player Groups

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Voice Recordings of Participants	Multiplayer Group	Participant talk dealt with game play. Numerous instances of participants assisting each other during play.	Instances of off task group talk in the non reflection groups. Frustration with technical difficulties.	Several instances of participants making in depth analysis of historical events to their game play.	Some participants' comments indicate that they did not view their game play beyond the prism of the game.	Numerous instances of participants verbalizing historical facts to help with their game play.	Several utterances of incorrect historical knowledge. Historical knowledge limited to military facts.

(table continues)

Table 16 (continued)

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Voice Recordings of Participants	Single Player Group	In the reflective journaling groups, Most participants remained on task.	Long stretches of quiet. Few instances of participants helping each other. Frustration with the game.	Instances of participants vocalizing connections between their game play history. Prevalent during reflection sessions.	Few instances of HOTS thinking in the non reflection groups due to little on task discussion. Analysis focused on military or political.	A few instances of participants uttering prior historical knowledge, Only one instance outside of reflection groups.	Several utterances of incorrect historical knowledge. Historical knowledge limited to political and military facts.

Table 17

Qualitative Analysis Effects Matrix Multiplayer and Single Player Groups

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Observations by Researcher	Multiplayer Group	Participants highly engaged in the game play and discussions. Participants helped each other.	Some participants "did not like games." Frustration with the difficulty of the game.	Participants planning collaboratively. Participants helped each other to understand historical context of play.	Limited in depth analysis and synthesis. Restricted to major events.	Use of prior historical knowledge. Participants discussed their historical knowledge.	Instances of historical misunderstanding or simplistic historical thought.

(table continues)

Table 17 (continued)

Data Sources	Treatment Groups	Engagement		Higher Order Thinking Skills		Lower Order Thinking Skills	
		Positive	Negative	Positive	Negative	Positive	Negative
Observations by Researcher	Single Player Group	A few participants enthused about playing the game. Participants preferred to play on the computer.	Many participants expressed frustration and stopped playing when they encountered technical difficulties.	A few instances of participants planning collaboratively using historical knowledge and game play experience.	Among non reflection group, little HOTS thinking. Participants did not connect game play to historical context	Some use of prior historical knowledge. Among the refection group, some discussion of historical context.	Participants stated simplistic versions of history. Limited use of prior historical knowledge. Little conversation.

ally because of World War I." Sean responded to Mike by saying that "France could have allied with Germany because they knew they would have been beat so why not team up?" Sara tried to convince Dean to end his alliance with Mike and Sean and told Dean, "Once they (Mike and Sean) have beaten us they are going to turn around and invade you just like Hitler did to Russia." These conversations reveal that the participants were trying to make sense out of their countries' roles in the game and how these roles conflict with the true history of World War II. Sara's conversation with Dean demonstrates that she is using her prior knowledge of World War II to convince Dean to leave his allies and join her side in the game. Sara and Ariel also conversed about how Great Britain's location and naval power allowed them to avoid much of the land conflict while Russia could be easily invaded but was difficult to conquer. Ariel's frustration with her inability to help Sara is disclosed when she uttered, "How are we suppose to win when I can't get any men to your country?" France and Germany keep sinking my ships and killing my guys. This is so annoying!" Sara elaborated on Ariel's frustration by stating, "We have to get an alliance otherwise we are going to lose badly. We have to get one of them on our team."

The simulation game put Sara and Ariel in the unenviable task of dealing with Germany's aggression when faced with the geographic and technological challenges encountered by the USSR and Great Britain during World War II. The challenges Sara and Ariel encountered pressured them to reach solutions to their predicaments. Sara and Ariel's use of their and their opponents' prior knowledge of World War II to form an alliance represents a synthesis of knowledge. Sara realized that her nation, the USSR, could not win a protracted fight with the combined forces of Germany, Italy, and France

without more alliance members than Great Britain. In their reflective session, Sara stated that “Russia’s technology made it impossible to play” and that “Russia would lose without friends.” The interaction within this multiplayer group indicates that the participants used their prior knowledge and game experiences to make new associates and choices in their game play and in their understanding of history.

The experiences of Dean, Mike, Sean, Sara, and Ariel stand in contrast to the experiences encountered by Tonya and Anna. Tonya and Anna participated in a single player non reflection treatment group. As in the case of Connie and Valery, Anna and Tonya experienced a great deal of frustration during their lesson. Both Tonya and Anna began their game experience by expressing misgivings about the game play. Tonya and Anna chose to discuss their relationships with friends during the tutorial phase of the lesson and did not ask any questions. Once the actual game began, both of these participants quickly abandoned their game play and expressed a desire to not play the game. Tonya completed only four game turns while Anna completed 7 turns. Tonya wrote IDK (I don’t know) as the answer to every question on her posttest. Anna wrote one simple sentence as her answer to each question. The single player groups did not afford Anna and Tonya the opportunity to interact with other participants to become reengaged in the lesson.

Recorded voices provide another indicator of the differences experienced by the participants in the treatment groups. The single player groups are filled with vast tracks of silence as the participants silently play the single person game but the multiplayer groups are filled with conversation about the game and the roles played by the participants. The conversation in the multiplayer groups is spurred both by the

interaction of the participants in the group and by the reflection sessions. In the single player groups, many participants tune out and wander off task until a reflection session brings them back to the game play experience. In the case of participants in the non reflection single player groups, many participants become off task and only come back to game play when one of the instructors moves around the classroom.

Summary of Findings for Research Questions # 2 & # 3

The combination of the qualitative and quantitative analysis produced the finding that there exists a significant difference in the experiences of participants engaged in the different treatment groups. Quantitative analysis reveals that there is no statistically significant difference between the means of the multiplayer and single player treatment groups as a whole on the means of posttests of knowledge ability. Quantitative analysis does indicate that there is a statistically significant difference between the means of multiplayer and single player treatment groups participants on posttests of reasoning ability. Furthermore, statistical analysis demonstrates that there is no significant difference in the means of posttest of knowledge ability or reasoning ability between the participants involved in the single player no reflection and multiplayer no reflection treatment groups. In addition, there exists no statistically significant difference in the means of posttest of knowledge ability between the multiplayer reflective journaling and single player reflective journaling treatment groups. There exists a statistically significant difference between the means of posttests of reasoning ability between the participants in the multiplayer reflection and single player reflection treatment groups.

Qualitative analyses indicate that participants in the multiplayer treatment groups were more engaged, spoke more often regarding the simulation, asked more questions,

and engaged in more higher order and lower order thinking than their peers participating in non reflective treatment groups. Qualitative and quantitative analyses demonstrate limited support for the hypothesis that participants in an educational simulation video game who participate in a multiplayer group will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no reflective journaling. There exists no qualitative or quantitative support for the hypothesis that participants in a multiplayer educational simulation video game will exhibit greater levels of lower order thinking skills on posttests than participants with no reflective journaling.

Research Question # 4

The fourth and last research question in this study is, "How does prior interest and or exposure to video games influence higher order and lower order thinking by participants during the course of an instructional video game?" The researcher tested the hypothesis that participants in an educational simulation video game with prior interest in video games will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no prior interest in video games to ascertain an answer to the research question.

Quantitative data for research question # 4

An analysis of the effect of participants' prior interest in video games on the cognitive outcomes after playing an instructional simulation video game will begin with a description of the participants' attitudes towards games, technology, and learning. Participants completed an online survey to gauge their attitudes towards video games, computers, and lessons involving computer technology. During the course of the online

survey, participants were asked if they played video games. As reported in table 18, 81.3% of participants indicated that they did play video games. All of male participants indicated that they played video games, while 67.6% of females responded that they played video games. As reported in table 19, the participants responded to the question, "Do you enjoy playing video games?" The Likert scale responses included the choices strongly disagree, disagree, neutral, agree, and strongly agree. Only 3.2% of respondents indicated that they disagreed with the statement, 17.5% of respondents marked neutral, 47.6% indicated that they agreed with the statement, and 31.7% of the respondents indicated that they strongly agreed with the statement. No participants indicated that they strongly disagreed with the question. The results reported in tables 18 and 19 indicate that the majority of participants in the research study like to play video games.

Table 20 reports the means of the participants' posttest scores by reasoning ability and knowledge ability by response to the question designed to elicit if the participant enjoy playing video games. From the data displayed in Table 20, it appears that participants that responded that they strongly agreed they enjoyed playing video games

Table 18

Participants' Responses to Do You Play Video Games

Response	Male	Female	Total
Yes	54	50	104
	100%	67.6%	81.3%
No	0	24	24
	0%	32.4%	18.8%

Table 19

Participants' Responses to Do You Enjoy Playing Video Games

Response	Male	Female	Total
Strongly Disagree	0	0	0
	0%	0%	0%
Disagree	0	4	4
	0%	5.4%	3.2%
Neutral	0	22	22
	0%	29.7%	17.5%
Agree	24	36	60
	46.2%	48.6%	47.6%
Strongly Agree	28	12	40
	53.8%	16.2%	31.7%

achieved a higher score on the posttest of reasoning ability. However, the participants' reported enjoyment of video games appears to have no correlation to the participants' score on a posttest of knowledge ability.

Further statistical analysis was needed to determine if the difference in means displayed in Table 20 was statistically different. Tables 21 and 22 report the results of an ANOVA Tukey honest significant difference (HSD) test on the means of the participants' posttest scores by the participants' responses to the question do you enjoy playing video games. The ANOVA Tukey HSD test was performed to determine if the differences between the different groups occurred by random chance.

Table 20

Posttest Means for Participants Responding to Do You Enjoy Playing Video Games

Posttest	Response	N	Posttest Mean
Reasoning Ability	Strongly Disagree	0	0
	Disagree	4	1.50
	Neutral	22	1.50
	Agree	60	1.43
	Strongly Agree	40	1.85
	Total	126	1.58
Knowledge Ability	Strongly Disagree	0	0
	Disagree	4	2.00
	Neutral	22	1.45
	Agree	60	1.38
	Strongly Agree	40	1.50
	Total	126	1.45

The ANOVA test indicated results displayed in Table 21 indicate that there exists a statistically significant difference between the means of participants' reasoning ability between participants who simply enjoy playing video games and those participants who strongly agreed they enjoy playing video games. As illuminated by Tables 21 and 22, no other statistically significant result exists between the participants who indicated differing levels of how much they enjoyed video games.

Table 21

Tukey HSD for Reasoning Ability Posttest by Participants' Enjoyment of Video Games

Dependant Variable	Response Group	Response Group	Mean Difference	p
Reasoning Ability	Disagree	Neutral	.00	1.00
		Agree	.07	.99
		Strongly Agree	-.35	.75
	Neutral	Disagree	.00	1.00
		Agree	.07	.98
		Strongly Agree	-.35	.20
	Agree	Disagree	-.07	.99
		Neutral	-.07	.98
		Strongly Agree	-.41*	.01
	Strongly Agree	Disagree	.35	.75
		Neutral	.35	.20
		Agree	.41*	.01

*Note. *p<.05, **p<.01*

Table 23 indicates the participants' responses on the survey question designed to uncover how much participants' play video games. Eighty percent of the participants in this research study played video games at least once a week. Over 60% of participants played video games up to six hours each week. Six participants, all males, played video games at least 15 or more hours a week. The six participants who indicated that they played video games more than 15 hours each week would qualify as hard core gamers.

Table 22

Tukey HSD for Knowledge Ability Posttest by Participants' Enjoyment of Video Games

Dependant Variable	Response Group	Response Group	Mean Difference	p
Knowledge Ability	Disagree	Neutral	.55	.23
		Agree	.62	.11
		Strongly Agree	.50	.27
	Neutral	Disagree	-.55	.23
		Agree	.07	.95
		Strongly Agree	-.05	.99
	Agree	Disagree	-.62	.11
		Neutral	-.07	.95
		Strongly Agree	-.18	.70
	Strongly Agree	Disagree	-.50	.27
		Neutral	.05	.99
		Agree	.18	.70

*Note. *p<.05, **p<.01*

The means of posttest scores on posttests of reasoning ability are reported in Table 24 by participants' hours of video game play per week using a Tukey HSD ANOVA test. Participants who reported playing video games at least 15 hours a week produced statistically significant higher mean scores on posttests of reasoning ability than participants who reported that they did not play video games on a weekly basis. The mean score of the hard core gamer group was one full point higher on the posttest than

Table 23

Participants' Responses to In a Normal Week, How Often Do You Play Video Games

Response	Male	Female	Total
None	0	24	24
	0%	32.4%	18.8%
0 – 3 Hours	18	38	56
	33.3%	51.4%	43.8%
3 – 6 Hours	20	6	26
	37.0%	8.1%	20.3%
7 – 10 Hours	6	2	8
	11.1%	2.7%	6.3%
10 – 15 Hours	4	4	8
	7.4%	5.4%	6.3%
15 or More Hours	6	0	6
	11.1%	0%	4.7%

the participants that indicated they did not play video games. There is no statistically significant difference between the means of participants' scores on posttest of knowledge ability when analyzed by participant video game play per week.

An examination of the quantitative data reported in Tables 18 thru 24 reveals that the majority of participants in this research study enjoyed playing video games. Most of the participants played video games at least once a week while a few participants played for at least 15 hours each week. Participants who strongly agreed that the enjoyed

Table 24

Tukey HSD for Reasoning Ability Means by Participants' Hours of Video Game Play

Dependant Variable	Response Group	Response Group	Mean Difference	p
Reasoning Ability	15 or More Hours	None	1.00*	.01
		0 – 3 Hours	.78	.07
		3 – 6 Hours	.72	.16
		7 – 10 Hours	.83	.18
		10 – 15 Hours	.33	.94

*Note. *p<.05, **p<.01*

playing video games score significantly higher on reasoning ability posttests than those participants agreeing that they enjoyed playing video games. Statistically, there is no significant difference between participants' means on posttest of knowledge ability regardless of the participants' prior disposition or views towards video games. However, there does exists a statistically significant difference between the means of reasoning ability posttest scores between participants who responded that they did not play video games on a weekly basis and those who responded that they played video games at least 15 hours a week.

Qualitative Analysis of Research Question # 4

While the quantitative analysis reveals some statistically significant and interesting results, it does not reveal causality. A qualitative analysis of the participants' actions during the lesson and an analysis of the participants' voice recordings serve to triangulate the data to produce a more meaningful understanding of the data. Tables 25

and 26 organize the qualitative data observed by the researcher during the course of the research study. For the purposes of this data analysis, the participants were categorized into 3 groups, non players, those who indicated they did not enjoy playing video games or did not play video games at home on a regular basis, casual players, those who indicted they spent 0 – 6 hours of video game play each week, and gamers, those who spent more than 6 hours playing video games each week. The researcher categorized the participants based on their responses to an online survey given prior to the lesson used in this research study. The participants were assigned a random number to identify themselves in the survey and during the course of the study. The researcher noted the location of each participant. The researcher then compared the location of the participants and the location of the voice recorders to determine if a participant was a non player, casual player, or gamer. During the course of the research study, the researcher took field notes. After the conclusion of the study, the researcher used the digital voice recordings and the transcriptions of the recordings to create the information contained in Tables 25 and 26.

A review of the qualitative data summarized in Tables 25 and 26 reveal that non-gamers or participants who indicated that they did not like to play video games were apt to become frustrated very quickly with the technological aspects of Making History 2.0. Valerie and Bianca are examples of the experiences of participants who are non-gamers that became quickly frustrated with their gaming experience. Valerie and Bianca began their gaming experiences by discussing how they hated to play video games. Valerie uttered on a digital recording, “Why are we playing games in school, shouldn’t we be in class learning?” Bianca responded to Valerie’s statement by saying “Anything is better

Table 25

Qualitative Analysis Effects Matrix Researcher Observation of Lesson

Type of Player	Technical Proficiency	Game Play	Interaction With Others
Non Players	Slow to start game. Asked many questions about how to play. Several participants became frustrated with the user interface. Outburst of frustration with computer speed. Frustration with technical aspects of game play caused participants to stop playing the game.	Very slow game play. At first, asked many questions, later asked few questions. As the game progress, many stopped playing. Frustration with game play and lack of understanding of game dynamics.	Little positive interaction with others regarding game play. Many engaged in off task behaviors with other non-game players. Completed other schoolwork assignments with other non-players.

(*table continued)*

Table 25 (continued)

Type of Player	Technical Proficiency	Game Play	Interaction With Others
Casual Players	Some slow to start game. Began game with only a few questions. Expressions of frustration with slow computers.	Slow game play at first, quicker as the game progressed. Became more actively interested as the game progressed. At first only were interested in "invading" as the game progress, used more of program.	A great deal of interaction between casual players and other players about how to play the game. As the game progressed, interactions with others focused on advanced game strategies.
Gamers	Started game without waiting for instructions. Helped others to navigate computer technical issues.	Very fast game play. Strategic game play. Use of advanced game tools.	Helped others with their game play Interactions with others focused on game strategy. Focused on "winning the game"

Table 26

Qualitative Analysis Effects Matrix Voice Recordings of Participants

Type of Player	Technical Proficiency	Game Play	Interaction With Others
Non Players	Excited utterances such as “What are we doing” “How do I play this game?” Statements indicating participants are confused about how to move in the game. Statements such as “I hate computers!” “I hate games!”	Statements such as “I don’t know what the point of this game is!” “I don’t understand what I am supposed to do!” Many references to frustration about losing battles, non-production of cities, or lack of alliances. Focused on taking over the world.	In the beginning, numerous questions to others about how to start or play the game the game. Later, less and less talk about the game and more discussions about off task subjects. In reflective groups, participants reengaged during and after each reflection session.

(*table continued)*

Table 26 (continued)

Type of Player	Technical Proficiency	Game Play	Interaction With Others
Casual Players	Numerous questions about how to play the game. Numerous conversations about technical aspects of game play. Utterances such as: "How do I speed up the game?"	Utterances expressing frustration with game play such as "I don't know what I am doing!" or "how to win this game?". Later in the game, more utterances such as "I am going to win this game!"	In multiplayer groups, heavy discussion about how to best play the game. In single player groups, less and less game related interaction as the lesson progresses.
Gamers	Few conversations or utterances about technical issues.	Conversation about the creation of alliances and strategy about how to win the game. Technical game play.	Collaboration with other gamers about how to best win the game. Numerous instances of gamers helping other players.

than being in class!" As their game experience progressed, Valerie and Bianca began to talk about off task topics, such as what they were going to do over the weekend and they discussed their relationships with other students. Valerie and Bianca were a part of a non reflection group and did not ever return to their game play during the remainder of the lesson. Valerie and Bianca were also overheard on the digital recorder expressing frustration with their technical comprehension of the game play. It is clear from the audio recordings that Valerie and Bianca did not understand how to play the game and did not utilize the opportunity to understand the dynamics of the game play during the tutorial. Valerie and Bianca did not solicit help from other participants in the class or the instructor; they merely stopped participating in the lesson and began to engage in other tasks. Valerie and Bianca's experiences are similar to those of other participants engaged in the non reflection treatment group who are non gamers.

The qualitative analysis that produced the information in Tables 25 and 26 reveal that non players would begin to lose interest in the lesson and engage in off task behaviors as the game progressed. Monica is a participant who is classified as a non gamer who engaged in a multiplayer reflective treatment group during her play of Making History 2.0. Monica asked numerous questions of her other group members during the early stages of the lesson. Monica continuously asked more technically proficient participants how to move in the game or how to build items in the game. Her group members were quick to help her play the game, but once the game play began; the other participants took advantage of Monica's limited understanding and forced her into untenable positions in the game. Monica was overheard uttering, "I don't understand and hate this game!" Monica would then tune out the game until the group would have to

reconnect during the reflective sessions. Monica would begin to play again directly after the reflective sessions but would quickly move to off task activities. Monica was clearly uninterested and said little during the reflective sessions as the game progressed.

Participants who were classified as casual gamers had a wide variety of diverging experiences depending upon how they engaged in the lesson. Michael and Gabriel's experiences are indicative of the experiences of causal gamers who participated in the research study. Michael participated in a single player group non reflection group, while Gabriel participated in a single player reflection group. Both Michael and Gabriel began their game play experiences by asking their peers questions about how to play Making History 2.0. Michael uttered, "I am taking over the world!" while playing his game. Michael was noticeably interested in the course of his game and became more proficient at his game play as the game progressed. Michael expressed disappointment at his country in the game by uttering such statements as, "France is terrible, why can't I be Germany?" Michael's statements indicated that he understood his nation's position in the game and understood the difficulties inherent in France's position in 1939. Michael remained engaged throughout the simulation.

In the case of Gabriel, he expressed frustration with the slow pace of the computer at the beginning of the simulation. Gabriel stated, "I wish I had my home computer, these computers are slow." Gabriel and other casual gamers, as well as non-gamers, had difficulties with the technical aspects of the game and faced a steep learning curve before they could fully understand and utilize Making History 2.0's full range of features. Gabriel repeatedly asked fellow participants and the instructor for help with the technical aspects of the game play. Once Gabriel began to grasp the basics of the game control, he

began to express more satisfaction with the game. About half way through the game play, Gabriel stated, “Yes, I am going to take out Russia and France at the same time!” Gabriel was very involved with the game at this point and was actively attempting to form alliances with other computer controlled nations to “take control of Russia.”

Gabriel and Michael’s experiences also reveal another aspect of casual gamers as well as non gamer participants’ game play. During the course of the study, the researcher observed that casual gamers never fully engaged in the more advanced parts of Making History 2.0. The technical and game play learning curve for Making History 2.0 is very steep even after all participants engaged in the game tutorial prior to the start of the game play. Participants with limited technical proficiency or limited computer game experience had to learn the dynamics of game play and expressed their frustration with the intricacies of Making History 2.0. Casual and non-gamers limited their game play to invading and conquering other nations. The game play effect was that many of the participants who were only worried about conquest quickly ran out of money, supplies, and infrastructure inhibiting their game play and increasing the players’ frustration. Non-players would quickly move to off task behaviors while casual players would focus on the conquest aspect of the game. By the end of the game, casual players had move to a point of technical proficiency where they were worried about alliances and supplying arms to their troops.

Whereas casual players and non-players encountered difficulties with the technical aspects of Making History 2.0, participants such as Dwayne and Ronald were indicative of how gamers experienced the game. Both Dwayne and Ronald responded in their surveys that they play games more than 15 hours each week. Dwayne and Ronald

were randomly assigned to the same multiplayer reflection group and planned to destroy all other members of their group from the outset of the game. While the casual and non-players focused on moving game pieces during the tutorial, Dwayne and Ronald focused on how to utilize the games technology progression feature where nations can create modern military, industrial, and agricultural equipment. Dwayne and Ronald were overheard on the digital audio recordings discussing their tactics to "take over the world." While the desired outcome of Dwayne and Ronald is similar to the casual gamers, their methods differ greatly.

In the course of their desire for world conquest through better game play, the gamers frequently helped their fellow participants learn to play the game and overcome technical difficulties. While Dwayne and Ronald desired to conquer the world, they were happy answer their fellow players' questions and would often offer unsolicited tips about how to change the screen view, create certain types of units, or change the production of a city. The gamers appeared to enjoy being the authorities in the room regarding the best practices to play a game.

As indicated in Tables 25 and 26, gamers expressed a desire to play the game in the future. One gamer designated as Tommy, repeatedly asked the researcher where they could find a "bootleg" copy of the game so they could play the game at home. Gamers displayed a high level of satisfaction with the game, even when randomly assigned to difficult nations such as France. No non-players and only a handful of casual players expressed a desire or interest in playing Making History 2.0 outside of the classroom. In a chance encounter weeks after the conclusion of the study, Tommy indicated to the

researcher that he had purchased Making History 2.0 and had “won” several times playing different nations.

Summary of Key Findings for Research Question # 4

Participants who had a prior interest and exposure to playing video games were more engaged during their game play, were more likely to appear to enjoy their game play, and became more technically proficient as their game play progressed. Participants with a great deal of prior exposure to video games, the gamers, played Making History 2.0 at a much higher technical level than other players, expressed a desire to continue the game outside of the classroom, and were actively helpful to their peers regarding technical and game play questions. Participants classified as non-players were likely to become disengaged quickly during the course of the lesson and would only become reengaged for brief periods following reflective periods if the participant was in a reflection group. Non-players expressed frustration with the technical aspects of the game and the difficulty of the game play.

The quantitative analysis of research question 4 indicates that there exists a statistically significant difference in the means of posttest scores of reasoning ability between participants who indicated that they enjoyed playing video games and participants who reported that they did not like playing video games or were less enthusiastic about video games. Participants who indicated that they play video games more than 15 hours each week scored significantly higher on posttest of reasoning ability than participants who indicated that they played video games less than 15 hours each week. There exists some support for the hypothesis that participants in an educational simulation video game with prior interest in video games will exhibit greater levels of

higher order thinking skills on posttests than participants in the same simulation with no prior interest in video games.

Summary of Key Findings

The major finding illuminated by this research study is that participants who engage in reflective journaling in a multiplayer treatment group are statistically likely to score higher on posttest of reasoning ability than those who participate in other treatment groups. The combination of the multiplayer grouping and instructional support of instructor guided reflection are needed to produce quantifiable statistical results on the posttest of reasoning ability. There exists no support for any hypothesis that purports to demonstrate there will be a statistically significant difference between the means of posttest of knowledge ability between the members of the different treatment groups. Qualitative analysis informs the researcher that participants of multiplayer and reflective journaling groups are likely to be more engaged, ask more questions, and be on task than their peers in non reflection and single player groups. Furthermore, participants in multiplayer and reflective groups engaged in increased higher order thinking but this talk did not translate to the participants' reflective journal papers or the participants posttests. Participants who had more prior exposure and interest in video games were more likely to be on task, participate in game talk, and become more technically proficient as the game progressed than their peers with less prior exposure to video games. Participants who indicated they spent more than 15 hours playing video games each week scored statistically significantly higher on posttest of reasoning ability than their peers who spent less time playing video games. There exists no quantitative support for the hypothesis that participants who have prior interest and/or exposure to video games will score higher

on posttest of knowledge ability than their peers who have less prior exposure to video games. The next chapter in this research study provides analysis and interpretation of the results reported in this chapter.

CHAPTER 5

SUMMARY

The world has become a much more connected place with the advent of the digital age. Students in the United States are entering the work force and competing for jobs with citizens around the world. In this highly technologically skilled world, the ability to navigate and thrive in the digital age has made the acquisition of digital age skills essential to finding and securing a job (Friedman, 2005; Gee, 2007). As outlined in chapter 1, the problem faced by social studies educators is how to prepare students for the challenges of the 21st century world while simultaneously teaching social studies content in a manner that facilitates higher order thinking that is essential for successful student learning in the digital age.

The widespread availability of computer and internet access among the populace of the developed world has given rise to a plethora of companies selling and promoting video games that purportedly teach content, as well as 21st century skills during game play. Software companies are attempting to fill the perceived void that exists as educational establishments slowly embrace the new digital medium. The software companies proclaim that their products teach players about educational content in a medium that is relevant to the digital learner. In the advertising literature for Making History 2.0: The Calm and the Storm, the producers of game state, “Making History captivates top and average students, but it also pulls the uninvolved and struggling

students into its historical world" (Muzzy Lane Website, 2007). Information technology companies such as Muzzy Lane, the producers of Making History 2.0, would have potential clients believe that one of the potential pathways to teach students 21st century learning skills as well as content would be to use video games designed to teach content in the classroom. No less than the current Secretary of Education Arne Duncan supports the idea that video games can teach students (Dretzin, 2010). Within this research study, the researcher tested the idea that students could successfully learn content as well as higher order thinking skills while playing Making History 2.0 and found mixed results for the hypothesis.

Several research studies have investigated the potential for video games to impact a players' learning but few research studies have examined the impact on players' higher order thinking (Squire, 2005; Gee, 2007). Likewise, few studies have examined the impact of multiplayer games on player's learning or the impact of players' prior interest and exposure to video games (Squire & Steinkuehler, 2005). The purpose of this study was to determine the relationship between the use of an education simulation video game play during a lesson and students' cognitive outcomes. The studies that have taken place indicate that players can learn from playing a video game (Squire 2005, Gee 2007). This study will help to fill a gap in the literature concerning video games by examining how different variables influences players' learning during the use of an educational simulation video game during a high school lesson. This chapter presents a summary of the study and the important conclusions drawn from the data presented in chapter 4. Included in this final chapter is a discussion of the implications for action and recommendations for further research.

Summary of the Study

How can social studies teachers change their teaching to incorporate student understanding of 21st digital technology while continuing to teach essential content? As stated in chapter 1, knowledge of how to utilize digital technology is quickly becoming an essential life skill for active civic participation in the developed world. Traditional drill and kill teaching methods will not enable students to engage in the current technological revolution and will force students to learn essential life skills on their own. The societal paradigm shift will affect current teachers and future teachers by forcing social studies educators to adapt to meet the goal of preparing students to become knowledgeable active democratic citizens (National Council for the Social Studies, 1994). Educators should provide students with active experiences using technology and learning within this new paradigm if they are to become effective citizens able to fully participate in an industrialized world dominated by the integration of computer technology in everyday life (Gee, 2005a). The use of simulation video games to facilitate authentic learning can motivate students to learn by engaging learners with the critical technological skills essential to becoming active knowledgeable citizens consistent with the purpose of social studies education as outlined by the National Council for the Social Studies. According to NCSS, the purpose of social studies education is "to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world." Social studies educators face the daunting task of making decisions about what is the appropriate skill set students need to become democratic citizens. Well designed simulation video games like Making History 2.0 potentially offer educators an

instructional method that can promote learning within the paradigm of this technological revolution, but as this study indicates, a knowledgeable teacher is a requirement for successful student outcomes.

During the course of this study, the researcher examined four major research questions. The first research question was "How does reflective journaling during the use of instructional simulation video games influence higher order thinking and lower order thinking?" The researcher explored the use of reflective journaling, the practice of stopping students at preplanned intervals to write reflectively about their experiences, on students' cognitive outcomes as they played Making History 2.0. The researcher developed the first research question to uncover if a structured lesson designed to foster student thoughtfulness would affect students' cognitive outcomes as they participated in the game. The hypothesis was that participants engaged in reflective journaling treatment groups would demonstrate higher levels of higher order and lower order thinking on a posttest of reasoning and knowledge ability.

The second & third research question explored in this research study was, "How does the use of multiplayer games influence higher order thinking and lower order thinking?" and "How does the use of single player games influence higher order thinking?" The researcher designed these two research questions to reveal if participant involvement in a multiplayer or single player version of Making History 2.0 affected a change in participants' cognitive outcomes. Prior literature on the subject is limited to exploring the creation of communities of fellow digital learners (Squire & Steinkuehler, 2005). There exists scant literature on the effect of multiplayer and single player gaming experiences on cognitive outcomes. Prior research has been published indicating that

collaborative activities during educational video games will enhance cognitive outcomes of students, but these studies did not focus on multiplayer or single player activities (Shaffer, Halverson, Squire, & Gee, 2004). This research study helps to fill the gap in the research on multiplayer game experiences. The hypothesis connected to these research questions was that participants who participate in a multiplayer version of an educational simulation video game would exhibit greater levels of higher order thinking skills on posttests than participants involved in a single player version of the same educational simulation video game.

The last research question explored during this research study was, "How does prior interest/exposure to video games influence higher order thinking?" This research question was developed as a result of the premises brought forth by Gee (2005c) and Squire (2005), as well as other researchers, that 21st century learners will be more connected to an educational lesson if the lesson is presented in a format in which they are familiar such as a video game (Gee, 2005c; Squire, 2005). Squire's research indicates that participants who liked video games were more likely to participate in educational video game play. Squire also stated that a group of participants stopped participating in the lesson during the course of the study because they lost interest in the video game (Squire, 2006). The researcher designed this question to explore the research of Gee and Squire into the effects of prior interest and exposure to video game play on participants' cognitive outcomes after experiencing Making History 2.0. The hypothesis used to test this research question is that participants in an educational simulation video game with prior interest in video games will exhibit greater levels of higher order thinking skills on posttests than participants in the same simulation with no prior interest in video games.

Overview of the Methodology

The researcher conducted the research study entirely in a suburban area high school with a diverse student population. The high school in question is 58% White, 24% Black, 12% Hispanic, 4% Asian, and 3% Multiracial. The participants were selected using convenience sampling. The classes that participated in the research were all college preparatory World History classes and the researcher had access to each of these classes. Five college preparatory world history classes participated in the research study consisting of 154 students. One hundred twenty-eight students participated in all aspects of the research study and completed informed consent forms. Over the course of two block class days with each period consisting of 120 minutes, the researcher conducted the lesson utilizing Making History 2.0. The researcher rolled a die to assign each participant into one of four treatment groups. The treatment groups consisted of a group that played the game in a single player mode with no reflective journaling, a single player group with reflective journaling, a multiplayer group with no reflective journaling, and a multiplayer group with reflective journaling. In the reflective journaling groups, the instructor stopped the game player after every 5 turns or approximately 15 minutes and allowed the participants to write reflective journal entries about their game play and lead a short discussion of the participants' game play and their understanding of the historical narrative of their game play. In the treatment groups without reflective journaling, the participants continued to play the game without interruptions of directed help from the instructors. In each treatment group, the participants completed an online survey to gauge their interest and prior exposure to video games and computers, completed a 30 minute tutorial to learn how to play the game, completed a 30 turn game

of Making History 2.0, and completed a posttest designed to assess the participants' higher order and lower order thinking after playing the game. The participants completed the prior interest and exposure survey and the game tutorial on the day prior to the actual lesson utilizing Making History 2.0. All participants completed the same scenario of Making History 2.0 that placed the participants as France, Germany, Italy, United Kingdom, or Russia in 1938.

The researcher provided all of the participants with an identification number used to identify the participant during the course of the study. Prior to participation in the study, the researcher provided each participant with an informed consent form. Each participant had to return a signed informed consent to participate in the research study. The researcher obtained IRB approval for the study and followed the IRB process. The researcher collected notes during the sessions and placed voice recorders strategically throughout the room to gather data about the participants' experiences. Participants' survey responses, reflective prompt writings, posttest answers, researcher observations, and participant voice recordings were all data sources used in this research study.

The researcher selected a mix-methodological approach to analyze the data gathered during this research study. A mixed methods approach allowed the researcher to analyze the data gathered from multiple methodological perspectives. Quantitative analysis informed understanding of the qualitative analysis and qualitative analysis informed the quantitative analysis. A quantitative analysis alone provides only statistical data without providing the researcher specific instances of how a participant was learning or experiencing the lesson.

Analysis of variance, descriptive statistics, and independent samples *t* tests were quantitative methods used to analyze the impact on participants' reasoning and knowledge ability after participating in the different treatment groups during the study. The researcher used analysis of variance and independent samples *t* tests to compare the means of the posttests results by the different treatment groups to understand if there was a statistical difference. The researcher also used independent samples *T* tests to reveal if there was difference in the participants' scores of posttest of reasoning ability and knowledge ability if the participants' reported different levels of prior interest or exposure to video games.

The study also utilized qualitative methods to analyze the data gathered. The researcher observed the participants, recorded participants' voices during the lesson, and analyzed participant responses to reflective prompts and responses on posttests. Qualitative methods described by Miles and Huberman (1994), Murray (2003), and Collins, Onwuegbuzie, and Sutton (2006) were utilized to analyze the qualitative data uncovered in this research study. In the course of the study, the researcher analyzed and coded field notes of observations, voice recordings of the participants during their game play, the written reflective responses and posttest answers of the participants to reveal themes about the observed behaviors during the sessions. The researcher then organized the coded notes into categories of participants' common experiences. The researcher noted common language by the participants and used the common language as the basis of the themes. The researcher then utilized the categories of common and uncommon participant experiences to reexamine the qualitative data to develop an understanding of the participants' experiences during the lesson. The researcher used the qualitative

findings to enhance the researcher's understanding of the data unearthed in the course of this study.

Major Findings and the Literature

Reflective Journaling and Higher Order Thinking Skills

As outlined in Chapter 2 several researchers have explored the connection between the teacher effect, or a teacher's impact in the classroom, and student learning while students engage with learning activities involving digital technology. Saye and Brush (2007), Gee (2006), Squire, Barnett, Grant, and Higginbotham (2004) conducted research studies exploring the incorporation of digital age technologies in the classroom and their research influenced the construction of this research question examining the effect of using reflective practices during the course of a lesson involving a simulation video game. Saye and Brush concluded that reflective scaffolding, or the practice of teacher facilitated student discussion during a lesson, increased students' ability to think critically about their learning. According to Saye and Brush, teachers should include constant scaffolding within lessons using technological affordances such as databases and video games in the classroom to encourage student thoughtfulness and learning. The major difference between this research study and the work of Saye and Brush is that Saye and Brush researched how participants in their study responded to an online database of the civil rights movement but their conclusions about participants' learning with reflective practices while involved with the database were generalized to other digital mediums.

In addition to the research of Saye and Brush (2007), Squire, Barnett, Grant and Higginbotham (2004) conducted a research study involving a game designed to teach

physics to students and concluded that game players do not thinking critically about their learning experiences during game play unless they are given the opportunity to engage in critical reflection about their learning. The research of Squire et al. (2004) led to the conclusion that reflective practices are necessary to create an environment where learners can process higher order thinking skills from a lesson incorporating a video game. Without the opportunity for reflective practice, students merely learned how to play the video game and did not learn physics knowledge. Squire et al. did not begin their study with reflective practices built into the lesson. As the study progressed, Squire et al. incorporated reflection into the lesson when they realized that participants were learning how to play the game and not focusing on the physics content. While the research study of Squire et al. evolved to include reflective practices, this researcher designed the present research study to determine if reflective practices would create a significant difference in the cognitive outcomes of the treatment groups.

Gee, (2007) concluded that video games are semiotic domains where learners are learning about the rules, values, requirements, graphs, charts, and motivations of the video game while playing the game. Gee believed that the learning of a semiotic domain within a video game would help students connect their learning of the semiotic domain to other semiotic domains, thus allowing students to create a meaningful understanding of new knowledge that is deep in content and connected to other knowledge. The writings of Gee indicated the need for thoughtful video game play by students in an educational environment where the learner can connect his or her game play to real content and allow critical reflection about their learning. Gee's writings demonstrated the need to conduct research to determine if reflective practices during an educational simulation video game

Table 5

Independent Samples T Test for Posttest Means for Reflection and No Reflection Treatment Groups

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.07	126	.29	-.10
Reasoning Ability	-1.85	103	.07	-.23

*Note. *p<.05, **p<.01*

such as Making History 2.0 will foster higher order thinking skills by participants in the video game play.

As detailed in chapter 4, the quantitative findings of this research study do not support the idea that the incorporation of reflective practices alone fosters the development of higher order thinking skills during the course of a lesson involving a simulation video game. Nor is there any support for the idea that reflective practices during the course of a simulation video game will improve participants' knowledge ability. Prior research literature led the researcher to conclude that reflective practices would increase participants' posttest scores. Table 5 illuminates the lack of statistically significant support for the hypothesis that participants engaged in reflection treatment groups would demonstrate higher levels of higher order and lower order thinking on a posttest of reasoning and knowledge ability. As indicated in Table 5, there exists a difference in the means of the reflection and non reflection treatment groups at the .07 level, which does not meet the .05 level needed for a statistically significant result.

Table 4

Posttest Means for No Reflections and Reflection Treatment Groups

Knowledge or Reasoning Ability	Treatment Group	N	Mean	Standard Deviation
Knowledge	No Reflection	72	1.42	.55
Ability	Reflection	56	1.52	.50
Reasoning	No Reflection	72	1.49	.61
Ability	Reflection	56	1.71	.76

As Table 4 demonstrates, there is a difference in the means of the two treatment groups on their posttest scores, but these differences do not rise to the level of statistical significance. The difference between the means is more pronounced on the posttest of reasoning ability than the test of knowledge ability. The prior literature indicates that there should be a statically significant difference between the treatment groups, but the quantitative data does not support that conclusion.

While the quantitative data does not support the hypothesis, there is qualitative data that does support the hypothesis that reflective practices facilitate the development of higher order thinking skills during a lesson involving a simulation video game. Participants involved in the reflective journaling groups engaged in reflective discussions about their learning, wrote more about their game experiences on the posttest and reflective responses, asked more questions than their peers ask, and engaged in fewer off task behaviors than their peers in non reflective groups. The discussion by the participants of the reflective treatment groups described in chapter 4 is indicative of

participants engaged in higher order thinking while playing an educational simulation video game. The instructor guided reflective sessions provided the participants with the opportunity to refocus their learning and refocus their engagement in the simulation. In the groups lacking the reflective sessions, participants were often unfocused or simply learned how to play the video game without any thought about the educational context of the lesson. The qualitative data gathered from this research study supports the conclusions reached by Saye and Brush (2007), Gee (2005b), Squire, Barnett, Grant, and Higginbotham (2004) that reflective practice will facilitate higher order thinking during lessons utilizing digital technology. The researcher must further examine the question of why the quantitative and qualitative data regarding higher order thinking produced different results.

Multiplayer and Single Player Experiences

With the advent of the modern internet, it is far easier for players to engage in multiplayer experiences than in the early days of video games. Consequently, research exploring multiplayer gaming is a relatively new field of inquiry. As detailed in chapter 2, some of the pioneers of multiplayer video gaming research are Gee (2005c, Squire (2006b), Steinkuehler (2005a), Prensky (2001), and Rice (2007). Due to his research involving observation and interviews of game players, Gee (2005c) concluded that most people prefer to play video games in groups. From these interviews and observations, Gee also concluded that video game play in a multiplayer format is highly meta-reflective and that players share their knowledge base for video games with other players through frequently asked questions and online forums. Through their game play with others, players greatly expanded their knowledge base and their skills needed to “win” the game.

According to Gee, if programmers properly design a video game for education then a multiplayer game experience will facilitate the learning of non-game play content. The research of Gee (2005c) indicated that the participants in this research study's multiplayer treatment groups should demonstrate higher scores on posttest of knowledge ability and reasoning ability than their peers in single player treatment groups.

Whereas Gee (2005c) conducted observations and interviews of video game players, Squire (2005) conducted one of the research studies examining the incorporation of a video game in a classroom. Squire hypothesized that the introduction of video games in the classroom would increase students' motivation to learn, would cause players to participate in new identities, and create better student understanding of the world. Squire conducted interviews, observations, teacher interviews, and collected field notes during his study. Unlike this research study, Squire's study did not test the participants' knowledge or reasoning abilities after their game play experiences. Squire's findings make obvious that this study's multiplayer treatment group participants should have been more engaged and should have reported higher posttest scores on knowledge ability and reasoning ability in their game play of Making History 2.0 than participants in the single player treatment groups.

While Squire (2005) was concerned about the incorporation of video games directly in the classroom, Steinkuehler (2005) examined the world of Massively Multiplayer Online Games (MMOG). Steinkuehler conducted a qualitative case study of the online video game known as Lineage. After analyzing her data, Steinkuehler concluded that game play in MMOGs fosters the development of communities of video games players by forcing players to learn at the outer edge of players' cognitive capacity.

According to Steinkuehler, successful play of a MMOG requires that players engage in the electronic community of video game players. In this research study, Steinkuehler did not explore if the extensive video game literacy learned by MMOG game players would lead to the learning of other associated content. The results of this current research study pick up where Steinkuehler's research left off by exploring if participant play in multiplayer video game setting leads to greater cognitive outcomes.

While Steinkuehler (2005) studied only massively multiplayer video games, John Rice (2007) created a framework to determine if a video game would facilitate the development of higher order thinking. Rice postulated that a video game would facilitate the development of higher order thinking among its players if the game immersed players in a 3D environment, required players to solve complex problems, and required problem solving with other participants in a multiplayer environment. The findings of this research study should have been similar to Rice's findings that a multiplayer version of Making History 2.0 facilitated the development of higher order thinking among the participants in multiplayer treatment groups.

Table 11

Posttest Means for Multiplayer and Single Player Treatment Groups

Group Assignment	N	Knowledge Ability Mean	Reasoning Ability Mean
Multiplayer	70	1.55	1.74
Single Player	58	1.36	1.40

Table 12

Independent Samples T Test for Posttest Means for Multiplayer and Single Player Treatment Groups

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	1.96	126	.06	.18
Reasoning Ability	3.02	125	.01**	.35

*Note. *p<.05, **p<.01*

The data gathered from this research study lends support to the research conclusions of Gee (2005c), Squire (2005), Steinkuehler (2005), and Rice (2007) that participation in a multiplayer video game encourages higher order thinking skills. Table 11 displays the means for posttest of reasoning ability and knowledge ability for participants of the single player and multiplayer treatment groups. The mean posttest scores for the multiplayer treatment group are higher for both the knowledge ability and the reasoning ability scores than the mean posttest scores of the single player treatment group. Table 12 shows that while the mean score for knowledge ability by the multiplayer treatment group is higher than the single player treatment group, there is no statistically significant difference among the means. Table 12 highlights the fact that there is a statically significant difference between the means of the multiplayer and single player treatment groups on the posttest of reasoning ability at the .05 level. Analysis of the data reveals no support for the hypothesis that participation in a multiplayer video game will improve a participant's knowledge ability. While independent samples *t* tests and qualitative analysis support the hypothesis that participation in a multiplayer

educational simulation video game will improve participants' cognitive outcomes on the posttest of reasoning ability, the researcher conducted further qualitative analysis to determine if the difference in the means was due to the multiplayer involvement of the participants.

A qualitative analysis of the data indicated that participants of the multiplayer treatment group spoke more often regarding the simulation, asked more questions, were more engaged, and participated in more reflective discourse. The social aspect of the multiplayer groups contributed to the participants staying focused on completing the game. The participants were able to support each other through technical difficulties, helped each other to learn the game, and fostered the development of teamwork as participants tried to "win" the game. The researcher's observations, participants' writings, and participants' discussions indicate that the multiplayer groups interacted more, but in the groups without reflective practices, the participants focused on winning the game and did not focus on the educational context of the lesson.

Reflection and Multiplayer

Whereas Gee (2005c), Squire (2005), Steinkuehler (2005) and other researchers make the claim that video games are valuable educational tools, the research of Krischner, Sweller, and Clark (2006) cautions educators that minimalist scaffolding will not lead to positive learning outcomes. The research of Krischner et al. (2006) did not examine video games or any single educational tool, but instead reviewed a large base of literature about experiential educational practices and concluded that instructional guidance is the best practice. The results of the research by Krischner et al. are supported by the conclusions of Sandford, Ulicsak, Facer, and Rudd's (2006) research into the

Table 13

Independent Samples T Test for Posttest Means for Single Player No Reflection and Multiplayer No Reflection

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.13	69	.26	-.14
Reasoning Ability	-.62	70	.54	-.09

*Note. *p<.05, **p<.01*

incorporation of video games in the classroom. Sandford et al. (2006) found that video games by themselves do not increase student motivation or require less teacher support than the traditional curricula of a classroom. Instead of the video game teaching the students with little teacher support, the researchers found that teachers needed to focus on developing student reflection and technical skills. The research analysis of Krischner et al. and Sandford et al. enhance understanding of Gee, Squire, and Steinkuehler's assertions that video games foster the development of higher order thinking among students.

The data compiled during this research study lends support to the idea that instructor guidance and planned reflection activities are necessary for facilitation of participants' higher order thinking during a lesson utilizing a simulation video game. While there is a statically significant difference between the means of the multiplayer and single player treatment groups, Table 13 demonstrates that there exists no statistically significant difference in the cognitive outcomes of the single player no reflection and the multiplayer no reflection treatment groups. From an analysis of the data collected, the

researcher concludes that without the benefit of reflective guidance participants are simply learning to play the video game and are not learning educational content.

Table 14 illuminates that the difference in the means of the single player reflection and multiplayer reflection groups are statistically significant. Table 2 reveals the mean scores of each group, and it is worth noting that there is little difference

Table 14

Independent Samples T Test for Posttest Means for Single Player Reflection and Multiplayer Reflection

Posttest	T	df	Significance (2-tailed)	Mean Difference
Knowledge Ability	-1.90	54	.06	-.25
Reasoning Ability	3.96	54	.00**	-.71

*Note. *p<.05, **p<.01*

Table 2

Means of Treatment Groups on Posttests of Knowledge and Reasoning Ability

Group Assignment	Knowledge Ability Mean	Reasoning Ability Mean
Single Player No Reflection	1.33	1.43
Single Player Reflection	1.39	1.36
Multiplayer No Reflection	1.48	1.52
Multiplayer Reflection	1.62	2.07
Total	1.46	1.59

between the means of the single player reflection, single player no reflection, and the multiplayer no reflection, but there is a difference between the multiplayer reflection and all of the other treatment groups. An analysis of the quantitative data gathered led the researcher to conclude that participation in the multiplayer reflection treatment group was the best possible learning situation for participants.

The quantitative data revealed in the course of this research study suggest that the combination of reflective practices and multiplayer gaming would facilitate the cognitive development of participants. The qualitative analysis undertaken by this researcher enhances the finding that both multiplayer and reflective practices are essential for positive cognitive outcomes. The participants in the multiplayer reflection group were more engaged with learning, more likely to talk about their game experiences, more likely to help their peers, and more likely to ask questions about the content of their video game play. Furthermore, participants of the multiplayer reflection groups had longer responses on posttests and reflective prompts. Participants in the single player and non reflection groups produced more instances of non responsiveness on the posttests and reflective prompts.

The researcher's analysis of the quantitative and qualitative data together clarifies understanding of the participants' experiences. This mixed methods analysis fits within Vygotsky's (1987) research regarding cognition and social experiences to explain the results indicating that participants experienced the greatest cognitive gains by participating in the multiplayer reflection group. As explained in chapter 2, Vygotsky theorized that people develop habits of mind through social interactions and the internalization of experiences. People have an understanding of the world that is

constantly evolving through their experiences. Vygotsky's zone of proximal development theory explained how the participants in each of the treatment groups experienced their video game play. Participants in the multiplayer reflection treatment group played the game through the focused prism of learning about the time period prior to World War II. Multiplayer reflection participants used their prior understanding of World War II to make game decisions and discussed with their peers and the instructor how those decisions reflected real world history. The participants' understanding of the World War II time period evolved through their experience with the game, social interactions, and reflective sessions.

The researcher's analysis of the data reveals that participants' understandings of World War II evolved through their video game play in accordance with Vygotsky's (1987) theory. The participants made connections to the historical situations of the nations involved and synthesized their learning during the video game play with their understanding of World War II. The instructor guided reflective sessions provided the participants with an opportunity to refocus their attention on the educational context of the lesson instead of focusing on video game play. The cooperative aspect of the multiplayer group allowed the participants to create a dynamic discussion with their peers and construct social meaning through their game play. For example, many students entered the classroom with little depth to their historical understanding of the pre World War II era. Cooperative discussions with other participants created a deeper social understanding of pre World War II era as different perspectives were presented in the collaborative groups and in the reflective discussions. Participants without the opportunity for reflective discussion or collaborative opportunities only had access to the

video game play for new experiences. The fusion of the collaborative and reflective experiences created a focused instructional dynamic were the instructor provided the instructional scaffolding via the reflective sessions and the participants made connections and developed new understandings through their social interactions and video game play.

Vygotsky's (1987) theory of cognition helps to explain how the cooperation in the multiplayer group facilitated the development of collaborative problem solving, as students had to develop an evolved understanding of how to play the game and the history of the time period. Combined with the reflective sessions, the multiplayer group developed a clear understanding of the historical context of the video game that was clear in the participants' discussions. Without instructor guidance, the participants of the multiplayer no reflection group played the video game and concentrated on becoming better video game players. The treatment groups without reflective instructor guidance did not experience content development guided towards an understanding of World War II at the same level of cognition as the participants in the reflective groups. Vygotsky's theory of cognition explains that the lack of instructor guided reflective opportunities facilitated a participant experience focused on how to play and succeed at the video game as participants were left to make sense of their own learning outside of their zone of proximal development. Consequently, many of the participants in the single player no reflection treatment groups became frustrated with the difficulty of game play and quit the lesson. The data analyzed supports the conclusion that educators need to provide reflective practices that focus students' attention during the use of video games in the classroom to facilitate the development of cooperative learning activities that stimulate the development of higher order thinking. Without collaborative and reflective

instructional practices, the use of a simulation video game in the classroom will engage students in how to become better video game experts.

The Effect of Prior Interest and Exposure to Video Games

In Squire's (2005) study of Civilization III in the classroom, he reported that 25% of the participants choose to complete an alternative assignment rather than participate in the video game. Squire theorized that these non-participants were not video game players and lacked interest in video game play. Gee (2007) postulates in his writings that the majority of students will be more engaged in a lesson if the lesson incorporates the use of a video game. In the research literature review for this study, there is scant literature devoted towards the impact of learners' prior interest and exposure to video games on their learning while participating in a lesson incorporating a video game in the classroom. This study explored the gap in the literature that exists regarding the effects of prior interest and exposure to video games and learners cognitive experiences during instructional video game play.

Quantitative data analysis illustrates that there exists a statistically significant difference in the means of posttest scores of reasoning ability between participants who indicated that they enjoyed playing video games and participants who reported that they did not like playing video games or were less enthusiastic about playing video games.

The Tukey HSD ANOVA analysis reported in Table 24 illustrates that the only statistically significant difference in the mean posttest scores existed between the participants who reported that they played video games 15 or more hours each week and participants who reported that they did not play video games on a weekly basis. The quantitative results give support to the hypothesis that participants in an educational

Table 24

Tukey HSD for Reasoning Ability Means by Participants' Hours of Video Game Play

Dependant Variable	Response Group	Response Group	Mean Difference	p
Reasoning Ability	15 or More Hours	None	1.00*	.01
		0 – 3 Hours	.78	.07
		3 – 6 Hours	.72	.16
		7 – 10 Hours	.83	.18
		10 – 15 Hours	.33	.94

*Note. *p<.05, **p<.01*

simulation video game with prior interest in video games will exhibit greater levels of higher order thinking skills on posttests than participants in the same situation with no prior interest in video games. The qualitative data analysis demonstrates that participants who had a prior interest and exposure to video game play were more engaged in their game play, were more likely to appear to enjoy the game, become technically proficient quickly, and were more likely to produce lengthy answers on posttests, thus lending support to the quantitative data analysis.

The data analysis of participants' prior interest and exposure to video games leads the researcher to the conclusion that participants with higher levels of prior interest and exposure to video games are more apt to have meaningful cognitive experiences during a lesson using a video game. Gamers, or those with a great deal of video game play experience, utilize their prior knowledge of the semiotic domain of video games to expand their knowledge of the context of the game. These gamers also used their

knowledge to share information and work cooperatively with other players. The experiences of the gamers highlight the ability of instructional video games to facilitate a cooperative classroom culture learning new knowledge and skills. Conversely, students with little or no interest in video games are more likely to have negative cognitive experiences when using a video game in the classroom. Vygotsky (1987) again provides theoretic support for the conclusion that prior interest and exposure to video games will enable participants to experience cognitive gains from participation in a simulation video game lesson. The participants' prior interest and exposure to video games has created a experience base for the participant to draw on while the experience the video game. The gamers then share their social knowledge learned through video game play to other participants thus creating a social understanding of video game play. The shared social understanding of the instructional video game was more difficult for participants with little prior interest and exposures to video games as those participants were operating outside their zone of proximal development. Teachers need to be cognizant of their students' prior interest and knowledge when planning lessons incorporating technology. Without thoughtful planning, a lesson using a video game may exclude a large percentage of the class.

Summary of Major Findings

After a mixed methods analysis of the data, the researcher concluded that participants with prior interest and exposure to video games appeared more engaged, more reflective, and scored higher on the posttest of reasoning ability than their peers in other treatment groups. Furthermore, participants with prior interest and exposure to video games were more likely to score higher on the posttest of reasoning ability, be

engaged in the lesson, and appear to be reflective in their learning while participating in the educational simulation video game Making History 2.0. The data analysis does not support the idea that participation in a simulation video game will affect participants' outcomes on posttests of knowledge ability. Engaged participants in all treatment groups expressed incorrect historical information, were ill informed about the causes of World War II, and expressed confusion about the role of the United States in the time period covered in the video game.

The prior literature supports the result that participants need multiplayer game experience and reflective practice to facilitate higher order thinking. The conclusion that the use of video games in the classroom will not foster the development of knowledge is in contradiction with much of the research regarding the incorporation of video games in the classroom. The prior research by Gee (2005, 2007), Squire (2005, 2006) and other researchers on the incorporation of video games in the classroom focused on higher order thinking in the classroom and did not distinguish between different levels of cognitive outcomes of participants.

Surprises Encountered During the Study

In the course of this study, the researcher encountered many surprising outcomes and obstacles. The first major obstacle the researcher encountered by the researcher was the difficulty in receiving approval from the school district to install Making History 2.0 on the school's computers. The process of approval took six months and more than 40 emails to secure. The school district's policy provides several bureaucratic walls to overcome for teachers who desire to use video games in the classroom. If this experience

is typical of other school districts, the incorporation of video games into the classroom may be stopped before it begins.

Another major obstacle encountered during the course of the study was the major technical difficulties encountered by some participants during the lesson. The researcher was careful to test the school's computers with Making History 2.0 prior to the start of the study. Even with this careful preparation, three participants encountered so many technical difficulties that they were unable to play the game for more than three turns and quit playing the game. Several other students had technical issues with their game play until the settings of the game were adjusted to utilize minimum graphics capability. The cause of the technical problems was the fact that a few of the computers had large amounts of spyware installed that slowed the computers performance, thus making the video game nearly unplayable. Teachers desiring to utilize video games in the classroom need to carefully prepare and check each computer to ensure that all students will be able to participate in the lesson.

The last major surprise encountered during the course of this study was the wide differences in technical skills among the participants. Several of the participants, who also happened to be the hard-core gamers, were proficient at computer programming while other participants faced difficulty in starting the video game. This wide difference between the skill levels among the participants caused difficulties for the less technically proficient participants. Those with fewer technical skills took longer to become engaged with the game and expressed a high level of dissatisfaction with the video game. Teachers seeking to utilize video games in the classroom need to be cognizant of the

technical skills of their students and plan their lessons to support those students who need technical assistance.

Conclusions

Instruction matters. Providing for instruction that facilitates collaborative opportunities for students is essential. The major conclusion of this research study is that without the guidance of a teacher providing reflection and collaboration, participants gain little in cognitive ability outcomes. When participants engaged in multiplayer groups without reflective practice, they demonstrated little in the way of cognitive outcomes. When participants engaged in reflective groups without the benefit of interactions with their peers, they gained little in the way of cognition. It was only in the fusion of the multiplayer game play and the reflective practice that participants expressed significant cognitive gains on the posttest of reasoning ability. The qualitative analysis revealed that participants in the multiplayer reflection group were much more apt to help their peers with their video game play, were engaged in reflective learning, and were more engaged in the cognitive aspects of the game. The prior writing of Van Eck (2006) illustrates that video game players learn through situation cognition or by learning through a real and meaningful context. The participants of the multiplayer reflection group were learning the content of the video game in a real and meaningful context by participating in a learning experience with their peers. In essence, the reflective multiplayer participants were building a video game community described in Steinkuehler's (2008) research. The practice of guided reflection helped focus the participants on the task of learning while they participated in the video game play. The interaction with their peers added a sense of real and meaningful context for the participants as the more technically proficient

game players assisted their peers with the video game play and thus helped to facilitate a sense of community during their game play. The participant experiences in the multiplayer reflection treatment group demonstrate the effectiveness of planned reflection and cooperative learning practices during the utilization of a video game during instructional practice.

The experiences of the participants in the multiplayer reflection treatment group stand in sharp contrast to the experiences of participants in the other treatment groups. The participants of the multiplayer non reflection group did engage in more dialogue and more reflection than the single player groups, but the non reflection multiplayer group participants were more likely to play the game for the sake of the game instead of focusing on the learning content of the game. While the reflective multiplayer participants discussed the real world outcomes and their game play, the non reflective multiplayer participants were more likely to engage in discussions centered on how to "win the game". The qualitative analysis of the experiences of the participants in the multiplayer non reflection group revealed that these participants did engage in some reflection and educational talk, but the content talk tapered off after each reflective session.

The single player reflective group participants did engage in reflective practices during the reflection sessions but spoke less than their multiplayer peers during these sessions and displayed less higher order thinking in their discussions and posttest responses. The participants of the single player reflection group were less likely to be engaged with their game play and by extension the participants' learning. Participants were much more likely to be unengaged in the video game play if they were in a single

player treatment group. As Steinkuehler (2005) and Gee's (2007) research indicate, video game play is a cooperative activity even for single players. The data collected from this study supports Gee and Steinkuehler's hypothesis that video game play is a social activity. Furthermore, the data of this research study supports the findings of Doolittle and Hicks (2003) that the use of technological affordances in the classroom and teacher facilitation can lead to a community of learners constructing their own view of the world. The participants' discussions and writings as well as the researchers observations support the idea that video games are a social activity and any utilization of a video game in a classroom should be a cooperative activity among the students' in the class. The cooperation between participants during their video game play facilitated higher order thinking, according to the data analysis of the participants' game experiences.

While the single player reflection group did engage in reflective practices during the reflective sessions, the single player no reflection group engaged in little to no reflection. The participants in this group were the most likely to become disengaged from the lesson, and were most like to leave responses on the posttest blank, and most likely to engage in off task behaviors. The observed behaviors and posttest results of this group should caution any education professional from letting the game "teach the students." As noted in the research of Krischner, Sweller, and Clark (2006) as well as Sandford, Ulicsak, Facer, and Rudd (2006) teachers should not use video games without instructor support. The successful use of a video game in the classroom by students necessitates a framework of excellent instruction. The research of Rice (2007) provides an excellent scale for what types of video game stimulate higher order thinking skills among players, but without a knowledgeable teacher, players are just learning to play the

game. Without the support of a structured lesson, participants of the single player non reflection group stopped playing due to lack of interest or frustration or simply learned to play the game without any thought about the game's greater context. Making History 2.0 was designed for use in the classroom, but without teacher support, participants learned how to play the game and did not learn about the historical significance that was part of the lesson.

Another major conclusion of this study is that there is no support for the idea that lower level thinking skills such as recall of historical events are enhanced by participation in an educational simulation video game. This study produced no qualitative or quantitative data demonstrating that participants learned lower order thinking skills from participation in the lesson. This researcher observed that participants arrived at the lesson with a wide variety of knowledge of the events of World War II. The wide divergence in historical knowledge can be attributed to the differing foci of the participants' World History teachers. Furthermore, there existed significant misunderstandings regarding historical understanding among the participants, such as participants who thought Russia was the enemy of the U.S. The participants' historical misunderstandings did not affect participants higher order thinking, but as Dewey (1916) would understand, these historical misunderstandings were not corrected by participation in the video game. The conclusion of this research study is that video games do not lend themselves to the memorization of facts, but video games due allow the learner to place his or her own understandings into the context of the video game.

A troubling finding is that while the reflective multiplayer participants scored statistically higher on posttests of reasoning ability, the actual mean of the posttest ability

was below the level considered to indicate higher order thinking. The qualitative data did support the idea that the participants in the reflective multiplayer group were engaged in higher order thinking, but the participants' writings did not support this claim. A possible explanation for this apparent anomaly between the quantitative and qualitative data is the limited time that participants had to complete the posttests and the fact that there was no grading incentive to score well on the posttests. The fact that the mean score of the participants in the reflective multiplayer group was statistically higher than other treatments groups indicates that the combination of collaborative play and instructor guided reflection facilitated the development of higher order thinking, but the participants writings did not meet the level of higher order thought thus making a conclusion problematic.

The qualitative data analysis provided much more robust support for the idea that the combination of collaboration and instructor guided reflection facilitated the development of higher order thinking. The researcher observed participants in the reflective multiplayer groups engaged in numerous thoughtful discussions about their game play and the connection of the game play to the participants' prior learning, but these discussions did not make their way into the participants' posttests answers. The researcher did observe that when participants in the single player groups finished their posttest very quickly the participants in the multiplayer reflection groups finished soon after. The conclusion of this researcher is that participation in the simulation video game with reflective instructions did facilitate participants' higher order thinking.

Although participants involved with multiplayer games in a lesson including reflective practices are more likely to develop higher order thinking skills, technical

experience matters, less technical proficient participants are not as likely to benefit from a lesson involving an educational simulation video game such as Making History 2.0. As Squire (2005) discovered when 25% of his participants opted out of his study, participants who have no interest in video games quickly tune out the lesson and become quickly frustrated with their game experiences and the lesson. The frustration by the non-video game players in this situation was exacerbated by the fact that these participants rapidly fell behind their more technically proficient peers. Participants with little technical experience in all treatment groups opted out of the study. In the refection group, these participants were brought back into the fold by the reflective sessions, but once the reflective session was finished the non-technically proficient students quickly lost interest again. In the non reflection groups, there was no mechanism to rekindle the interest of these participants and once they opted out of the lesson, they continued to be off task for the entire lesson. Teachers must be cognizant of the technical proficiency of their students when designing a lesson incorporating a simulation video game. Just as with all knowledge, students bring a wide variety of understandings to the classroom and teachers should ascertain the technical proficiency of the students in their classes and plan lessons with the appropriate scaffolding given the technical proficiency their students.

An educational simulation video game can be successfully utilized in a classroom when there is a well designed lesson that encourages student reflection and creates a collaborative classroom environment. Teachers should develop lessons that require students to interact collaboratively and reflect on the learning taking place during the lesson. Teachers can provide students with reflection prompts, stop the lesson during the

game play, or utilize the collaborative groups to facilitate reflective practices. Furthermore, a teacher must plan for those students who are not technically proficient and incorporate their lack of technical expertise into the lesson plan. Teachers can pair the less technically proficient students with the technological well-to-do. Well designed educational video games are another tool in the teachers tool kit that can be used successfully to educate the technologically literate students of today if teachers plan their lessons with reflective and collaborative practices.

Implications for Action

The findings of this research study lead the researcher to conclude that there is a deficit of teacher education in the area of incorporating technology in the classroom. Burns (2006) found that teachers were merely utilizing computers to replace pen and paper activities thus making computers very expensive notebooks. Burns concluded that more education was necessary before teachers could realize the promise of modern technology in the classroom. In the same context, the literature review of video games in the classroom and the difficulties encountered during the course of this study highlight the need for teacher training regarding the utilization of video games and other modern technology in the classroom. Without more training, many teachers will fall prey to the promotional literature that games teach by themselves. As demonstrated by the data analyzed in this study, the incorporation of video games in a classroom requires a robust lesson and forward thinking by the teacher.

Another implication for action uncovered in the course of this research study is the need for more up-to-date computers and access to websites in schools. School budget constraints force schools to upgrade their computers infrequently and many schools

spend five to seven years between computer upgrades. During the course of this research study, the lack of up-to-date computers hindered the participants' experiences with the video game. The sound and graphics had to be turned down creating a less inviting game play experience for the players. Computer technology improves at a hectic pace and schools must become creative in the methods used to upgrade their systems to keep up with the technology. Otherwise, only older games will be able to be utilized in the classroom.

Recommendations for Further Research

One of the major questions left unanswered by this research study is why the qualitative data analysis revealed reflective talk indicative of higher order thinking among the participants in the multiplayer reflective group, but the participants' written responses did not reflect advanced reasoning skills. One possible explanation is a deficit in writing skills among the participants. Perhaps the students are better at verbal communication than written communication because the students have more practice talking than writing. The researcher observed several and pervasive instances of discussion indicative of higher order thinking and postulated that the lack of grading incentives and peer pressure contributed to the differences among the quantitative and qualitative data. More research needs to be conducted into this apparent contradiction between the data sets.

A limitation of this research study is the sample size of the treatment groups. The size of the treatment groups ranged from 28 to 42 participants with 128 participants completing all aspects of the study. The small sample size limits the generalizability of this research study. Similar research studies need to be conducted in order to make the

conclusions of this study generalizable. Furthermore, future studies should attempt to include a diverse group of participants from different age and grade levels to make the findings more robust and broad based.

The research of Squire (2005) first pointed out the danger of uninterested participants opting out of a lesson incorporating a video game and this study supported Squire's findings that non-technically proficient participants will opt out of the lesson. More research needs to be conducted on how students who lack technological skills can be incorporated into lessons involving technology and video games. This is an essential research question given the changing nature of the world and the assertions of writers such as Freidman (2005) about the need for skills in technology. If educators allow those uninterested in technology to remain unenlightened, how will these students compete in our super faced paced technologically dependent world?

Rice (2007), Gee (2005a, 2005b, 2007), Squire (2005, and Sandford, Ulicsak, Facer, and Rudd (2006) theorized what type of video games would best facilitate the development of higher order thinking among students, but more research needs to be conducted in this area. What aspects of a game encourage thoughtfulness? What type of game encourages the development of collaboration? How can a video game transfer video game play to real world learning? All of these are aspects of video game design that need further study.

Concluding Remarks

The world is already flat. The call to arms by the National Council for the Social Studies to develop citizens cannot be realized without preparing students for the technological challenges of the 21st Century. Video games are one possible avenue to

incorporate instruction that fosters the development of 21st century learning skills. Researchers such as Gee (2007), Prensky (2001), and Squire (2005) believe that the prevalence of video games in modern society and the design of games make video games uniquely suited to teach students the skills needed to compete in our modern world. Video games are not a magic solution as some would have educators believe, but video games are another tool in the teacher's kit to broaden the horizons of students. In order for the potential of video games as educational tools to be fully realized, teachers need to be taught to incorporate technology such as video games in the classroom and computer systems need to be upgraded in schools. A well designed video game coupled with a well designed lesson incorporating collaboration and reflection can help students to problem solve in a digital world.

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APPENDIXES

APPENDIX A

Web Based Student Video Game Attitude and Familiarity Survey

1. Do you play video games?
   - Yes
   - No

2. To what extent do you agree or disagree with each of the following.

a. I enjoy playing video games.

Strongly Agree Agree Neutral Disagree Strongly Disagree

b. I prefer multiplayer video games to single player video games

Strongly Agree Agree Neutral Disagree Strongly Disagree

c. I learn when I play video games

Strongly Agree Agree Neutral Disagree Strongly Disagree

d. I would enjoy playing a video game during a school lesson

Strongly Agree Agree Neutral Disagree Strongly Disagree

e. I prefer school lessons where I use technology to traditional note taking and lecture lessons.

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. Do you prefer multiplayer or single player games?
   - Multiplayer
   - Single Player

4. What type of video games do you play? You may choose more than one answer.
   - Massively Multiplayer Online Games
   - Simulation
   - None
   - Real Time Strategy

- Role Playing
- Strategy
- First Person Shooter

5. Which of the following systems are in your home? You may choose multiple answers.

- Nintendo Wii
- Nintendo DS
- Nintendo Game Boy
- Xbox
- Xbox 360
- Playstation 2
- Playstation 3
- Computer
- PSP
- None
- Other

6. In a normal week, how often do you play video games?

None
0-3 Hours
4-7 Hours
8-11 Hours
12-15 Hours
16 or more Hours

7. Do you play video games online?

- Yes
- No

8. In a normal week, how often do you play video games online?

None
0-3 Hours
4-7 Hours
8-11 Hours
12-15 Hours
16 or more Hours

9. What is your race?

Indicate what race you consider yourself to be. Check all that apply.

- White
- African American
- Hispanic
- Native American

- Chinese
- Japanese
- Korean
- Other Asian
- Mixed

10. What is your gender?
    - Male
    - Female

APPENDIX B

Reflection Prompts

Instructions: After every fifth turn, the player will answer in written format one or more of these reflective questions. Students may discuss their answers with their fellow participants and/or the instructor.

1. Is you county prepared for war or have you focused on economic and/or diplomatic activities? Why?

2. What were the major events that took place during that last five turns? Why did these events occur?

3. What is the political and economic situation of your country currently? Are you satisfied with your county's situation? How are you going to improve your country's situation?

APPENDIX C

Written Assessment

1. What alliances were created in your game? Why? Where there alliances you wanted to create but could not?

2. In the game, how did nations respond to German aggressions? Compare this to history---Why in 1938, did France and the Soviet Union refuse to honor their defensive pacts with Czechoslovakia?

3. Why did Neville Chamberlain and other European leaders choose appeasement?

4. How did your knowledge of the Munich conference and the policy of appeasement influence your game decisions?

APPENDIX D

Written Assessment Rubric

KNOWLEDGE
Knowledge of evidence from social sciences: facts/supporting details; themes/issues; and concepts/ideas

Level	
6	• Key concepts/themes/issues/ideas are thoroughly identified, defined, and described • Significant facts/supporting details are included and accurately described • Has no factual inaccuracies
5	• Key concepts/themes/issues/ideas are considerably identified, defined, and described • Facts/supporting details are included • Has only minor factual inaccuracies
4	• Key concepts/themes/issues/ideas are partially identified, defined, and described • Some facts/supporting details are included • May have a major factual inaccuracy, but most information is correct
3	• Some key concepts/themes/issues/ideas are identified, defined, and described • Few facts/supporting details are included • Has some correct and some incorrect information
2	• Few key concepts/themes/issues/ideas are identified, defined, defined, and described • Facts/supporting details are not included • Information is largely inaccurate or irrelevant

1

- Key concepts/themes/issues/ideas are not identified, defined, and described
- Facts/supporting details are not included
- Information is inaccurate or absent

REASONING
Analysis, evaluation, and synthesis of evidence

Level

6

- Identifies and logically organizes all relevant evidence
- Uses appropriate and comprehensive critical thinking skills and Habits of Mind to analyze, evaluate, and synthesis evidence
- Reaches informed conclusions based on the evidence

5

- Identifies and logically organizes most of the relevant evidence
- Uses appropriate and comprehensive critical thinking skills and Habits of Mind to analyze, evaluate, and synthesis evidence
- Reaches informed conclusions based on the evidence

4

- Identifies and logically organizes some of the relevant evidence
- Uses appropriate and comprehensive critical thinking skills and Habits of Mind to analyze, evaluate, and synthesis evidence
- Reaches informed conclusions based on the evidence

3

- Identifies some of the relevant evidence but omits other evidence
- Uses incomplete critical thinking skills and Habits of Mind to analyze, evaluate, and synthesis evidence
- Reaches incomplete conclusions based on the evidence

2

- Identifies little relevant evidence and omits most of the evidence
- Uses unclear or inappropriate critical thinking skills and Habits of Mind to analyze, evaluate, and synthesis evidence
- Reaches inaccurate conclusions based on the evidence

1

- Important evidence relevant to the problem is not identified
- Critical thinking skills and Habits of Mind are absent
- Conclusions are lacking or unclear