Examining the Impact of Virtual Reality Integration into a Social Studies Classroom

by

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Abstract

One of the critical roles of instructional leaders is to help teachers with technology integration. Instructional leaders should be familiar with emerging technology and understand how they can help teachers integrate new technology appropriately into their classrooms. One tool that has become increasingly popular to support student learning is virtual reality (VR). The purpose of this study was to explore the use of VR in a social studies classroom as it pertained to three key areas: content knowledge, students' classroom engagement, and historical empathy. The study utilized a quasi-experimental mixed methods to collect data, and both qualitative and quantitative data were analyzed. Specifically, a pre and post test, pre and post-survey, video recordings, teacher and student interviews, writing reflections, and field observations were collected during the course of this study. There was a VR group and Website group that explored the life of Anne Frank during the Holocaust and her time within the Secret Annex. The results of this study showed that no statistically significant difference in content knowledge and social studies engagement were found. However, statistically significant growth was observed in the development of historical empathy. Qualitative data particularly revealed that the use of both VR and the website was beneficial to promote student engagement, understanding of historical past, and historical empathy. The findings suggest that integration of VR is beneficial for student learning and instructional leaders should find ways to support teachers' integration of VR in K-12 classrooms.

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List of Abbreviations

VR	Virtual Reality
TPACK	Technological Pedagogical Content Knowledge
TK	Technological Knowledge
CK	Content Knowledge
PK	Pedagogical Knowledge
TCK	Technological Content Knowledge
PCK	Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge
SAMR	Substitution, Augmentation, Modification, Redefinition
HMD	Head Mounted Device

Chapter 1: Introduction

To facilitate student learning, integrating technology into curriculum is important (Mascolo, 2009). Productive classroom environments promote, utilize, and explore technology that can be used to build a strong foundation for student learning (Koehler & Mishra, 2009). Additionally, many people in today's workforce use technology not only to complete daily tasks, but also to build their product or provide a service for consumers; therefore, 21st century classrooms need to integrate technology that can be used amongst students, so students are familiar with and can quickly learn technology used in the workforce (Schunk & DiBenedetto, 2016).

One tool with potential to support student learning and one used in many different fields is virtual reality (Millican, 2017; Winn 1993). Virtual reality refers to a three-dimensional, computer-generated simulated environment (Fuchs, Moreau, & Guitton, 2011). This technology creates an immersive environment where people feel that they are part of the environment. Virtual reality uses head-mounted gear and gaming controls to create an immersive experience (Furness et al., 2002). The immersive experiences allow the students to step into a three-dimensional world and explore their surroundings through sights, sounds, and at times touch (Simpson, Cowgill, Gilkey, & Weisenburger, 2015).

The purpose of this study was to explore the use of virtual reality in a social studies classroom. More specifically, this study examined how the use of virtual reality impacted students' classroom engagement, content knowledge development and historical empathy development in a social studies classroom. Many educators acknowledge that the use of technology is an effective way to promote student engagement in a today's classroom (Avidov-Ungar & Shamir-Inbal, 2017), but not much is known about how student engagement is

impacted specifically through the use of virtual reality. While the use of virtual reality is common in the gaming world, the tool is not being widely adopted in today's classroom as of yet. The three dimensional and immersive environments can provide unique and engaging learning experiences that traditional learning resources (e.g., videos, books) cannot provide; therefore, more studies at K-12 schools are needed to see how virtual reality specifically could impact student engagement in classroom.

Virtual reality also has a potential to help increase students' content knowledge by providing students with immersive learning experiences where students experience and see the world first hand (Alhalbi, 2016; Cummings & Bailenson, 2015). Furthermore, virtual reality could potentially impact student growth by making more connections mentally and emotionally about the people of that time period, which promotes historical empathy. According to Kohlmeier (2006), historical empathy is defined as an inclusive process that strives to engage both cognitive (perspective taking) and affective (care) aspects that allows historical figures or events to become contextualized within their historical experiences, thoughts, and perspective. Historical empathy connects both cognitive and affective means of understanding history (Endacott & Brooks, 2013). While virtual reality could impact these three critical areas (student engagement, content knowledge, and historical empathy), it is important to note that technology itself does not automatically make students learn. When appropriate pedagogy is integrated with relevant technology, student learning and classroom engagement can be promoted (Mascolo, 2009). Therefore, this study endeavored to provide the balance of virtual reality use with traditional learning activities (e.g., reflection and group discussion) in order to provide a strong foundation of learning.

Statement of the Problem

An increasing number of researchers have been exploring the possibility of using virtual reality (VR) in many different fields. For instance, within the mental health field, VR was used to provide a type of therapy to aid people with anxiety by allowing them to practice their speech skills by providing virtual large crowd environments that do not have the pressure of the physical reality (Maples-Keller, Brunnel, Kim, & Rothbaum, 2017). Similarly, a group of researchers allowed rehabilitation patients to practice speech patterns and body movements using VR (Laver, George, Thomas, Deutsch, & Crotty, 2011). The surgical field also used VR to allow surgeons to practice on virtual patients to help provide efficiency and accuracy while conducting cataract removal surgeries (Thomsen et al., 2016). The field of architecture has used VR to help construction workers practice and understand work safety measures before going on site (Le, Pedro, & Park, 2014). Another facet of VR was used to allow blind people to build spatial awareness of a room before actually physically being present (Picinali, Afonso, Denis, & Katz, 2014). The field of business has also utilized VR to create interactive shopping malls to gauge shoppers' reactions to layouts and designs (Lee & Chung, 2004).

VR has continued to not only be explored in multiple fields, but it has been used to some extent within education. Many of VR studies have been conducted in higher education settings. A study used game-based VR to help with classroom engagement and learning effectiveness in an engineering class (Ferrer, Perdomo, Ali, Fies, & Quarles, 2017). A science course in higher education provided a comparison of virtual activities to traditional learning activities using infrared spectroscopy and found that VR promotes the meaningful use of technology within the classroom and aided in building stronger cognitive connections and implementing effective skills (Lamb, Antonenko, Etopio, & Seccia, 2018). Other higher education science labs used VR to

outsource their labs versus in school labs and reported VR as engaging whether used at home on students' own or within the class surrounded by their classmates and instructor (Makransky et al., 2019).

A few studies examined the use of VR in K-12 classrooms. One study explored how VR can be used amongst elementary students to provide foundational math skills (Xu & Ke, 2016). VR was also integrated in an English language class at a middle school in order to help students understand the concepts of cause and effect and compare and contrast (Chen et al., 2020).

While the integration of VR in K-12 classroom is increasing, VR has not been explored much within the social studies class. The use of VR in a social studies lesson has potential to create authentic learning environments where students interact with historical figures or explore historical events, potentially helping students better learn the historical concept of the time period that they are being studied (Zhang, 2019). The integration of VR can also help students develop historical empathy by allowing students to see and experience the lives of historical figures in 3D environments. Examining the experiences of teachers and students of VR use in a classroom is critical for instructional leaders to provide practical guidance on integrating immersive technology into a K-12 classroom.

Purpose of Study

To fill the research gap and help teachers and instructional leaders integrate VR in the classroom, this study explored the possibilities and challenges of integrating VR into a social studies classroom. The study focused on how not only educators but also students could benefit from the use of VR in a classroom, and how it can play a role in building historical empathy. The following research questions guided the study.

1. To what extent does the integration of VR influence students' historical knowledge development?
2. To what extent does the integration of VR influence students' classroom engagement?
3. To what extent does the integration of VR influence the development of students' historical empathy?
4. What advantages and challenges does a teacher experience while integrating VR in a social studies classroom, if any?
5. What advantages and challenges do students experience while learning with VR in a social studies classroom, if any?

Significance of the Study

The findings of this study can be used to promote the use of VR within K-12 classrooms among many different stakeholders: students, educators, and instructional leaders. Students are able to engage in VR to help explore a historical time period that extends their content knowledge and engagement within the classroom. If these groups within the educational setting can see the benefits of VR in students' content learning, more educational immersive reality tours and experiences could be created, which could further support student learning. The findings of the study can also inform educators of specific ways to design an instructional unit that allows VR to have an instrumental role in helping build engagement in the classroom, student content knowledge, and historical empathy.

Instructional leadership often has the ability to provide funding for the purchase of VR equipment. The findings of the study can help instructional leaders make an informed decision on investing in resources which create an immersive learning environment for students by

allowing the use of more VR activities within the classroom (Sheniger & Murray, 2017). One of the critical roles of instructional leaders is to support teacher professional development. The findings of this study can be used for instructional leaders to design effective professional development on how to use the virtual reality equipment, explore virtual reality sites that educators could use, and how to use virtual reality in conjunction with other traditional activities. The findings of the study can also add to the literature on VR use in K-12 classroom, especially in a social studies classroom, by demonstrating the impact of VR use on students' engagement, historical empathy development and knowledge development.

Theoretical Framework

In order for teachers to successfully integrate technology into instruction, they should demonstrate essential types of knowledge. Mishra and Koehler (2006) proposed a framework called TPACK that represents the relationships of these knowledge. TPACK stands for Technological, Pedagogical, and Content Knowledge. There are seven critical components within the framework. Pedagogical knowledge (PK) refers to educators' knowledge about best practices and methods of instruction within the classroom. Next is content knowledge (CK), which is the subject matter that is being learned within the classroom. Technological knowledge (TK) refers to teachers' knowledge on how to use the technology provided. Pedagogical content knowledge (PCK) is the blending of pedagogy and content to build an effective lesson. Technological pedagogical knowledge (TPK) is a blending of knowing the technology available and how to use it within the classroom. Next is technological content knowledge (TCK), which is an expanding knowledge of what type of technology is available to the content literacy in the classroom. Lastly, TPACK emerges as a whole unit with technology, content, and pedagogy merging together to create a holistic classroom that promotes learning and student engagement.

Mishra and Koehler (2006) acknowledge that this definition is complex and multi-faceted. This educational framework was used in this study to build a strong foundation of pedagogy (instructional design), technology (VR), and content (social studies). VR is the emerging technological component within this study. This study explores VR as it connects to the content of social studies. TPACK provides the basis for merging both technology and content with an educators' personal pedagogy. The pedagogy within this study is active learning as a conduit for student engagement and learning. This study strived to see how virtual reality, social studies, and pedagogy (instructional practices) merge together to provide a strong educational unit within the classroom. Additionally, recognizing what merits emerge from allowing technology such as VR within the social studies content in terms of student engagement and knowledge is an important component of this research.

Methods

To answer the research questions, this study employed the quasi- experimental mixed methods research approach. A quasi-experimental study is used to evaluate interventions that do not use randomization (White & Sabarwal, 2014). The current study included two groups, experimental group and control group. The students in the experimental group used VR to explore the Anne Frank House, while the students in the control group reviewed the Anne Frank House website instead. While the website includes 3D images, students simply move around different parts of 3D images, not being surrounded by virtual world. This study intends to compare 3D-based website and virtual world experience using Head-Mounted Device (HMD) in order to inform teachers and instructional leaders with selecting appropriate tools.

Mixed methods allow for a comprehensive exploration of the research questions by providing a holistic view of participants' experiences with both quantitative and qualitative data

(Schwandt, 2015). Through the course of 4 days within a high school in a metropolitan city in southeastern part of the U.S., the researcher utilized VR to implement a unit about The Holocaust with emphasis on Anne Frank. The Anne Frank unit was chosen since it was embedded inside the teacher's World War II unit; by focusing on the Anne Frank unit it narrowed the focus of the VR available and direction needed for this study. The researcher collected data from field observations, interviews, and artifacts as well as a pre and post-survey and pre and post-test data. The various pieces of data were collected in an effort to support triangulation and validity when answering each of the research questions.

Assumptions

There are assumptions made within this study. First, it is assumed that VR is a viable technology that could be utilized within schools across the United States as a support for classroom instruction. Though the price of VR can be expensive, a potential VR set could be purchased within schools and used within multiple classrooms. Another assumption is that students would quickly figure out how to use VR due to their personal experiences of using various technology. Also, both participants, the teacher and students, are assumed to be willing to share honest responses in interviews, reflections, and artifacts.

Limitations

There are limitations on this study. One of the first limitations was that there were only 10 Oculus Quests (VR equipment) that could be used. Thus, while part of the class used the VR equipment, others worked on traditional activities. They were then sanitized, and the other group was allowed to use the equipment and experience the VR simulations. The limited use of VR equipment and constraints related to administration may negatively affect classroom engagement. Another limitation was the changed learning environments caused by Covid-19.

The school experienced many changes to student rosters as well as the freedom and the ability for students to work together on assignments and projects. With restrictions (e.g. not grouping together for longer than 15 minutes at a time and staying 6 feet apart), some of the activities had to be modified to allow for these measures to be implemented. For example, collaboration was done through digital devices such as laptops and smartphones instead of sitting in groups for discourse and activities. The lack of collaboration may influence the impact of the VR use.

Covid-19 did not only impact student collaboration, but researcher and teacher collaboration as well. The interviews with the teacher was conducted in person with over 6 feet distancing, which was recorded as well; however, time constraints and end of the school year distractions did impact the interview process as well as limited researcher experience. Another limitation was the researcher's inability to observe both the VR group and the Website group each day for the entire class time. Since the researcher was also teaching during 3 out of the 4 research days, she could not observe the entire classes. Instead, she visited the classes for a short time frequently whenever she could for the VR and Website group.

There were further limitations that need to be considered about this study. The first is that participants in the study were not randomized. Within the school structure, students are selected prior to the start of the school year by counselors and principals; therefore, the participants were pre-determined to be in the classes selected. There is also a limited number of participants. Since the number within the virtual reality group and the control group is between 12 to 22, the sample size was small. This includes student interviews which were limited to 2 from the control group and 4 from the virtual reality group. Also, the length of the unit could be a limitation as well since it only lasts 4 school days, and the amount of virtual reality time is limited to 2 of the 4 days.

Definition of Terms

Before an in-depth look at the study is undertaken, there are several definitions highlighted below that need to be addressed further for the purpose of this study.

1. Instructional leadership refers to various people (i.e. principals, teacher leaders, central office curriculum monitors) who help build and maintain a vision of expectations for their school systems that connect to school climate, educators' pedagogies, and technology use (Mascolo, 2009).
2. Immersive technology allows users to experience an alternate reality by creating a digitally altered world for them to experience; it does so by blocking out user's physical reality or replaces it with one that is digitally created by programmers (Blascovich et al., 2002). Immersive technology is often used as an umbrella term that includes virtual reality, augmented reality, and mixed reality.
3. Virtual reality is technology that allows a person, through the use of head mounted gear, to experience an alternative reality through their five senses (Blascovich et al., 2002; Steuer, 1993). The study utilized immersive technology through virtual reality gear to orchestrate several of the lessons within the unit of study.
4. Historical empathy is an inclusive process that strives to engage both cognitive (perspective taking) and affective (care) aspects that allows historical figures or events to become contextualized within their historical experiences, thoughts, and perspective (Kohlmeier, 2006).
5. SAMR (substitution, augmentation, modification, and redefinition) measures how the technology is being used within the classroom by the educator and the students. It creates a scale system where substitution is a basic replacement of a traditional tool (i.e. pen and

paper for a Google Doc) to redefinition which creates a new technological tool or project (i.e. creating a new virtual tour) (Parong & Mayer, 2018).

6. TPACK (technology, pedagogy, and content knowledge) is an educational pedagogy created to express the integration of technology into various content areas. Educators determine how their content, technology use, and personal educational philosophy intertwine to build an effective student classroom (Mishra & Koehler, 2006).

Organization of the Study

This research study includes five chapters that explore how virtual reality plays a role in the content classroom in a high school through student engagement, content knowledge, and historical empathy. Chapter One introduces the topic of the research study by providing background, research questions, assumptions, limitations, and definitions of significant terms. Chapter One also includes the purpose of the study and the significance of such a study being conducted. Chapter two provides a review of the literature that focuses on virtual reality, student engagement, historical empathy, TPACK, and instructional leadership. Chapter three outlines the methods and procedures for this study to be undertaken successfully. Chapter four highlights the findings of the study and any significant results that emerged. Lastly, Chapter five includes limitations, conclusions, and possible recommendations if this study were taken further by other researchers or explored by other educators within high schools.

Summary

To conclude, this study is designed to help teachers and instructional leaders obtain a clear picture of how virtual reality can benefit the classroom. A thorough review of the literature revealed that little research had been completed of virtual reality being used at a high school level among content courses- specifically social studies. This study is a mixed methods research

study conducted in Alabama on how virtual reality could be used to promote engagement, content knowledge and historical empathy in a high school classroom.

Chapter 2: Literature Review

Introduction

Chapter 2 provides a review of connected literature and builds the framework for integrating VR into the social studies classroom that would be beneficial for instructional leaders. This literature review focuses on key components related to technology integration as well as the introduction of immersive technology and historical empathy. The theoretical framework comes from the existing research regarding TPACK and SAMR. The literature review begins with defining TPACK and SAMR then analyzing the goals of social studies within the classroom. The review continues to explore the multiple forms of immersive reality and studies where VR has been used outside of education and within education. This literature review then defines historical empathy and how it is promoted within the social studies classroom within a variety of instructional methods.

Technology Integration Frameworks

Technology integration has been researched and discussed in numerous ways since the emergence of computers within school systems (Saettler, 1990). With technology merging into classrooms, a need emerged to provide teachers with opportunities to not only develop content knowledge and pedagogical knowledge, but also to learn how to use technology within lessons (Pierson, 2001). Mishra and Koehler (2006) proposed a framework called TPACK that represents the relationships of these knowledge. TPACK stands for technological pedagogical and content knowledge. There are seven critical components within the framework (See Figure 1).

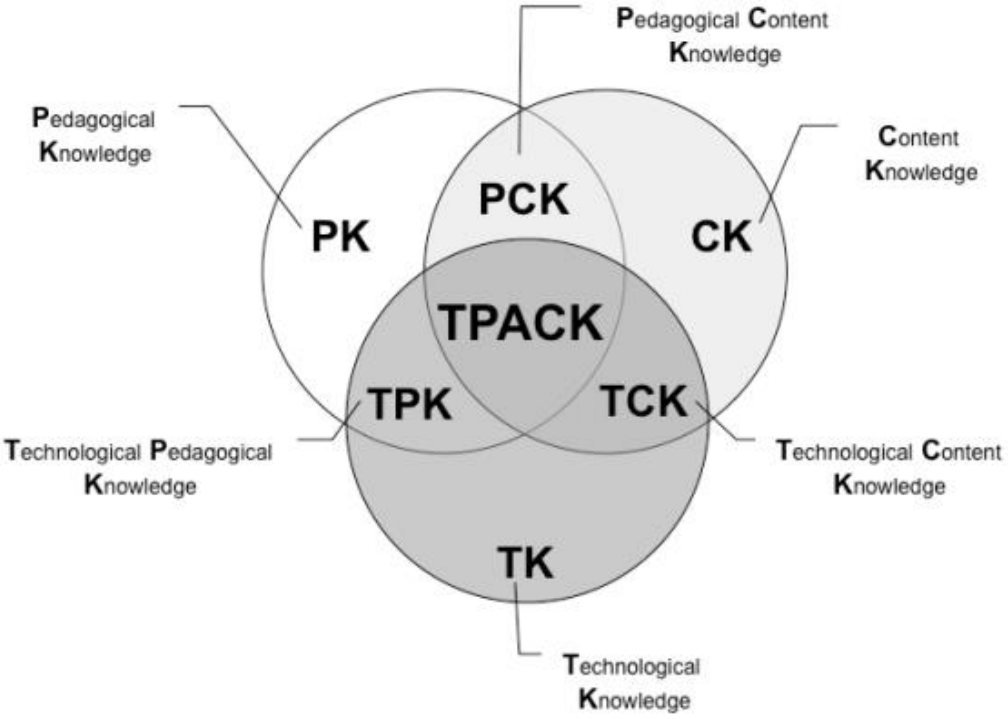
Pedagogical knowledge (PK) refers to educators' knowledge about best practices and methods of instruction within the classroom, which includes but is not limited to classroom

management, teaching strategies, and student engagement. Next is content knowledge (CK), which is the subject matter that is being learned within the classroom. Technological knowledge (TK) includes not only different hardware technologies such as screens and hard drives, but also the software such as applications (apps) or programs like Google extensions or Microsoft products. Pedagogical content knowledge (PCK) is the blending of pedagogy and content to build an effective lesson. Technological pedagogical knowledge (TPK) is a blending of knowing the technology available and how to use it within the classroom. Next is technological content knowledge (TCK), which is an expanding knowledge of what type of technology (hardware and software) is available to increase knowledge of the content in the classroom.

Lastly, TPACK emerges as a whole unit, "TPCK is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy; knowledge of students' prior knowledge." (Mishra & Koehler, 2006, p. 1029). Mishra and Koehler (2006) acknowledge that this definition is complex and multi-faceted.

Figure 1.

TPACK Framework



Cox (2008) claimed that, when using TPACK for a study, there should be clarification on whether the study incorporates a transparent technology versus emerging technology. Cox defined transparent technologies as any items used within a classroom to help aid in teaching or learning such as an interactive whiteboard or document camera. Whereas "emerging technologies" refers to new technology that is being investigated and how it can be used to enhance content knowledge within the classroom. By distinguishing this difference, researchers can better understand how different types of technology influence student learning.

Scholars have developed instruments to measure TPACK. Graham, Burgoyne, Cantrell, Smith, St. Claire, and Harris (2009) created a questionnaire that measured TK, TPK, TCK, and TPACK confidence levels among in-service elementary and secondary teachers. Another study used a survey to determine teacher efficacy in web-based instruction and incorporated this into

their definition of TPACK by adding a W (TPACK-W) (Lee & Tsai, 2010). The W stands for the use of the worldwide web. Their survey found that teachers could have PCK, but not necessarily PK for website instruction in the classroom.

The TPACK framework is widely used to investigate technology integration in classroom. For example, Graham et al. (2012) collected interviews from pre-service teachers and asked them to discuss how they plan to integrate and use technologies within their classroom. The authors included TPK, TPACK, and TK within their interviews. Another study used detailed lesson plans and tasks within the classroom to see how TPK, TCK, and TPACK worked within the selected content and found that a rubric they created was able to detect how TPACK worked as an educational framework (Harris et al., 2010).

Another framework that is being widely used to guide teachers' technology integration is called SAMR. SAMR represents Substitution, Augmentation, Modification, and Redefinition. SAMR is a useful tool for teachers in terms of scaffolding student technology support on an individual basis such support ultimately helps reach higher levels of technology incorporation within an educators' lesson. Substitution is a replacement of traditional teaching methods. For example, pen and paper is replaced by a word processor program on a laptop. Augmentation focuses on replacement but with better or easier use, such as a spell check program that is integrated with the word processor program. Modification uses different or various types of technology to create and format an original piece of work such as a newspaper template with the latest news. Lastly, redefinition is the changing of a task into something brand new while sharing and collaborating with others. Through these various levels, teachers can determine how technology can be effectively utilized in a lesson to foster engagement.

Table 1:

SAMR Model

	Substitution (S)	**Augmentation (A)**	**Modification (M)**	**Redefinition (R)**
Definition	Technology acts as a direct substitute, with no functional change	Technology acts as a direct substitute, with functional improvement	Technology allows for significant task redesign	Technology allows for the creation of new tasks, previously inconceivable.
Type	Enhancement	Enhancement	Transformation	Transformation
Example	Instead of a paper/pencil test, a student uses a Google form test	Google Form test with teacher markups and feedback	Create a digital movie based on content knowledge	Explore content through virtual reality and interview people to compare to what they explored

Social Studies Standards and Curriculum

A closer analysis of the social studies classroom is a critical component to build a holistic picture of how VR can play a role in the classroom. One of the key aspects is to focus on the goals of what students should learn within social studies. In the past, the focus has been the memorization of facts that connect historical time periods. The goal of the social studies class

was for students to be able to regurgitate historical fact without deeper analysis or meaning (Barr, 1997); however, the goal of social studies has slowly transitioned.

The purpose of social studies has shifted from memorization to promoting critical thinking skills among students. This goal has been included in the National Council for the Social Studies (2013) as one of the main objectives to "nourish students' critical literacy and consciousness." This shift from memorization to critical thinking skills within social studies became rooted within the United States when Common Core Standards spread across the nation (Kenna & Russell III, 2014). States, such as Alabama, created their own standards based off Common Core to implement more skill-based learning within a variety of subjects including history. Alabama's standards became known as Alabama's College and Career Ready Standards, and professional development shifted within schools to focus on soft skill development such as time management, content reading analysis, etc. The purpose of teaching social studies is not only to gain content knowledge, but to use that content to extend students critical thinking abilities and analysis process. "Investigation and the use of primary sources, cause and consequence analysis, and understanding about change and continuity are primary concepts of historical thinking" (Rantala, Manninen, and Berg, 2016). Many of these aspects can be utilized within the social studies classroom by having a varied instructional practice that allows for hands-on learning of history as well as lecture and discourse.

When common core standards emerged nationwide, one of the goals was to "move classroom teaching away from a focus on worksheets, drill-and-memorization activities, and elaborate test-coaching programs, and toward an engaging, challenging curriculum that supports content acquisition through a range of instructional modes and techniques, including many that develop cognitive strategies" (Conley, 2011). This shift is seen in defining historical knowledge.

Historical knowledge is not limited to the regurgitation of facts, but is multi-faceted. Barton and Levitsk (2008) describe this from a students' perspective of history and what different types of learning can emerge when the goal of social studies is to build critical thinking and analysis as well as historical fact. Through a variety of instructional means, students can reach four stances- identification stance, analytic stance, moral response stance, and exhibition stance. These stances are ways that historical knowledge can be represented through student discussion, writing reflections, and other instructional activities. The identification stance is the similarities of what happened in the past to what is happening in the present. For example, when a student connects the persecution of Jews and other groups during World War II to groups that are marginalized today such as the LGTBQ or the mass destruction in Eastern Europe, students are able to connect the past to current events. The analytic stance focuses on the causes and consequences of historical events and how that plays a role in how history is presented. This is demonstrated in the classroom when students begin to express through instructional activities that history is being shaped by various political, social, and economic decisions within that county. The response stance is when students engage in the triumphs, failures, or tragedies as they engage in reflecting on the past. For example, when students voice emotions that people would have felt when experiencing the historical past, they are connecting on empathetic level to those circumstances. Lastly, the exhibition stance is where there are public displays of history such as projects or testing of that historical knowledge (Barton & Levitsk, 2008). Students portray their knowledge, analysis, and emotional connections through an assessment within the classroom. Social studies is needed for students to reach all four stances that Barton and Levitsk describe for students to reach their highest level of learning and build their critical thinking skills within the social

studies classroom. Teachers need to incorporate activities and teaching strategies that allow for students' to enhance their learning within the classroom.

Technology especially VR can be a leading way for these changes to occur by introducing another way to incorporate historical standards within the classroom, and make move from the memorization to synthesizing and analyzing how the past has influenced people today. VR has the ability to allow students to experience historical realms that would enhance those various learning stances and helps students engage in analysis of the historical past by allowing students to experience history in an immersive way.

Technology Integration and Instructional Leadership

Instructional leaders can help teachers integrate technology into classroom by utilizing TPACK and SAMR. This brings what Mascolo (2009) referred to as neither teacher-centered or student-classrooms, but as a combination of many educational elements that are seen under both teacher and student-centered learning. Many instructional leaders can use TPACK as way to see how educators in their school implement technology, how it is being utilized within classroom, and how that matches the teacher's personal educational pedagogy (Avidov-Ungar & Shamir-Inbal, 2017).

Instructional leaders need to help teachers implement higher levels of technology use as seen in SAMR because technology can increase student motivation when used correctly (Parong and Mayer, 2018). Parong and Mayer (2018) found that student motivation within a classroom plays a significant role in how engaged a student is with a learning activity. Though various small short lessons throughout the school year, instructional leaders can promote student engagement by providing professional development. This would, in turn, promote not only the growth of educators, but student growth as well (Mascolo, 2009). This self-efficacy or individual

progress monitoring and learning that emerges in the student and the educator can allow both to increase their knowledge of the content and the technology. Schunk and DiBenedetto (2016) theorizes that self-efficacy can help others work harder at their tasks when they feel that they are competent and prepared for the task. That is why it is critical for instructional leaders to provide meaningful professional development to educators. Instructional leaders can empower educators to promote technology that is in conjunction with the lesson that promotes growth and creativity in the learner.

Instructional leaders can continue to dive into effective technology use by helping educators not only explore the technology already commonly in use, but also to help them use new and emerging technology. Empowering educators is an instructional leaders' main goal to achieve success within their schools (Hallinger, 2011). As new technology emerges, more effective professional development is needed. One technology that has great potential to support student learning is immersive technology, which includes virtual reality and augmented reality. Instructional leaders need to understand how such technology can be integrated into a classroom to support student learning.

Immersive Technology: What Is It and How does it Work?

Immersive technology allows users to experience an alternate reality by creating a digitally altered world for them to experience; it does so by blocking out user's physical reality or replaces it with one that digitally is created by programmers (Blascovich et al., 2002). Immersive technology is often being used as an umbrella term that includes virtual reality, augmented reality, and mixed reality. The different types of immersive technology correlate to the degree of how much of the physical reality is altered within the digital reality. This new technology emerged in the technological world around the 1960s with much growth and change

still happening today. The idea of immersive technology has long been embedded within people's imaginations even showing up in movies dated back to the 1930s (History of Virtual Reality, 2017). A pioneer of his time, Professor Ivan Sutherland wrote an essay in 1965 that has since seen many of its ideas reach fruition, such as the various equipment to help immersive technology function successfully (Millican, 2017).

Using immersive technology, users can experience an imaginary world or a simulation of various worlds such as a sports tournament or a historical time period. Users can engage their cognitive reality and sensory motor skills, which allows them to travel to this alternate world (Fuchs, Moreau, & Guitton, 2011). Immersive technology has an advantage to diminish the separation from reality that someone experiences compared to existing technology. When one watches television or plays a basic video game, she/he sees the action taking place, but she/he has a distinct feeling of separation, not feeling a part of that reality. Immersive technology has the ability to make people feel as though they are in a different place by blocking people's vision to only what the program wants them to see. Users are engulfed by the sense of being in the false reality. This feeling of being "present" in immersive technology is critical to its success in creating an alternate reality for users to experience (Cummings & Bailenson, 2016; Slater & Wilbur, 1997). Immersive technology creates a space where a learner can be easily transported to an alternate reality that can actively engage their senses such as walking around, seeing the various movements, and communicating with people and the environment around them. This technology has the potential to allow learning to become more tactile and real for learners by being in a first-person position to interact with that alternate reality (Millican, 2017; Winn, 1993).

To experience immersive technology, users may need to use a device called a Head-Mounted Device (HMD) depending on the level of immersion. This device looks much like a skier's goggles over the person's eyes, which creates a computer-generated field of vision for them. When a user moves around a room, immersive technology allows users to feel that she/he is exploring different environments created by motion-tracking sensors. These goggles can be worn with headphones or have a built-in sound system; the sounds complete the illusion that the person is currently in a different "real world" than the one they were previously (Millican, 2017). Dr. Thomas Furness, the founder of the University of Washington's Psychology department "Human Interface Laboratory," was at the forefront of virtual reality as it emerged in the 1980s. Furness's illustration of how virtual reality works allows us to understand why virtual reality would be immersive within the classroom as it pertains to different times, people, and locations. Furness writes:

> Immersive VR works as follows. The subject dons [puts on] a 'VR Helmet' that positions two goggle-sized TV screens close to the user's eyes. Each eye gets a slightly different image of the virtual world. The image shown to the left eye is offset slightly from that seen by the right eye. The brain fuses these two images into a single 3D image, helping to give users the illusion that the virtual environment has depth. (Furness et al., 2002, p. 984).

This type of full immersion technology can lead to students and educators reaching different heights of knowledge, application, and synthesis within their curriculum. Educators can utilize how virtual reality creates a "believable" world and provides a level of realism to the mind because it involves many of the senses (Millican, 2017; Simpson, Cowgill, Gilkey, & Weisenberger, 2015; Templeman, Page, & Denbrook, 2015). To enhance the immersive

experience, the gear that is worn can also include feeling the textures and the weight of the objects, or possibly smelling different scents that she/he would experience in reality (Cummings & Bailenson, 2015; Millican, 2017); these 5 main senses are seeing, hearing, touching, smelling, and tasting that can be utilized when creating an immersive reality (Pediaopolis, 2014). When using immersive technology within a classroom, students could feel like they are walking through Shakespearean London by feeling the damp, cold air or smelling the stench of proper sewage, thus helping them to see the reality around them as their own, and potentially draw even closer to it.

Virtual Reality, Augmented Reality, and Mixed Reality

Types of immersive technology that have been widely explored included: virtual reality, augmented reality, and mixed reality. The key difference between all three is the degree in which the user is immersed in the alternate reality created by the programmer. The most immersive is virtual reality then alternated reality and mixed reality. Since mixed reality is hybrid of virtual reality and augmented reality, mixed reality will be defined last.

Virtual Reality is highly dependent on a Head- Mounted Device (HMD) since this type of immersive technology completely encompasses the user in a full alternate reality. Virtual reality strives to immerse all the user's senses into this alternate reality. Depending on the HMD and other hardware involved, virtual reality can allow the user to freely move around within the alternate world, to interact with the characters found in this world, and to make cognitive choices about how to proceed within the virtual world. In the early 1990s, virtual reality was defined by the amount of technological gear that was needed to place someone in an alternate reality until Steuer (1993) wrote a seminal piece that pushed for virtual reality to be defined more about the experience than the hardware that was needed to create it. As technology has evolved, less and

less hardware is needed for virtual reality to occur for a user. The HMD can now be used in conjunction with certain YouTube videos or with apps that have VR software code. This allows the users to have an exciting virtual experience such as being on a roller-coaster or walking through the Louvre in Paris experiencing a personalized tour. There are even more elaborate virtual reality rooms that allow the user to sit down in a chair, place the HMD on, and then experience the wind rushing by or the chair moving when something happens within the virtual program.

HMD headsets are one of the more critical components of virtual reality, and one company, *Oculus* owned now by Facebook, has taken the lead in developing virtual reality HMD that offers a variety of different types depending on how the virtual reality intends to be used. Different types of HMD that are being developed include *Oculus Rift S*, *Oculus Go*, and *Oculus Quest*. *Oculus Rift S* is dependent on gaming gear or a gaming station, and the headset has built in cameras that work with infrared light. There are a multitude of wires that make the headset connect to the gaming station. *Oculus Rift S* displays high resolution images and provides powerful gaming endowments but is inflexible in that users need to be connected to an external device such as a PC. *Oculus Go*, a stand-alone HMD, has all the necessary components for users to experience virtual reality, and thus users do not need to connect *Oculus Go* to an external device. *Oculus Go* does have an outer controller but gives the option of a smartphone app that can control the HMD as well. It has limited storage, and it is more for people who are watching virtual reality movies than gaming purposes. Lastly, *Oculus Quest* brings *Oculus Go* and *Oculus Rift S* together in one device. *Oculus Quest* is an HMD that combines the freedom of *Oculus Go* with no cords and the *Oculus Rift S* that includes built in tracking to help with room-scale tracking for a new overall experience (Priday, 2019).

Augmented reality potentially uses a head-mounted device (HMD) to alter the current reality a user is in, but this device is not required to experience augmented reality. A user has a digital overlay to their current reality where only some aspects are changed for the user. For example, the user may be standing in a math classroom, when the user places the HMD on, the classroom is still the same, but now the user might see some virtual components added such as an interactive math problem or a puzzle table that the user sees and can virtually interact with in this altered space. One of the new developments for augmented reality is the ability to not need a HMD to experience this alternate reality. Games such as *PokemonGo* allow people to use their smartphones to download the app, and walk physically and virtually through physical parks, but interact with virtual PokeStops and catch virtual Pokemon; these games have made augmented reality an everyday household technology accessed through smartphones (Paavilainen et al., 2017). Augmented reality draws from the physical reality and places virtual interfaces around the user to help them complete various tasks depending on the purpose of the design of the software. Educators use many augmented reality apps. One example is *Quiver Vision* which allows the educator to print off coloring pages appropriate for their subject, have students color them, and then use the app to make the illustration emerge off the paper for the students to see and experience. Another example, *Skyview Lite* available on iTunes allows students to find and locate stars, constellations, and more in the night sky. These types of augmented reality apps set the tone for even further expansion into the classroom.

Finally, mixed reality is a mix between augmented and virtual reality. Mixed reality has many similarities with augmented reality by having a basis in the physical world, but reaches into the virtual more than augmented reality. Mixed reality still uses a HMD, which projects a virtual image into the user's physical world for them to interact with using special gloves or in

some cases their actual hands. An example of this would be the new Skype calling device from Microsoft. The user places a Skype call and they can see the menu, place the call, and more with the digital interface provided (The Difference Between, 2018). The *HoloLens2* is another mixed reality interface that allows a digital interface with minimal hardware to enhance collaboration and communication worldwide in the workforce (HoloLens2, 2019). Mixed reality makes the virtual world mesh with and interact more with the physical world than the user. Although, this may sound much like augmented reality, mixed reality creates a more interactive interface for the user and the physical reality is only enhanced by virtual components that the user can actively manipulate. Educators could use mixed reality to allow the student to stay physically and mentally present in the classroom, but analyze and critique different portions of the human anatomy in the virtual body in front of the user. The Table 2 summarizes three types of immersive technology.

Table 2.

Comparison of Different Types of Immersive Technology

	Virtual Reality	**Augmented Reality**	**Mixed Reality**
Definition	Fully immersive alternate reality created by the software program. Strives to make all the senses feel like they are in an alternate reality.	Has a digital overlay over the physical environment that has virtual components that users interact with on a limited basis.	Stay in the physical world, and virtual components emerge for the user to interact with as needed.

Potential Equipment	HMD, gloves, suit, smartphone, app	HMD, smartphone, app	HMD, gloves
Example	360 videos/VR apps	PokemonGo by Niantic. QuiverVision	Skype by Microsoft

Virtual Reality in Research

Many different academic fields and various careers are currently using virtual reality to enhance their fields in a multitude of ways. Researchers have used virtual reality to train doctors and patients, to educate people on safety guidelines and to assist people with disabilities. This is only to name a few ways virtual reality has enhanced a variety of different fields.

Virtual Reality Research in Medicine

The medical field is an ever-growing area in which virtual reality is being used. One area that the medical field is utilizing virtual reality is to enhance training techniques for patients and doctors. A comprehensive literature review was conducted by Maples-Keller, Brunnel, Kim, and Rothbaum (2017), and the researchers focused on how virtual reality could be used to help psychiatric patients especially those who suffered from high anxiety along with other disorders. The researchers reviewed studies over a 20-year time span of virtual reality in the medical field using specific search engines such as PsychInfo, Medline, and more. The researchers analyzed studies that mentioned a variety of terms such as virtual reality exposure therapy, psychiatric therapy, autism, and more. From these studies, they were able to conclude that virtual reality was most effective when helping psychiatric patients with high anxiety disorder. They found several

ways virtual reality aided those in various disorders such as people who had a fear of public speaking, were able to use virtual reality to simulate an ever-growing crowd that they could practice their coping skills with while presenting their speech. Another example used virtual reality in a simulating a calm, serene environment to reduce anxiety.

Another comprehensive literature review was conducted by Freeman, Reeve, Ehlers, Clark, Sponlag, and Slater (2017). The researchers reviewed 285 studies with 192 focusing on anxiety and 44 on schizophrenia, and the study concluded that patients only benefited when they had targeted design (individualized) virtual reality intervention. The study also discovered that virtual reality could often be misused or not applied correctly when trying to treat or diagnosis mental illness. The researchers claimed that helping patients train or practice coping mechanisms using virtual reality can help many patients work towards easing anxiety and increasing their personal freedom.

Virtual reality is not limited to psychiatric patients within the medical field. Other studies have focused on how it aids in rehabilitation with a variety of different patients. A study conducted by Laver, George, Thomas, Deutsch, and Crotty (2011) analyzed how virtual reality was used with stroke patients and examined whether virtual reality rehabilitations were effective as when compared to more traditional rehabilitation methods. They did this by randomizing groups and setting control groups with a total of 19 trials which reached over 500 patients. The researchers discovered that although the effect was small, there was a significant amount of evidence that virtual reality can help increase arm function and build up patient daily activities.

The surgical field has quickly adapted to using virtual reality by using it to help with training and gaining experience. One study by Thomsen et al. (2016) focused on cataract surgery training and how virtual reality could enhance their performance while seeing who benefitted

more from the training - novice cataract surgeons or experienced cataract surgeons. They used virtual reality to simulate the cataract surgery and gave each surgeon a proficiency test. Overall, they had 18 cataract surgeons complete the virtual reality proficiency test (EyeSi) move with varying levels of experience. The results showed that the surgeons with the least amount experience showed the most growth, but even surgeons of with more experience demonstrated growth though not as significantly as the others. This study concluded that virtual reality is helping surgeons focus their skill before performing actual surgery.

Another example of the medical surgical field using virtual reality is lumbar surgeons who perform more aggressive back surgery. Gasco et al. (2014) used an *ImmersiveTouch* simulator to see how medical students did performing lumbar surgery that placed pedicle screws along the spine. The purpose of the study was to explore the usefulness of virtual reality in learning this surgical skill. They had a control group which used traditional methods of visuals and lecture only before practicing on a physical plastic model and a simulation group that used the virtual reality simulator. Each group practiced and they measured the errors made when placing 2 pedicle screws into the lumbar region. After a total of 52 screws were analyzed, they found overwhelming results that the simulation group outperformed the control group in length error, coronal error, and pedicle breach. They concluded virtual reality is a valuable learning tool that involves "sequential learning [and] depth perception" (Gasco et al.,2014, p. 968).

Virtual Reality Research in Architecture and Construction

The field of Architecture and Construction is also using virtual reality to build safety practices and to create accurate levels of reality to aid in the building and sales of different areas and properties. Le, Pedro, and Park (2014) conducted a study on how virtual reality can help train construction workers in safety regulations to avoid potential dangers. They argue that

currently the construction site is hazardous for many, and that having the safety training conducted using virtual technology could reduce the amount of accidents on the worksite. They used a framework that allowed for role-playing, dialogic learning, and social interaction for construction safety and health education. They did this using a 3-step process looking at the root causes of accidents on construction sites, reflecting on safety theories, and analyzing game-based training practices. They concluded that collaborative virtual reality has the ability to improve safety experiences on construction sites and that the amount of on-site accidents could be greatly reduced. Training and practice are a common use of virtual reality among various different fields.

Architecture is also using virtual reality to build virtual reality spaces for blind people using auditory methods to build spatial awareness and knowledge. Picinali, Afonso, Denis, and Katz (2014) conducted a study that pursued the possibility of using virtual reality to help blind people practice navigating a room before physically entering the area by the use of auditory sounds and spatial configuration. They separated 10 people into two groups of five. One group practiced learning a room in the physical reality and the other within virtual reality. They found there were significant gains in the people who used the virtual reality and the mental maps that they created from the special area. They also found that the virtual reality was capable of preserving the correct measurements and topographical area of the real room. Virtual reality is allowing many professional areas to expand on their practice and training which helps limit the risk and increase knowledge of these specialized areas.

Virtual Reality Research in Business

Business is another area where virtual reality is being used to help buyers look and interact with options before purchasing or investing. Lee and Chung (2004) were already

experimenting with creating an interactive shopping mall experience by integrating virtual reality and avatars through Web DSS. They concluded that there was still limited functionality with the technology they had available at that point for it to be successful. Fast forward to 2017, Kapusy and Logo conducted a study that introduced the values that can be derived from a virtual reality shopping experience specifically among the latest Generation Z. With Generation Z being digital natives (those that have grown-up since birth in the age of technology) and making up 40 percent of the world's consumers, they have a strong digital footprint. In response, they have found businesses like eBay marketing products such as the connected mirror or the eBay fitting room. The mirror has the capabilities to adjust the lighting to the time a consumer plans to wear the outfit, virtually try it on, and add accessories. It also eliminates the need for the consumer to undress and allows selection of various colors or styles that are in stock at that time. Virtual reality shopping allows the consumer to feel comfortable with the purchase, potentially reducing the amount of returns to that business.

Virtual Reality Research in Education

Another area that a growing number of researchers have examined the possibility of virtual reality in is the field of education. Virtual reality is often seen in science and mathematical areas. Many studies have found that virtual reality is an effective and fruitful means for learning. "Using VR (virtual reality) in education can improve students' performance and achievements, leading to the support and development of the educational process, along with clarifying abstract symbols." (Alhalabi, 2016, p. 919)

Learning math in a child's developing years is typically critical in their future success in math and how they view the subject or their abilities; therefore, more studies have emerged about how virtual reality can aid in building an immersive learning environment that explores the field

of math. A study by Xu and Ke (2016) explored virtual gaming for math to help build fundamental math skills. They used an open-source virtual reality server and explored the playability, usability, and content integration within the virtual reality math game. They selected three college students who were majoring in math, two males and one female, between the ages of 20 to 25. All three found the open source virtual math game interactive and engaging, but the researchers did find that sometimes the gameplay did not come intuitively regarding how to proceed or interact with certain objects within the game making it potentially problematic for students of a younger age group.

Ke and Kim (2017) explored open source virtual reality math gaming with an emphasis this time on student achievement among elementary students. They had the students perform a pre-and posttest to determine the level of growth and achievement each student had. The researchers divided 132 students into a control group and a group that used virtual reality. The virtual reality math game included various challenges, a story line for the students to follow, and immediate positive reinforcement through sounds or virtual rewards. They found significant leaps in achievement among the students who used the virtual reality open source math game. Virtual reality game play in the educational field shows that elementary students are highly engaged in the learning process.

Game-based virtual reality is not limited to the mathematical field, but it is also showing significant growth in various sciences and engineering as well. Ferrer, Perdomo, Ali, Fies, and Quarles (2017) studied how augmented reality could be altered within game play for students to help increase student engagement and learning effectiveness. Specifically, they looked at altering temperature visualization for virtual humans with the game for students to be able to perceive accurate temperature reading within a virtual space. One way was through the current particle-

based or novel-based visualizations. These virtual humans would then allow the students to walk within a virtual reality design layout and interact with their surroundings. They found that many of the students were more likely to gauge the temperature in the virtual human within the setting than without the virtual reality.

Dinis, Guimaraes, Carvalho, and Martins (2018) used first year engineering students to design virtual game play for future engineering students. They conducted two trials: one with virtual reality and the other with augmented reality. Their initial findings show that engineering virtual reality game play ease; the transition of the knowledge from the learning activity to the participant. It also showed great gains in increasing motivation to learn among the students.

Lamb, Antonenko, Etopio, and Seccia (2018) conducted a study that had a side by side comparison of virtual reality to hands on learning activities within science using an infrared spectroscopy. Their comparison study approached a few main methods of delivery of scientific instruction: video-based lecture, an immersive reality called *Serious Educational Game*, and lastly a hands-on activity. There were 53 males and 47 females. The students were then randomly selected into the varying instructional groups. Each group was video-taped with every participant being interviewed extensively, and the researchers then took various measurements to within each group to guage engagement and learning. They concluded that virtual reality promotes the meaningful use of technology within the classroom, and that it aided in building stronger cognitive connections and implementing effective skills.

Another comparison study was conducted by Parong and Mayer (2018) that examined the effectiveness of virtual reality in comparison to a desktop slideshow. They did this through two experiments. The first experiment was conducted with college students who viewed how the body functions through immersive virtual reality or a self-directed PowerPoint on a desktop

computer. They predicted that the virtual reality would have high motivational markers among the students and score high on the post-test, but that the PowerPoint would have lower motivational markers though higher post-test scores than the other group. The results corresponded with their predictions accurately. Their second experiment had students either watch a segmented VR lesson and produce a written summary or participate in the continuous VR from experiment 1. They found overwhelming results that the students who completed the written summary performed significantly better than those who only did the virtual reality lesson. The study also found that there was no difference in interest or motivation in either group. Virtual reality does appear to be supplemented with a way for students to debrief and discuss what they experienced within the virtual reality lesson.

Some higher education institutions are beginning the process of outsourcing their labs rather than conduct them in a classroom setting in the effort to save time and money. Makransky et.al (2019) compared how students did performing a virtual lab at home versus within a traditional classroom setting. Their focus was on the learning outcomes of each group and if they were the equivalent to each other. The took a sample of 112 microbiology students with 76 of those being female. One group participated in the virtual lab at home and another group participated in the same virtual lab, but within the confines of a traditional classroom building. They found that there was no significant difference between the two groups and that the students' motivation was unaffected as well, leading them to the conclusion that virtual reality is an engaging activity that can withstand leaving the traditional classroom for people to enjoy and learn from the virtual experience; therefore, virtual reality is engaging whether it is used at home for a lesson or within a classroom with surrounding classmates and instructors.

Virtual reality has been integrated into a writing class and researchers have found that virtual reality when used in conjunction with reflective writing or discussion leads to higher retention of the subject matter. One study by Parong and Mayer (2018) took a lecture-based science lesson and turned it into a VR lesson. The researchers examined how students learned from each one as well as their continued motivation and interest. The students were divided into two groups: one using traditional methods of learning through lecture and photos, and the other through the lens of a virtual reality lesson. The results were surprising considering that the most typical prediction or assumption is that technology will naturally lead to higher student achievement. However, what they found was that either group, as long as they did a written summary or use of technology after the activity had the highest results in student achievement. When it came to student motivation and engagement, the virtual reality was higher. But if they did not complete the written summaries, the student learning was diminished in comparison in both traditional and technological settings (Parong and Mayer, 2018). Virtual reality allows students to engage with the subject matter and through thoughtful reflection is able to build on their knowledge to make critical inquiries.

Virtual reality studies have increased to support English language learners (ELLs). Chen et al. (2020) used Google Earth, a virtual reality tool to explore various locations around the globe, to aid 22 ELLs who were in middle school expand their expository writing. Using mixed methods, they found that there was significant growth in writing after utilizing Google Earth virtual reality. Students' descriptive language skills had been increased and the results showed clear cause/effect and compare/contrast. The follow-up focus group showed that the ELLs were highly engaged and enjoyed learning through virtual reality which can help in future ELL classrooms. There were setbacks for the teacher in the way that it was time-consuming to use and

distracting at times for students as they learned how to use Google Earth virtual reality. The researchers found virtual reality has to be used effectively and many instructors will have a learning curve as they begin using virtual reality more within a classroom setting.

Si, Bai, and Hao (2017) designed a content-based virtual reality program using *Kinect* to create a model of people within the virtual world and to create interactive pieces within for users to interact with as they learn English within that immersive reality. The researchers tested the virtual reality at Shanghai University in a unique English learning class that coincided with learning "medical electronic instrument(s) and its maintenance" (Si, Bai, and Hao, 2017, p. 1) They researched how to make the language students were learning within context so that the students could see, interact, and learn the words in conjunction with how they exist not only within the virtual reality but in everyday society as well. The researchers found high engagement and learning from the students, but they concluded that the traditional classroom methods were still needed to continue reinforcing what students were learning in the immersive reality. Virtual reality in conjunction with traditional methods appears to have high markings of engagement and learning outcomes.

Some researchers conducted a virtual reality study using a program called, *Second Life*, to build an alternate world for students to emerge themselves in. *Second Life* is software program found or downloaded on computers. Although the program does not provide the full immersion experience that currently available virtual reality technology can provide, it does allow users to create a virtual world that they can then interact with. Users can create avatars in their worlds can be used and then meet with others who are also on there (Morgan, 2013). The professor integrated Second Life in a French college course in order to create a world that modeled France. The researcher wanted students to immerse themselves in the language, the culture, and the area

without the expense of traveling there. The researchers concluded that the overall immersion was very helpful for students to practice their French skills.

In the field of social studies education, a number of educators have claimed the possibilities of using virtual reality to provide authentic learning environments where students interact with historical figures or explore historical events. For instance, Zhang (2019), wrote an article, outlining how to utilize virtual reality within a history classroom. Zhang suggested not only using virtual reality within the classroom, but also having students create their own historical virtual reality simulation for others to experience. In a virtual reality lesson, students are expected to think about the different elements that would have appeared within that historical timeframe, how the historical figures spoke to each other, the importance of gender roles, and more as they create their own virtual reality. Zhang argued that immersion will help students learn a better historical concept of the time period that they are studying. Zhang also highlights that if a teacher is going to undertake utilizing virtual reality to teach history, they need to do the following: (a) to plan and think through any potential obstacles ahead of time, (b) to create a framework that enhances integration into the time period, and (c) to allow for students to reflect and create revisions to their work and possibly to the teachers' work as well.

Katsuma, Adipranata, and Erandaru (2017) created the historical kingdom of Majapahit using Google Cardboard and shared possible classroom impact. The researchers created many aspects of the historical area including dogs, warriors, food, the village square, fisherman, and more. Their hope was that it would increase students' interest and awareness of the historical area, but they have not conducted the study to see if that has been achieved. There is a strong need to conduct empirical studies on how virtual reality can be integrated into a social studies classroom.

Historical Empathy

Historical empathy is defined as an inclusive process that engages both cognitive and affective aspects with various historical figures to help students not only understand, but contextualize past experiences, thoughts, and rationale (Kohlmeier, 2006). Historical empathy has been an ambiguous term among historians, and over time the definition has been defined by what it is not and has slowly morphed into what components it does consist of: perspective taking and care. This component of care is where historical empathy can be broken down into the four different core factors of care: caring about, caring that, caring for, and caring to. These four factors play a critical role in defining historical empathy and measuring historical empathy among students. Each factor represents a different sector of caring that the student can reach during the course of historical learning. "Caring about" analyzes how much a student is interested in the historical past. "Caring that" reflects a student's emotional and mental reaction to the historical event. "Caring for" represents how much a student wants to help people in the past based of what is happening in the historical time period. "Caring to" is a student's desire to make changes in the present based off what they learned from the historical past (Kohlmeier, 2006).

Table 3:

Historical Empathy Chart

Perspective Taking	**Element of Care**
1. The ability to make and create connections between various circumstances, actions, or peoples'	1. Caring About- Student's interests in the past 2. Caring that- Student's reaction to the consequences of an historical event

intent of the times they live in. (Ashby and Lee, 2001)	3. Caring for- Student's desire to help the people in the past because he or she feels badly about what happening to them 4. Caring to- A call to respond to the present based on one's reactions to past events

Historical empathy is a critical component often neglected by many social studies teachers because of the ambiguity of historical empathy and the difficulty in measuring its growth; however, many educators are moving more and more to creating a clear definition with a working measurement based off the definition. While researchers in the past characterized historical empathy as only the cognitive act of perspective taking, recent research suggests, through four components of care, that historical empathy is related to both cognitive and affective domains. Thus, when examining historical situations or events, an investigator should examine how a historical figure might not only think, but also feel about the particular situation, and how the cognitive and affective aspects influenced the decisions that the historical figure made (Endacott & Brooks, 2013).

To help develop historical empathy, "students are required to discern the difference between life in the present and life in a distant past while maintaining the possibility that past perspectives hold some validity" (Endacott & Brooks, 2013, pg. 42). The researchers, Barton and Levstick, (2004) are the ones who developed the four components of care as being a critical piece that helps to define historical empathy. This was a distinct change from Foster and Yeager

(2001) who helped the guide the definition by stating what historical empathy was not. For example, imagination alone or a student feeling only sympathy was not enough to be historical empathy. Historical empathy is where students can become invested in the past, see the historical figures as people in their time, and connect with those historical figures on how they are different and how they are the same in present time.

Defining Historical Empathy in Education

Historical empathy in education has had many ups and downs as American values have shifted and changed. However, around the 1960s, there was more of a permanent move to incorporate this into the educational system (Cunningham, 2009). Social studies standards have even moved to include historical empathy and developing it within the classroom. The National Council for the Social Studies (NCSS) College, Career, and Civic Framework for Social Studies Standards (2013) states, "Historical understanding requires developing a sense of empathy with people in the past whose perspectives might be very different from those today" (p. 42). Though not given the exact title of historical empathy, the standard highlights students' cognitive and affective understanding of people in the past.

Despite its importance, social studies teachers have been struggling with incorporating historical empathy into their lessons due to a lack of understanding of the different mechanisms that are working within historical empathy that allows a definition to eventually emerge. The word "empathy" itself can be interpreted in many different ways, and teachers are unsure of what specifically historical empathy means. Endacott and Pelekanos (2015) claimed that there are three components to creating a firm definition of historical empathy: historical contextualization, perspective taking, and affective connection.

Historical contextualization is having someone understand (a) the norms of a historical society from an individualistic aspect, (b) how historical figures live their daily lives and interact with others to the group norms of society, and (c) what the government structure and policy look like. Perspective taking is considering a hypothetical situation that could have occurred within a historical time period, and having the student make connections on how this historical figure would have handled the situation based off the historical figure's personal life, prior experience, and the cultural norms that correspond with the historical figure and the time period. Lastly, affective connection allows the student to make historical inferences as described in perspective taking, and then make more a more comprehensive connection to how life was in the past. This allows the student to make connections of similarities and differences of the historical past to the student's present-day living experiences (Endacott & Pelekanos, 2015). When working to increase historical empathy, these three areas help create a realistic working space for many educators taking it from a more abstract theory to a more concrete area.

Historical empathy is a central concept within the social studies curriculum that can shape how students critique and analyze documents, and how they personally connect to the experiences people had throughout history (Endacott &Brooks, 2013; Huijgen van Botel, van de Grift, &Holthuis, 2017; Yilmaz, 2007). Researchers have examined historical empathy development in social studies lessons. Perotta (2008) examined how high school students identify the antebellum time period with a primary focus on Elizabeth Jennings. Through the use of KWL charts, writing assignments, and an in-class debate, Perotta analyzed the students' personal identity and how their identity impacted how they viewed the historical figure Elizabeth Jennings. Perotta did this in conjunction with historical empathy as the umbrella of how their identities are shaped today as well as influenced in the past, and it is reflected in the students'

work. Her emphasis was on whether students' social identities in high school have any connection to how they demonstrate historical empathy within the classroom. To do so, the researcher created a five-level historical empathy evaluation framework. Within this framework, the definition of historical empathy as previously discussed is laid out in more detail to help establish historical empathy measurement and aid in reflecting if there was growth among the students.

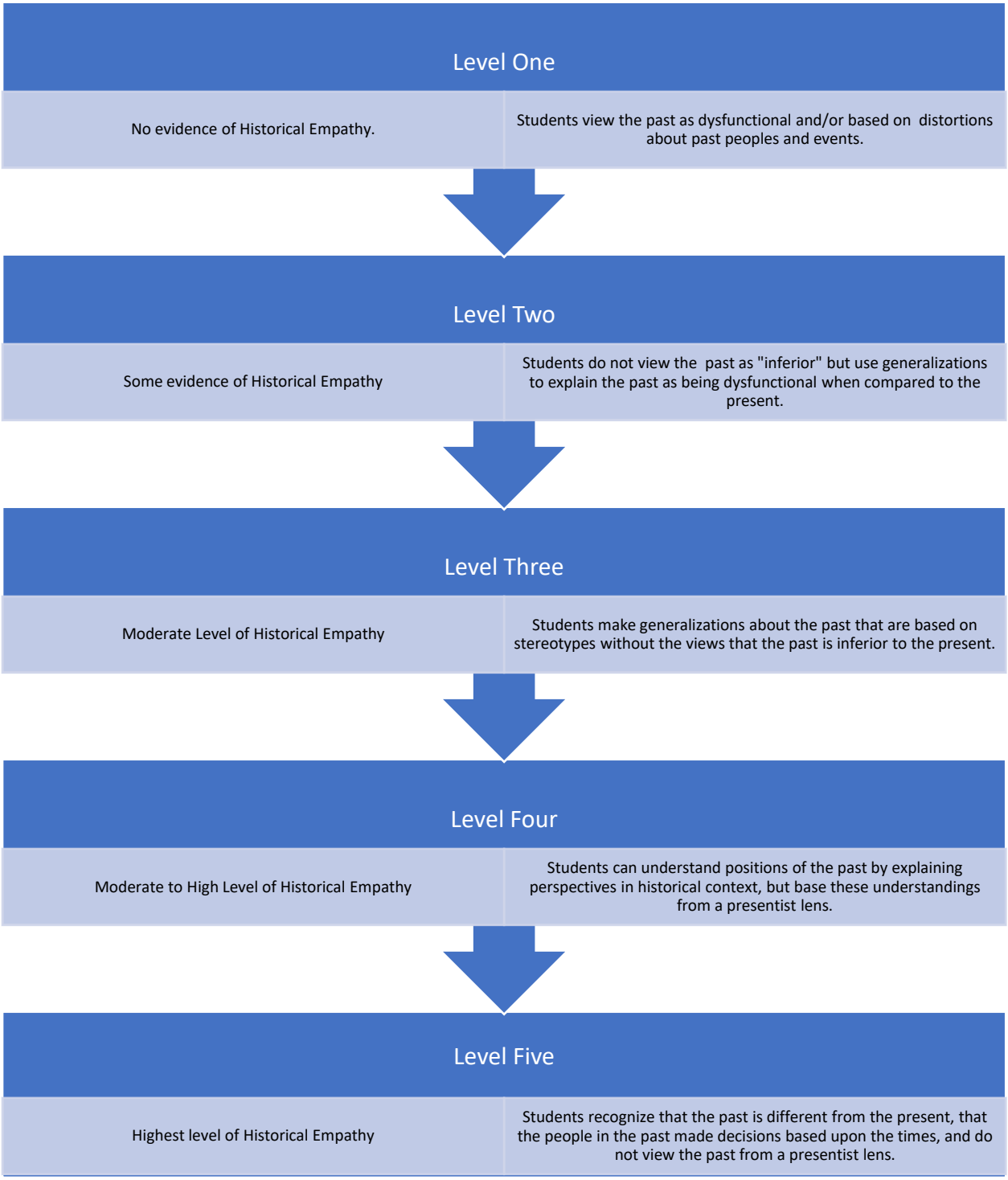
The first level shows no physical evidence of historical empathy. Students view the historical time periods as odd or distorted from the students' perspective. For example, during a Civil War lesson someone might find it strange that the entire South did not promote slavery or the war, and do not notice the nuances of people's varying opinions in that time period. At level two, students show a little evidence of historical empathy by not expressing the past as substandard to the student's reality, but may still make broad oversimplifications about the historical time period under discussion. A student could say that the Civil War was when the Union struggled with leadership: a simplified statement, but one that does show they are seeing the problems within the Civil War. The third level illustrates a reasonable amount of historical empathy by students drawing conclusions about the past through the use of stereotypes, still generalizing, but not seeing the historical time period as substandard. A student would say that there was no industrialization in the South- a stereotype of the Civil War but drawing conclusions about the South.

At the fourth level, students move to a higher level of historical empathy by being able to articulate through discourse or the students' writing the various perspectives from the people alive during that historical time period; however, it is still delivered in a way that the students still see their perspective from the present-day reality. A student discusses with the teacher about

how many of the women had to stay home, and help the war cause by making clothes or bullets. This shows higher level thinking, but by using the words such as "stay home" students indicate they are still seeing it from present day where staying home has a potentially negative connotation to it. This is only if students are perceiving "stay home" as a constraint on women's rights or what women were allowed to do during times of war in early history versus active combat allowed by the military which became more common in the 21st century. The final level, five, is where the students can describe the historical time period, show various perspectives, and put their current reality aside to see it only from the past and how historical figures would have felt and perceived the world around them as it was during their time period (Perotta, 2018). The student discusses during class that Abraham Lincoln presented the Emancipation Proclamation freeing slaves in states that had seceded not only to give them freedom, but to help add to Union soldier number with the hope that the now free slaves would fight on their side. It shows the student thinking from a logistical point from the time period and placing themselves in the recently freed slaves' position about what their next steps could be. See graphic for a visual that was created based off this hierarchy of levels. These four levels demonstrate the different ways students can empathize with historical events and people within the classroom.

Figure 2:

Levels of Historical Empathy



The hierarchy of ability to outwardly demonstrate historical empathy within a social studies classroom is critical to any analysis of how historical empathy has been able to grow with

a lesson unit or over the course of the school year. If educators continue to learn more about historical empathy, and help cultivate it within their schools and among their students, then this will potentially push students to increase their student learning by seeing history from a different perspective other than their own.

Promoting Historical Empathy in Social Studies Classroom

Historical empathy within the social studies helps student engagement in inquiry and helps create a deeper appreciation for the people who lived in different historical periods. Student engagement in the active learning of history through the use of historical empathy was found in several studies. The research by Foster (1999) analyzed how historical empathy could excite and engage students to learn history specifically about Neville Chamberlain. As Neville Chamberlain is often used to show a lack of foresight because of his famous quote, "Peace for Our Time," Foster considered him a figure that students might find difficult to empathize with. Taking an alternative approach to the study, Foster did not ask students to take on Neville's persona or place themselves in that time period; instead he used primary resources and other documents/historical evidence to shape the policies that were active during Chamberlain's time that would have influenced his decision. Foster also allowed students to engage with the pieces by discourse and annotation.

A differentiating instruction method promotes students' connection to historical empathy. A study conducted by Uppin and Timostsuk (2019) wanted to investigate how a museum activity might help both students and teachers with developing historical empathy and how a museum might play a role in that process. Using a qualitative method, Uppin and Timostsuk conducted pre-interviews, immediate post interviews, and another post-interviews 3 months after the museum field trip, "Three months after the visit, students felt that the museum lesson helped

illustrate rather than teach them the WWII period" (Uppin & Timostsuk, 2019, p. 4). The researchers concluded that the varied instructional methods help promote historical empathy by allowing students to interact with the historical knowledge in different ways.

Another study used a simulation method to help promote historical empathy among students. Rantala, Manninen, and Van den Berg (2014) used a simulation method that emphasized taking on another's persona and examined how high school students were able to understand historical figures' decisions in the past. This study was conducted in Helsinki with two 75-minute history classes. After completing a variety of activities, Rantala, Manninen, and Van de Berg found that motivation and interest in the topic directly impacted students' level of historical empathy. The instructional method of simulation helped students build historical empathy, but Rantala, Manninen, and Van den Berg did find that there was significant struggle in making historical empathy sustainable strongly within students.

Researchers claimed that allowing students to express their thoughts on the historical period is an appropriate way to promote historical empathy. Often historical writing is in third person, but Brooks (2008) found that 1st person writing illustrated higher historical empathy. Brooks (2008) studied specifically how writing could potentially be used to aid student's ability to express historical empathy. For two weeks, Brooks collected writing samples and interviews from an 8th grade Social Studies classroom. The writing samples varied between 1st person and 3rd person, and the researcher examined which students were able to best express historical empathy. Brooks (2008) found that 100% of the students liked the 1st person writing more, 45% were able to consider historical figures feelings, and 27% found that they were able to learn more about the topic. In contrast, 3rd person writings had on average 7% positive feedback and ability to express feelings.

Another instructional method that is used to promote historical empathy is the use of multimedia. The expression of historical empathy though multimedia is especially easier for students to connect to more emotionally traumatic times in history because they can see people acting out that time period, and see the struggles that the historical figures are going through. Metzger (2012) explored this venue (film) of sustaining historical empathy by focusing on the Holocaust during World War II. Metzger conducted a case study of a high school teacher who chose to watch *The Pianist* and then assigned writing questions and discourse to examine how students expressed historical empathy afterwards. Many students were able to express historical empathy and expressed their willingness to take ethical action to help prevent future racism and prejudice among different religious and ethnic groups. Several of the students expressed their need for action after witnessing the historical film and asked critical thinking questions of the time period. The researchers concluded that students' historical empathy was not only expressed on a high level, but had lasting impacts as some of the students made moves to help future generations. By cultivating empathy without also allowing for opportunities for students to take action can lead to increase anxiety among students (Singer & Klimecki, 2014).

Chapter 3: Methods

Purpose of Study

The purpose of this study was to explore the possibilities and challenges of integrating virtual reality (VR) into a social studies classroom. While previous studies have presented how VR played a significant role in enhancing training experience of adult learners (e.g.,Le, Pedro, & Park, 2014; Thomsen et al., 2016), a limited number of studies have examined the use of VR in K-12 classrooms. Furthermore, classroom level VR studies mostly explored VR use in the science, technology, engineering and math (STEM) field (e.g., Ke & Kim, 2017; Xu & Ke, 2016) or language lessons (e.g., Parong & Mayer, 2018). Limited studies have examined the integration of VR into a K-12 social studies classroom.

The use of VR in a social studies lesson has potential to create authentic learning environments where students interact with historical figures or explore historical events, potentially helping students better learn the historical concept of the time period that is being studied (Zhang, 2019). The integration of VR can also help students develop historical empathy by allowing students to see and experience the lives of historical figures in 3D environments. Examining the experiences of teachers and students of VR use in a classroom is critical for instructional leaders to provide practical guidance on integrating immersive technology into a K-12 classroom. Consequently, this study aimed to integrate VR (i.e., Oculus Quest) into a 9th grade social studies classroom and to explore the possibilities and challenges of VR integration. The following research questions guided the study.

1. To what extent does the integration of VR influence students' historical knowledge development?

2. To what extent does the integration of VR influence students' classroom engagement?
3. To what extent does the integration of VR influence the development of students' historical empathy?
4. What advantages and challenges does a teacher experience while integrating VR in a social studies classroom, if any?
5. What advantages and challenges do students experience while learning with VR in a social studies classroom, if any?

Research Design

To answer the research questions, this study employed the quasi- experimental mixed methods research approach. A quasi-experimental study is used to evaluate interventions that do not use randomization (White & Sabarwal, 2014). The current study included two groups, experimental group and control group. Mixed methods study is an approach where researchers collect and analyze both quantitative and qualitative data in order to better understand research problems and acquire multiple perspectives (Johnson, Onwuegbuzie, & Turner, 2007)

Quantitative approach is where the researcher collects data that is empirically able to be analyzed through a variety of statistical mathematical formulas. For example, a pre-test and post-test will allow the researcher to conduct a paired t-test that would measure if there was a growth in knowledge. This empirical measurement allows for a study to have what some consider evidence in whether goals or expectations were met depending on the type of research. Qualitative approach is where the people within the study are interviewed and observed during the course of the research. The interviews, field observations, and collected artifacts such as writings or notes from the participants are then held under a cognitive

microscope by the researcher. The researcher looks for common themes, similar wording, facial expressions that will allow the human element of the research to be clearly illustrated and depicted within the study. Collecting quantitative data is best when looking at how two variables have a relationship together; whereas, qualitative inquiry can dive into the point of view and various perspectives of the participants (Schwandt, 2015).

The current study employed the quasi-experimental mixed methods research approach in order to examine the impact of the use of VR in a social studies classroom. This study also aimed to provide a view of VR use from a teacher and students' point of view. To do so, this study allowed empirical data to be gathered through various surveys and tests, but it also allowed the researcher to collect interviews and qualitative evidence to build a holistic view of using VR in a social studies classroom. This study intended to present a comprehensive picture of VR in a social studies classroom by analyzing student engagement, knowledge gained, and historical empathy pursued.

Setting

This study was conducted in a suburb of a large metropolitan city in Alabama. The school district has a total of seven schools and over 6000 students. There is one high school within the system. Within the high school, there are a little over 1900 students- with some diversity in ethnicity and race. Students are 60% white, 21% black, 16% Hispanic, and less 1% are Asian or consider of mixed race. The high school has about 31% on free or reduced lunch. The female to male ratio is evenly paired at 50% female and 50% male. Most teachers have more than 3 years of experience within the high school. There is a 97% graduation rate with 68% being considered ACT college ready when they graduate. Only 14% of the high school population actively engage in advanced placement courses.

Two classes were invited to join this study. One is an "experimental group" or "VR group" where students studied world history using VR. Another class was a "website group" where students learned the same subject using a website that included D virtual images along with traditional means of learning and activities such as stimulus-based questions or discourse. Stimulus-based questions are multiple-choice questions that are connected to a document, chart, or graph that are designed for synthesis of the information (College Board, 2020). Discourse is where the class engages in active discussion of the lesson material, which enhances communication and debate skills (Study, 2020).

There are three different levels of freshman world history in the school: Standard, Honors, and Advanced Placement. The two classes invited to the study were Honors world history classes. The reason Honors classes were chosen for this study was due to the classroom teacher's schedule. His Honors classes were chosen at the teacher's request since it accommodated his schedule since he is also a soccer coach within the school system. The unit that was taught for this study was Anne Frank and the Holocaust. Anne Frank's story begins in 1936 as the Nuremburg Laws begin in Germany. Her families attempt to leave the area and then hid in a secret annex. The story ends with their discovery by German troops. Her time in the "Secret Annex" has been recreated to a certain extent and it lends itself well to both traditional and VR learning activities.

For the VR group, they used Oculus Quest to experience the Secret Annex virtually. The Oculus Quest from Facebook has a variety of apps which include historical tours and experiences. The Anne Frank VR is a free app that can be downloaded on to the Oculus Quest from their App Store. The app can be accessed at the following link https://www.oculus.com/experiences/go/1596151970428159/?locale=en_US. The Anne Frank

VR experience included two parts: Story Mode and Tour Mode. Students had to complete Story Mode first in order to experience Tour Mode. Story Mode was a short video clip that summarized Anne Frank's life and her time in the Secret Annex. The Tour Mode allowed students to experience the rooms in which Anne hid for a couple years. The Secret Annex was to scale within the virtual reality, and students used the handsets to walk within the space and interact with various objects that continued Anne Frank's story. The control group used a website instead of having a 3D virtual experience. The control group used https://www.annefrank.org/en/ which has a tour of that included 3D images of Secret Annex. This site allowed students to click and see each room that Anne lived in.

The VR activities that were used in the course of this unit were selected carefully, so that experiences were age appropriate for 13 to 14-year old students. Anne Frank and the Holocaust is a violent and dark topic, and there was the concern that some of the VR apps and experiences would not be appropriate for the classroom (Keegan, 2014); however, both the VR experience and the website were selected that allowed the students to see and experience without the violent aspect occurring around them. The Website and the VR group mirrored each other in activities and instructional learning with the only major exception being the use of VR within the VR group only. The purpose of this was to explore how students' experience were different after they used either the Website or VR and whether there is any difference between the VR group and the Website group. The development of daily activities were guided by lessons created by The Children's Museum of Indianapolis, which can be found at the following website https://www.childrensmuseum.org/sites/default/files/Documents/Educators/6-9_POCAnneFrank_UOS.pdf. Students' daily activities and data collections are summarized in Table 4.

Comparison between Website group and VR group

Website Group	**Virtual Reality Group**
Days: 4	Days: 4
Day 1: Essential Question Learning Targets Pre-Test/Pre-Survey Vocabulary and Discussion Quotes Analysis Reflection	Day 1: Essential Question Learning Targets Pre-Test/Pre-Survey Vocabulary and Discussion Quotes Analysis Reflection
Day 2 and 3: Discussion and Essential Question Learning Targets Biographical sketch of Anne Frank's life Anne Frank's VR- Half Writing Reflection	Day 2: Discussion and Essential Question Learning Targets Biographical Sketch of Anne Frank's life Anne Frank's website Writing Reflection
Day 3: Discussion and Essential Question Learning Targets Biographical sketch of Anne Frank's life Anne Frank's VR- Half Writing Reflection	Day 3: Discussion and Essential Question Learning Targets Speech to a 6th grade class assignment Post-Test Post-Survey Writing Reflection

Day 4: Discussion and Essential Question Learning Targets Speech to a 6th grade class assignment Post-Test Post-Survey Writing Reflection	Day 4: Experience VR Tour Writing Reflection

There were limited VR headsets; therefore, students in the VR group also completed traditional activities while other classmates were engaged in VR activities. To help all students in the VR group experience VR, the class was divided into two groups. The division of the class helped all students in the class experience the virtual tour within the 52-minute class allotted timeframe.

Participants

The Website group had a total of 27 participants; however, due to school events and personal issues, some students were not able to participate in the classroom activities four days in a row. The Website group included 19 girls and 8 boys. Two are of African American descent and 2 are Hispanic with the remaining students being White. The VR group had a total of 17 participants. The VR group had 11 girls and 6 boys. There are 2 African Americans and 3 Hispanic student with the remaining students being White. The classroom teacher has been teaching for nine years and holds a Bachelor's in History with minor in Secondary Education. He currently teaches World History to freshman at the high school. The teacher has a plethora of

technological equipment that is provided by his school district. He has a Smartboard and Hovercam, and each student has a device to use. The school also provides software, apps, and subscriptions to educational websites such as DiscoveryEdu, GoGuardian, Screencastify, and more. The school is considered a Google endorsed school using Chromebooks, Gmail, and Google resources for many of their classroom materials.

Before Covid-19, the teacher described his use of technology as minimal such as using PowerPoints for presentations. Since Covid-19 and the start of the 2020 school year, he has seen an increase in technology use both on the educator's side and the students. He actively uses a learning management system called Schoology where he posts all of his lessons, videos, and activities for any learners who are off campus. The teacher feels moderately comfortable using technology within the classroom. He allows students to use Google Chromebooks to access and complete materials.

Data Collection

To answer the research questions, both quantitative and qualitative data were collected. Quantitative data included (a) a pre and post- knowledge test and (b) pre and post-survey. The pre and post- knowledge test measured students' historical knowledge growth as it pertains to Anne Frank and the Holocaust (See Appendix A). There were eighteen multiple choice questions and four open-ended discussion questions on the pre and post-test. The pre and post-test were selected from the https://www.childrensmuseum.org/sites/default/files/Documents/Educators/6-9_POCAnneFrank_UOS.pdf, the Houghton Mifflin textbook about the Holocaust, and http://holocaust.umd.umich.edu/lul/Readings/Unit%20Test.pdf. The pre and post-test also included 4 short answer questions which allowed students to express historical empathy with the Anne Frank unit.

The pre-survey collected a multitude of information. The demographic question included students' background, and technology use prior to using the VR set in the classroom, and students' general perceptions on VR use. (See Appendix B). The survey also included items from interpersonal reactivity index (IRI, Davis, 1983). IRI measures participates perceived empathy, and one of four constructs examines a person's reported perspective taking. The seven items measuring perspective taking was included in the pre-survey. The post survey included the same items from IRI and also included likert-scale and open-ended questions exploring the perceived challenges with VR, advantages with VR, and how VR encouraged student engagement.

The qualitative data collected included (a) pre and post interviews with the teacher, (b) student interviews, (c) reflection, (d) field observations, and (e) classroom recordings. The interviews with the teacher was designed to collect the teacher's perception of technology, VR use in the classroom, and historical empathy growth among students. (See Appendix C). The pre-interview focused on gathering background on how much the teacher used technology in the classroom not only for teacher led technology, but student led technology. Additionally, the pre-interview explored the teacher's beliefs in technology integration in classrooms, expectations on student engagement, learning, and historical empathy in his virtual reality classroom, and possible concerns about using VR in the classroom. The post-interview with the teacher focused on the teacher's overall experience teaching with VR technology and any difficulties in using the equipment or carrying out the VR tasks. The post interview also examined the teacher's evaluation of the two classes (i.e. virtual classroom versus website classroom) in terms of student engagement, knowledge, and historical empathy.

A total of 6 students were selected for student interviews. Students that were selected for interviews met the following criteria: high engagement, positive VR use, low VR use, or growth within their reflections or assignments. These students were chosen because they vocalized either great enjoyment or difficulties when using the VR or during the traditional class activities. The field observations and student reflections focused on how student's engagement was portrayed throughout the unit either through discourse, activities, or writing, and technology use specifically when using VR to understand Anne Frank and the Holocaust. The interviews also examined any challenges Anne Frank faced, historical empathy growth and how VR played a role in developing perspective taking and care within students for Anne during the Holocaust. (See Appendix H). The interviews with students were designed to help them express their connections with the historical time period and people represented, which would help the researcher to explore how historical empathy developed during the course of the unit.

The reflection assignments were given to every student at the end of each class (See Appendix D). The writing reflections endeavored to allow students the chance to express historical empathy within the instructional unit. The writing assignment asked students to demonstrate the life of Anne Frank and her struggles to a 6th grade class learning it for the first time. The writing assignment on Day 4 focused on the four stances from Barton and Levitsk: identification stance, analytic stance, moral response stance, and exhibition stance. These four stances describe the various ways learning can be expressed by students within a historical unit. The stances focus on student historical connection from the past to the present, cause and consequences of historical events, how students engage in the failures and triumphs in history, and then a project or assessment that demonstrates their historical knowledge. The reflection questions focused on the stances due which allowed for accurate depiction of student levels of

engagement and the potential for historical empathy to emerge when considering perspective taking and care. Classes were observed in person and through a video recording. The researcher paid great attention to students' class engagement such as the number of students answering questions during discourse, students' facial expression and body language, and attentiveness during lesson.

Procedures

The study was approved by Auburn University's institutional review board before collecting the data. All students and parents signed a waiver at the beginning of the unit. (See Appendix F). This waiver stated that their grade would not be affected if they chose not to participate in the study and that no recordings or video would be made public or posted to social media. The unit lasted for a total of four days. Before the unit began, a pre-interview with the teacher took place at the school, lasted for an hour and half, and was recorded using a voice recording app on a smartphone. Once the pre-test and initial survey were completed for the VR group, the teacher moved into the unit through discourse each day that lasted for 10 to 15 minutes. Then, for about 15 to 25 minutes, there were activities that included VR, writing reflections, and traditional activities such as primary source analysis and pictorial creations of historical events to demonstrate the historical time period.

During the VR portions of the unit, students had an accompanying writing reflection once the activity was complete. There were only 10 Oculus Quest headsets; therefore, time with VR was divided among the students. On day 2, half of the class had a VR reality activity, while the other completed a traditional learning activity. On day 3, they switched roles, so every student was able to participate in the VR activity. From this activity and field notes, the researcher invited 6 students based on the criteria: engagement, active or passive VR use, or growth within

their reflections or assignments. Interviews were conducted via Google Meet and recorded. The interview times were scheduled outside of school time to minimalize class disruptions at the end of the school year, and average interview length was 10 to 15 minutes.

For the control group, after finishing their pre-test and survey, students moved directly into the daily lessons which consisted of 10 to 15 minutes discourse, 15 to 20 minutes of traditional activities such as analyzing primary sources, perusing Anne Frank's website, and creating interactive timelines.

Students in both groups had an accompanying writing reflection once the activity was complete. On the last day of the unit, all students (VR and Website group) were given a post-test and post-survey. Finally, a post-interview with the teacher was conducted. Throughout the process, the researcher kept field notes and had informal conversations with the teacher as they progressed the unit.

Data Analysis

Mixed-design ANOVA was used to determine whether there were differences in knowledge development, social studies engagement and the development of *Care* between the VR group and Website group over time. The between subject factor was group condition (i.e., VR vs. Website), and the within subject factor was project participation time (i.e., pre vs. post). Descriptive statistics were used to analyze demographics of students and students' satisfaction of using technology. Finally, independent t-test was used to determine the difference in students' perception of using the website and VR.

The pre and post interviews with the teacher were recorded and transcribed, and then they were both carefully reviewed while applying appropriate codes. Coding is the process that divides the data, breaks it down into manageable sections, and identifies or names those parts

(Schwandt, 2015). “Coding requires constantly comparing and contrasting various successive segments of the data and subsequently naming them using a theme or category” (Schwandt, 2015, p. 30). There are three different types of coding: (a) a priori- content specific scheme, (b) a priori- non-content specific scheme, and (c) grounded, a posteriori, inductive, context-sensitive scheme. A priori, content specific theme studies the problem and uses the language that drives the problem to derive the code from the data. An a priori, non-content specific scheme is where the coding is derived through typology and the derived codes are the data only with no specific content to guide its form. Lastly, the grounded, a posteriori, inductive, context-sensitive scheme is a mix of the first two where a typology is used to develop the coding, but is generated in context and through data samples (Schwandt, 2015). This study focused on grounded, a posteriori, inductive, context-sensitive scheme or inductive coding that allowed content terminology to guide the coding, and left room for new codes to emerge for the data as well. The coding generated was to promote the understanding of historical empathy growth among students, the challenges and advantages of VR in the classroom, and student engagement throughout the historical unit.

The post interviews with students were also recorded and transcribed. These data along with filed notes were carefully reviewed and appropriate codes were attached. While comparing different codes from multiple datasets, emerging themes were identified. How each research question was analyzed in Table 5.

Table 5:

Research Matrix

Research Questions	Data Collection	Data Analysis
To what extent does the integration of VR influence	Pre-Post Test; pre-post surveys; reflections; interviews	mixed-design ANOVA; coding

students' historical knowledge development?		
To what extent does the integration of VR influence students' classroom engagement?	Pre and post-surveys; Interviews with students and the teacher; field notes, reflections	mixed-design ANOVA; independent t-test; coding
To what extent does the integration of VR influence the development of students' historical empathy?	Pre and post-surveys; Writing samples, Interviews with students and the teacher; field notes, reflections	mixed-design ANOVA; coding
What advantages and challenges does a teacher experience while integrating VR in a social studies classroom, if any?	Teacher interviews; field notes; video recording	Coding
What advantages and challenges do students experience while learning with VR in a social studies classroom, if any?	Student interviews; post-surveys; reflections; field notes; video recording	Descriptive statistics; Coding

Trustworthiness

Triangulation is where 3 or more pieces of evidence is collected and analyzed to answer the research questions best (Schwandt, 2015). The study triangulates the data in several ways to ensure that each component is measured and analyzed to the fullest extent. A pre and post test was given to both the control and VR group which allowed the researcher to investigate whether VR played a role in the development of historical knowledge. The reflections at the end of the unit and field artifacts were used to triangulate the findings from the pre and post test results. This allowed for three types of data to be collected on whether historical knowledge was gained during the course of the study.

Student engagement was measured during the course of the unit through field observation in both groups. The survey taken before and after the unit in the both the control and VR groups helped to measure whether student engagement was different between the two groups as well. Lastly, post-interviews with students from both the VR group and the control group allowed the researchers to examine how student engagement emerged or was expressed from both groups during the course of the unit.

Historical empathy was analyzed through field observations of both the control and VR groups. The field observations allowed for students' words and actions to be documented as they experienced the lessons. Student artifacts were then collected, which showed how students expressed perspective taking and care in regards to historical empathy such as caring about (interest in the past), caring that (reaction to consequences in the past), caring for (desire to help people in the past), and caring to (change the present based off past events) (Kohlmeier, 2006). Specifically, field observations, artifacts, and reflections were analyzed using the two main components of historical empathy: perspective taking, and care.

Researcher's Bias

The researcher has been teaching in same metropolitan school in Alabama for fourteen years. She is the first in her family to graduate from college and has obtained graduate level degrees. She has a Bachelor's in History, a Master's in Education, and an Education Specialist degree in Teacher Leadership. She actively uses technology in her classroom and works to incorporate new technology as it becomes available. She has presented at the Alabama Educational Technology Conference for the past three years. There is a bias towards anticipating that the VR group will experience higher levels of student engagement and historical knowledge.

Historical empathy is a new area of growth for her and she is curious to see how this connects to student development as it pertains to understanding the historical figures within the unit.

CHAPTER 4: Results

Impact of VR Integration on Knowledge Development

A total of 20 students from the Website group and 13 students from the VR group took the knowledge test. However, only 14 students from the Website group and 10 students from the VR group completed both the pre and post-tests. The pre and post-test included 18 questions, and the analysis of students' test scores ranged from 9-17 (pre-test) and 8-16 (post-test). For the Website group, 11 out of 14 students' test scores slightly increased, while 2 students' scores decreased. For the VR group, 4 out of 10 students' scores slighted increased, while 3 students' scores decreased. The rest of 3 students' scores remained the same.

In order to examine the impact of VR use on students' historical knowledge development, a mixed-design ANOVA was performed. The findings demonstrated that although students' post-test scores increased in both the VR group and Website group (see Table 6), no statistically significant main effect for time (pre and post) was found ($F_{(1,22)}$=2.402, p=.135). The difference between the group across the time was not statistically significant either ($F_{(1,22)}$=4.101, p=.579). This indicates that the use of either Oculus Quest or website did not influence students' historical knowledge development.

Table 6:

Changes of Students' Pre- and Post- Knowledge Test

	VR Group (N=10)				Website Group (N=14)			
	Pre-test		Post-test		Pre-test		Post-test	
Knowledge Development	M	SD	M	SD	M	SD	M	SD
	12.90	2.558	13.20	1.687	13.29	2.016	14.00	1.881

While students' test scores did not demonstrate statistically significant improvement, students' survey, reflection, and interview data suggested possible benefits of technology use

(both the Website and Oculus Quest) on content learning. For instance, Macy (White, Female, Website group) suggested using the Website in her post-survey: "[I would recommend using the website] because it makes it easier to remember what I learned." Chris (White, Male, Website group) also made a similar comment, "I would recommend using the website for other social studies classes. The website offers information on the subject of Anne Frank and the holocaust." In reflections, students in the Website group were able to express how the Website tour helped them with learning more about the life of Anne Frank. For instance, Audria (White, Female, Website group) wrote, "I liked how we were actually able to see what the annex looked like and gained information about it. The website helped to learn about Anne Frank because I am a visual learner and it helped me understand it better by being able to see what happened where she stayed." Jordan (White, Male, Website group) also shared learning benefits in his reflection: "The tour was fun. I liked how you got to see the rooms and spaces of the secret annex. It helped imagine how they lived and how cramped it was."

Students in the VR group also highlighted that the VR use helped them better understand the life of Anne Frank. Shelby (White, Male, VR group) wrote in his post-survey, "I would recommend it because it helps to understand what life was actually like for Anne." Brenda (White, Female, VR group) made a similar comment, "Yes, it helps you understand where they lived and what it looked like and it just helps put an idea in your head."

During the interview, the researcher asked whether students gained any new knowledge while exploring Secret Annex using Oculus Quest. Most students were introduced to Anne Frank when they were 6th graders and they read, *Anne Frank: The Diary of Young Girl*, when they were 8th graders. During the interview, Sara (White, Female, VR group) said," I never realized how small of a space she lived in and with so many other people as well. I [already] knew her story,

but VR brought into another level…. the headset experience transported us there and really helped her story live in a new way." José (Hispanic, Male, VR group) also said that the VR experience helped him with content learning. He said, "I really liked it. I liked being able to walk around with my hands. You could click on stuff and it would tell you more about the object and Anne's life. How that object played into Anne's life. I think we really learned stuff with the VR." The analysis of students' reflection also showed the learning benefits of VR use. Melanie (Hispanic, Female, VR group) wrote, "I really liked the experience. I liked that I can interact with things and it was educational. It helped me learn because when I interacted with the items in the virtual reality, it told me the history about it and things from Anne's diary. I recommend it if you're learning about Anne."

In conclusion, students' pre- and post-test results did not demonstrate any statistically significant impact of either VR or the Website use on students' knowledge development. However, the qualitative data such as students' post-surveys and interviews suggested that the use of technology helped students develop a deeper understanding of the historical facts and help them have in-direct experience of historical events.

Impact of VR Integration on Students' Class Engagement

The changes of student' engagement in a social studies class was examined by analyzing students' pre and post-surveys. Students in general shared positive attitudes toward social studies; the mean scores across all survey items were over three (See Table 7). While students' post survey results were slightly higher for most items, the analysis of mixed-design ANOVA presented no statically significant impact for time (pre and post) and groups (VR vs. Website). This means that the use of either VR or Website did not change students' engagement in the

social studies class. Also, the findings showed that students' engagement in the social studies were not different depending on the use of VR or website.

Table 7:

Changes of Students' Engagement in Social Studies

	Across the groups		VR Group		Website Group		Time Effect	Group Effect
	Pre (M/SD)	Post (M/SD)	Pre (M/SD)	Post (M/SD)	Pre (M/SD)	Post (M/SD)		
I am enthusiastic about a social studies class.	3.37 (.82)	3.47(.77)	3.00 (0)	3.25 (.463)	3.64 (.92)	3.64(.92)	*F(1,17)*=1.406 (*p*=.25)	*F(1,17)*=2.445 (*p*=.14)
I am interested in materials I learn in this class.	3.67(.796)	3.76(.77)	3.50(.70)	3.50(.52)	3.82(.874)	4.0(.894)	*F(1,19)*=.584 (*p*=.45)	*F(1,19)*=1.681 (*p*=.21)
I am active participant in my social studies class.	3.29(.90)	3.38(.86)	3.10(.99)	3.50(.97)	3.45(.82)	3.27(.79)	*F(1,19)*=.338 (*p*=.57)	*F(1,19)*=.035 (*p*=.854)
I am excited to come this class.	3.60(.82)	3.55(.75)	3.60(.96)	3.60(.84)	3.60(.69)	3.50(.70)	*F(1,19)*=.130 (*p*=.72)	*F(1,19)*=.022 (*p*=.883)

While no statistically significant changes in students' class engagement were observed, students' post survey demonstrated overwhelmingly positive perceptions of VR use in a social studies classroom. Students' survey data presented high mean scores: "Virtual reality makes learning social studies fun" (M=4.23; SD=.83) and "Virtual reality makes learning more exciting" (M=4.15; SD=.99). During the interview, we asked Melanie (Hispanic, Female, VR group) whether her learning experience would have been the same if she used a book instead of Oculus Quest. She said,

> Reading a book or a passage or even a worksheet, it would have been less fun, I think. Lots of students don't like doing that type of stuff and will just go off on their phones or tune out depending. This really helped them want to learn more about Anne Frank because it was almost like a reward for doing so. It's more fun this way. You get to see the story line and talk about it with your friends about how it looked or what she

experienced. I think it was the best thing you could have done rather than read another article.

During the interview, Sara (White, Female, VR group) said that she experienced more active discussion in her classroom while she was participating in the VR activity, which made her think that VR use can help students with engagement. She said, "I think it will help more students engage in history and become excited to be in class instead of just on their phones. The VR really helped it come alive and students were up and talking when we used it. Discussion was happening— there was excitement in the room."

José (Hispanic, Male, VR group) also explained that the VR helped him become interested in the topic. He said that when he was introduced to the story of Anne Frank in his 8th grade, he was not interested in learning about it. However, the use of VR promoted his interest. He said, "In those times before I didn't really listen because I wasn't really interested, but this time I was. It was very interesting about having to live in the annex and limit rations and all that."

Students expressed their interest in using VR more in their social studies class: "I would like to see my teacher use virtual reality more in the social studies classroom" (M=3.92; SD=1.03). Across the interviews, post-survey and reflections, students emphasized that VR gave them a different level of experience, which made them want to use more VR in their social studies classroom. Amanda (White, Female, VR group) said in her post survey: "I recommend because it helped me get the sense of everything. You don't get the cramped feeling from pictures and text, but VR you felt like you were in the space." Sara (White, Female, VR group) also talked about her unique learning experience. She said, "The experience was fun and something I have never done before. I liked how I got to see the place up close and there wasn't

anything I really disliked. It helped me see and understand the place they were living in. Overall, it was a cool experience."

Students' perceptions of the Website use were also examined and compared the mean scores between the VR group and Website group by conducting the independent T-test. While the mean scores of VR group was higher for most items, the difference was not significant except the items of future VR use (See Table 8). Interestingly, higher of number of students in the Website group (n=10) indicated that using the website was easier compared to the 6 students in the VR group. Thus, the mean scores of Website group (M=3.86) were higher when comparing that of the VR group (M=3.46).

Table 8:

Students' Perception of Using Technology

	VR Group (N=13) M(SD)	Website (N=14) M(SD)	Independent t-test
Using virtual reality (the website) increases my attention towards the course.	3.85 (.80)	3.64 (.75)	*t*=-.684; *p*=.58
Virtual reality (the website) makes learning more exciting.	4.15 (.99)	3.71 (.91)	*t*=-1.2; *p*=.58
Virtual reality (the website) is easy to use.	3.46 (.77)	3.86 (.66)	*t* =1.4; *p*=.31
Virtual reality (the website) use makes it easier for me to remember what I learned in class.	3.92 (.76)	3.50 (.76)	*t* =-1.4; *p*=.65
I would like to see my teacher use virtual reality (the website) more in the social studies classroom.	3.92 (1.03)	3.71 (.61)	*t* =-.64; *p*=.03*
Virtual reality (the website) makes learning social studies fun.	4.23(.82)	3.71(.83)	*t* =-1.61; *p*=.73

In conclusion, students in both groups shared positive engagement in a social studies class even before they were introduced to technology. Thus, while their engagement scores were slightly increased after their technology use, no statistically significant differences were found.

No statistically significant differences between the VR use and the Website use was found. However, students' surveys, interviews, and reflections suggested that the use of technology, particularly the use of VR, make learning history fun and engaging, and a high percentage of students wanted to use VR more in their social studies classrooms.

Impact of VR Integration on Historical Empathy Development

Changes of students' perspective taking was explored by comparing the pre and post survey items from Davis (1980). Analysis of mixed-design ANOVA presented that although mean scores of post-surveys for both VR group and Website group increased, the difference between pre and post was not statistically significant ($F_{(1,20)}$=.387, p=.541). No group difference was found ($F_{(1,20)}$=.015, p=.905).

Table 9:

Changes of Students' Pre- and Post-Perspective Taking Items

	VR Group (N=11)				Website Group (N=11)			
	Pre-test		Post-test		Pre-test		Post-test	
Perspective Taking	M	SD	M	SD	M	SD	M	SD
	17.18	2.82	17.36	4.00	17.18	3.70	17.72	4.38

Students' changed historical empathy was examined by analyzing students' writing samples based on the historical empathy rubric (see Table 10).

Table 10:

Historical Empathy: Care Rubric

	1	**2**	**3**	**4**

Caring About	Student expresses no interest in the past	Student expresses little interest in the past	Student some interest in the past	Student expresses a large amount of interest in the past
Caring That	Student has no reaction to the consequences of an historical event	Student reaction a little to the consequences of an historical event	Student react some to the consequences of an historical event	Student react much to the consequences of an historical event
Caring For	Student does not desire to help the people in the past because he or she feels badly about what happening to them	Student has little desire to help the people in the past because he or she feels badly about what happening to them	Student has some desire to help the people in the past because he or she feels badly about what happening to them	Student has a large desire to help the people in the past because he or she feels badly about what happening to them
Caring To	Student expresses no call to respond to the present based on one's reactions to past events	Student expresses a small call to respond to the present based on one's reactions to past events	Student expresses some call to respond to the present based on one's reactions to past events	Student expresses a large call to respond to the present based on one's reactions to past events

The analysis of writing samples presented that after the lesson, there were statistically significant increases in three areas: *caring about, caring that, and caring to*. Only the *caring for* did not present any statistically significant difference between pre and post-writing samples. In addition, while a slightly high level of increase was observed in the VR group when comparing to the Website group, no statistically significant differences were found between the VR group and the Website group. (See Table 11).

Table 11:

Analysis of Historical Empathy Writing Samples

	VR Group		Website Group		Mixed-Design ANOVA Results	
	Day 1 Writing Assignment (M/SD)	Day 4 Writing Assignment (M/SD)	Day 1 Writing Assignment (M/SD)	Day 4 Writing Assignment (M/SD)	Time Effect	Group Effect
Caring About	2.40 (.516)	3.20 (.422)	2.36 (.809)	2.64 (.674)	*F(1,19)*=14. 717 (*p*=.001)*	*F(1,19)*=1.599 (*p*=.221)
Caring That	2.20 (.632)	2.90 (.316)	1.82 (.751)	2.36 (.809)	*F(1,19)*=12.035 (*p*=.003)*	*F(1,19)*=4.086 (*p*=.058)
Caring For	2.10 (.568)	2.40 (.516)	2.25 (.622)	2.25 (.452)	*F(1,20)*=1.212 (*p*=.284)	
Caring To	1.10 (.316)	1.90 (.738)	1.17 (.389)	1.50 (.674)	*F(1,20)*=13.648 (*p*=.001)*	*F(1,19)*=.826 (*p*=.374)

In the *caring about* portion of the rubric, students were able to express an interest in the historical past in their post- reflection. There was a significant statistical increase within historical empathy for both the VR and the Website group. In the initial writings, 8 out of 14 students in the VR group scored a two or lower with expressing an interest in the past. Some students within their reflections focused on how Anne must have been bored rather than the element of fear that brought her to confinement or the reasons why she was hiding within the secret annex. For example, Joseph (Black, Male, VR) stated “You would get very bored and get tired of doing the same thing. I would get stressed just because you couldn’t leave for like 150 days. To keep her mind off the main world, I would eventually do the same thing because I would get bored. I would probably eventually write a whole book.” As demonstrated, the student

interest was based more in Anne's restrictions due to her feelings than the historical events within Anne Frank's lifetime.

With the final writing assignment, 8 students moved to a 3 or 4 on the rubric by describing Anne Frank's life with accuracy and her situation within the secret annex. Joseph's growth was evident when he was asked to described Anne's life to a 6th grade class. He said,

> During the time that Anne Frank was alive Adolf Hitler was Germany's main ruler. He hated Jews so he got all other Germans to go against Jews. He went as far as putting them through a concentration camp which was called the Holocaust. In the Holocaust were Jews being starved to death and if they didn't are there way would have been put in a gas chamber. The only way to get out of going there was to hide. That is what Anne Frank and her family did. Anne Frank was a fifteen year old girl that lived a normal life, except she was a Jew. When she and her family were told they were to be taken to a camp, the family didn't like that idea so they hid. This made her go from acting like a 15 year old to have to act 20 because of what was going on. They decided to build a secret room under their house where they would stay and hide. They would build an underground bunker where they would hide out. They had four other people join them in the hideout. The bunker was very small the families didn't have any personal space. There was barely two bedrooms. During this time Anne wrote books and diaries to pass some time. They thought they would be able to come out of hiding because people were coming for Germany. Right before that their house was inspected, they were found and put in jail. Only Otto would come out alive.

Although there is still gaps in his writing (e.g., factual error), this growth of seeing her experience as one of boredom to one that was forced upon her and the negative impact it had on

her and her family was evident. *Caring about* was not only seen in the writing reflection rubrics, but highlighted in the student interviews as well. For instance, when the researcher asked her interest in learning the past, Malea (Hispanic, Female, VR) said, "Personally I think it's fun learning about our past or how we got here or even how we evolved." Sara (White, Female, VR) stated her *caring about* history in this way: "With history…There is no definitive answers and it's purpose isn't as easily known, but we learn from diving deeper into people and how and why they did things-which can make us better, but I think people sometimes struggle to see that honestly."

While the Website group showed a statistical increase between the Day 1 writing reflection to the Day 4 writing assignment, the average increase was smaller than the VR group. A total of 8 out of 16 students scored a 3 or higher on the rubric on the Day 1, but not much difference was observed on the Day 4 reflection. For example, Adeline (White, Female, Website Group) on Day 1 wrote, "Honestly, it sounds awful having to be cooped up for so long and with so many people. However, understand how Anne do it she did to survive the future. To be honest I would [write in a diary] because everything and anything is better than the Holocaust." Her statement demonstrates historical knowledge, and *caring about* the historical past. Her Day 4 statement is similar, "Anne Frank was a teen during the Holocaust that kept a diary and documented everything. She lived in secret in an attic basically. She lived there for 2 years in a cramped attic. It was either that or get caught and go to a concentration camp. So what do you think, did she and her family make the right decision?" The Day 4 writing assignment asked students to describe Anne Frank's life and the historical events that surrounded it to a group of sixth graders, Adeline was able to demonstrate *caring about* in both the Day 1 and Day 4.

With the *caring that* portion, field observations, writings, and recordings were reviewed to see how students react to consequences of a historical event such as The Holocaust. There was a significant statistical increase within historical empathy for both the VR and the Website group. A total 9 students scored a two or lower on the initial writing reflection, but this increased to 4 by the Day 4 writing assignments. Lorelai (Hispanic, Female, VR) expressed how Anne's diary was a consequence of her historical surroundings in the writing reflection when she said, "I think before I thought it was just to write and log in her days, but this time I really feel like it was her voice as well as her escape. With eight people she was unable to vocalize even those around her due to the secrecy and the fear, the diary gave her that as well as the long-term part of telling her story to others." Within a student interview, Melanie (Hispanic, Female, VR) discussed the consequences of the historical past (*caring that*) when she said, "Americans came and started freeing camps and areas, but they didn't get to Anne in time though."

The Website group showed increase in *caring that* by writing more about the consequences in Anne's life in their Day 4 writing as well. Twelve out of fifteen students scored a two or lower on the rubric and that decreased to five out thirteen in the Day 4 writing assignments. Fred (White, Male, Website Group) demonstrated this growth. On Day 1, he wrote, "If I were to live in a secret annex I would go crazy. I would feel like I'm being kept in a cage against my will. I think Anne wrote in a journal to keep from being bored. Also, I think she did so to record history. If I were Anne I would not write, I would draw comics, because I love to draw and writing can be boring." This demonstrated a certain degree of *caring that* of Anne's situation, but mainly the emotional side and not the historical events that were weighing in on Anne's life. By the Day 4 writing assignment, Fred was able to capture the consequences of the historical events surrounding Anne Frank's life. He wrote,

> During the time that Anne Frank was alive there was the Holocaust. Adolf Hitler's plan to get rid of all the Jews. Anne and her family were Jews and if they were found they would've got sent off to concentration camps. Anne's Dad's co-worker let Anne and her family live in their secret annex. While living in the annex, Anne had to adapt to a new way of life. There was certain things that you could not do like go outside or sit to close to the window. To keep Anne busy, she wrote in her diary. To this day Anne is still famous for her diary.

When asked in the post-test about why Anne and others were being targeted, Morris (White, Male, Website group) demonstrated the consequences of the historical past: "They were being prosecuted by Nazis because Hitler had convinced/ordered soldiers to round up all the Jews and send them to concentration camps." In the post-test, out of the twenty-seven responses, twenty-three stated it was because she was Jewish without mentioning the historical past. Overall, both groups showed some growth whether using the Oculus Quest VR equipment or the perusing the 2D website.

There was significant statistical increase between the Day 1 and Day 4 writing in the rubrics about *caring for* for both the VR and Website groups. Most VR students measured a two or three on the rubric on the initial Day 1 reflection and the Day 4 reflection. *Caring for* is seen when students express a desire to help the people in the past because he or she feels badly about what happening to them. Most students within their initial writing reflections were able to express this. For example, Gina (White, Female, VR) said, "I think living in a secret annex would be scary and hard to adapt to. I think I could relate to Anne in some ways because of how March 2020 was. It was scary because it was something I have never experienced before so, I assume that's probably how she felt. I think Anne wrote in her diary to clear her mind a bit and

to get down on paper about everything so maybe someone could read it one day." In Gina's final writing reflection and within the video recordings, she mentions how, "the Nuremburg laws were passed that discriminated Jewish people. These laws were made by Hitler's ideas and beliefs." She was able to see and react to the consequences of the historical event by using her word choices when describing Anne's situation. In the post-test, Janet (White, Female, VR) demonstrated *caring for* Anne and her historical past when she explained, "She wanted to go against it, fight for her people, and she wanted people to remember her." This was similar in the Website group, with the majority of the students measuring a two or three on the rubric. Students in both the VR and Website groups used words that signaled caring for what was happening to Anne and the others during the Holocaust by using words such as, "discrimination", "injustice", and "marginalized." Lorelai (Hispanic, Female, Website group) in her interview demonstrated caring for when she said, "There are some similarities like how the LGBTQ is disrespected and treated badly sometimes in society which is not the same but similar to having to go to concentration camps." Lorelai is able to acknowledge that Anne and other Jews are being disrespected for their beliefs and makes a connection to modern day social reform issues.

Caring to is when students have a call to respond in the present day based on the student's reactions to past events. No student writings expressed a call to respond in the initial reflections. The statistical analysis did show a significant increase; however, the numerical score was still low with most students scoring a 1 on the rubric. There were a few students in the final writings who had leanings towards this idea of change. Janet (White, Female, VR) said, "Anne's diary had such a powerful impact because it reminds us how her and the other 6 million murdered Jews were beautiful people who the world failed to save." Her statement sees the need for action, but does not explicitly state an action that could be taken today. Another student,

Emily (White, Female, VR) comes close to it as well when she says, “Six million Jews were murdered during the Holocaust. We remember the lives of those lost by remembering Anne Frank.” She acknowledges the atrocities that occurred, the consequences of the historical event, and demonstrates care, but is slightly short about expressing a call to action. This was also similar in the Website group. There was little to no call for action or caring to in their initial writings or their Day 4 reflections. For example, Candice (White, Female, Website group) noted the atrocities against Anne and other Jewish people in her reflection,

> During the time the Nazi persecution of Jews was getting worst. Nazi troops attacked Jewish homes and business. Jews were seen as “threat” or “dangerous” to the Germans. Hitler’s final solution was a genocide of all the Jews. Anne Frank and her family life was in danger not only because she was a Jew but because her family helped other Jews out at this time. Actions like this could have your life taken. The secret annex was where Anne Frank and the other Jews hid out. When the persecution against Jews was getting worst. Hiding was the only way to survive.

There was call to respond in the student interviews with two students saying that social media could be used as a way to show injustice in the world. Sara (White, Female, VR) described Anne’s writing and her attempts for change in this way: “I think we both had strong faiths and want to do more to make a better world around us. We have different ways of wanting to do that, but we are both teenagers who are trying I think.” Teresa (White, Female, VR) had a more action-oriented response when she said, “Send people over there and give out food. Help keep them warm.” In the post-test, the most common response was that it was a way for students to know the horrible events that took place during the Holocaust, no student stated that it would help us prevent something that horrific or to help groups that are being persecuted today.

Therefore, the development of historical empathy was demonstrated in both the VR and the Website group in *caring about* and *caring that.* However, no difference was observed in caring for. While students demonstrated a slight increase of caring to, both groups struggled to *care to* within the historical events.

Teacher's Perspectives: Benefits and Challenges of VR Integration

In order to examine teacher's perspectives of VR use, teacher interview data, classroom video recording, and field notes were analyzed. The findings demonstrated that the teacher found VR use is beneficial to increase students' engagement and help students connect the past with the present. Teachers perceived VR to be beneficial in the classroom due to heightened student engagement. Increased engagement can be demonstrated a number of ways: students' degree of attention, curiosity, or passion that is seen during the instructional period (Glossary of Educational Reform, 2016). Increased engagement for the teacher was described specifically for him as "discussion is [the] easiest way to see kids are engaged." The analysis of field observations indicated that students in his classroom during COVID-19 have been very quiet even when attempting discussion. Due to COVID-19 restrictions, some students have opted for virtual learning and group activities were discouraged, resulting in the lack of interaction in the classroom. During the post-interview, the teacher indicated that he observed more active discussion after students used Oculus Quest, which made him feel excited to see students' changed engagement. He stated, "it was great just hearing them talk afterwards about how that [life for Anne] must have been." During the unit, the VR group expressed a high level of discourse from the instructional activities to the very last reflection with expressive discussions such as "how was Anne Frank's daily isolation compared to quarantine," which was noted in the field observations.

In order to explore the number of students who were engaged in the discussion after VR/website activity, the researcher investigated who talked and who did not talk and what they talked about: 12 students out of the 14 were active in the discussion about Anne Frank in the VR group; they asked questions and shared their thoughts with other classmates. These students in the VR group began a discussion of how quarantine was similar to the experiences of Anne Frank and then transitioned to the discussion on how Anne's experience was vastly different during her isolation. The observation notes indicated that Sara (White, Female, VR) said, "Quarantine brought to us isolation, but we had outlets and a good bit of freedom. Anne lived with eight other people and constantly worried about death on the other side of that door." Jim followed this with, "Yeah, it wasn't a disease but people she knew that were now the threat too."

This type of conversation within the VR group that the teacher experienced made him believe that VR has influenced on students' classroom engagement. He told during the post-interview, "I believe the VR group was definitely more engaged than the non-VR group. I know the non-VR was first [in the morning], but they never seemed to get into it like the VR group did. More discussion and questions about Anne for sure." The Website group rarely had discussions within the classroom and had little class discourse discussing Anne and her struggles.

Another benefit of VR use in the social studies classroom from a teacher's perspective was providing students' a connection to the present or making history relevant to today. In the pre-interview, the teacher was asked, "How have you seen students' express connection to historical figures or events?" The teacher stated, "There is normally something going on in today's news, or in our recent past, that somehow relates to what we're talking about and that's when students really start to get interested. Comparing previous events/people with today." The analysis of field notes showed that the teacher found the use of VR helped students make a

connection to history. The teacher said informally, “This group [VR group] is able to compare and contrast their lives to Anne Frank- that is a great way to relate to the historical content.” Interestingly, the analysis of the video recording captured the moment where the teacher told students in the class, “Look at the connection you get with the VR-students are able to get a realistic view of history.”

During a training session with the VR prior to using them with his classes, the teacher experienced the Anne Frank tour mode himself, and frequently made statements about how realistic her annex was and how it was an exact replica to the space as he had seen in photos previously. He told, “I liked the interactivity of the students being able to walk around the annex and understand what it would be like to live in hiding as Anne Frank did for the many years she did.” This connection to the past was built upon by using the VR to help create an experience that the students felt they were a part of within the social studies classroom.

Despite the various advantages of VR, the teacher did acknowledge some challenges to using VR in the classroom. The two major challenges with VR were the financial expenses and effective professional development for teachers. Initially, the teacher was reluctant to state the value of trying for different options to purchase the VR. He said, “I’ve looked into the use of VR and AR for my class before, but the cost of devices and subscriptions have made it impractical”; however, after he observed students’ engagement, he was excited about the possibility of technology grants that might be available for a class set of VR equipment to be purchased for the school. He stated, “Cost is a major drawback to VR, so school leaders could promote grants and other opportunities to reduce that cost, outside of just saving classroom money for years on end to accumulate enough money to purchase a set.” The teacher also indicated the importance of providing professional development focusing on how to effectively use the VR as well as the

mechanical logistics of using the VR. The teacher expressed concern about teachers needing basic training on how to use the hand controllers, and then guidance on how to incorporate them within the social studies lessons. He particularly stated that providing teachers with a learning experience where they use VR as students can help them not only see the value of integrating VR but also feel comfortable using the tool. He stated, "I think participating in a lesson as a student could go a long way in reluctant teachers being more willing to participate and utilize VR. Practicing the basics-turning on and off, volume."

Students' Perspective: Benefits and Challenges of VR Integration

In order to examine students' perspectives of VR use, the following were analyzed: student interview data, classroom video recording, pre and post- survey, and field notes. The findings demonstrated that the students found VR use is beneficial in providing a fun and engaging learning environment and in students understanding the historical past better than through traditional learning. Students conveyed VR to be beneficial in the classroom by voicing how fun, easy, and engaging it was to use within the lesson. Nellie (White, Female, VR) stated in her post-survey that, "I would recommend it because it is interesting and will help us be more engaged during class." Lizzie (White, Female, VR) stated "Yes! It was very fun it was a great learning experience." Teresa (White, Female, VR) explained she would like to use VR because "it was fun and it helped you understand it in a whole different level." Malea (Hispanic, Female, VR) explained further by saying, "Yes because it was very interesting and entertaining. The only con about it is how bright the words were and my eyes began to hurt. It is still great technology and I think we should use it more often to really grab students' attention and show them how harsh and real the Holocaust was."

Out of the thirteen VR post-surveys, seven of them mentioned in some way how fun or engaging the VR was to use. This was also highlighted in the video recordings when students were using the VR. Melanie (Hispanic, Female, VR) said while she was using the Oculus Quest, "this is so fun- I hope we can do this again" and in her Day 3 reflection writing further described her experience, "My experience was smooth! What I liked about it is that it had visuals. It was easy to understand once you got the hang of it. The graphics were amazing too. It's a fun way to learn how people used to live. It helps by understanding some aspects that we have never seen, but it can also be distracting." In a follow-up interview with Maria, she clarified this by saying,

> Reading a book or even a worksheet, it would have been less fun I think. Lots of students don't like doing that type of stuff and will just [be] off on their phones or tune out depending. This really helped them want to learn more about Anne Frank because it was almost like a reward for doing so. It's funner this way. You get to see the story line and talk about it with your friends about how it looked or what she experienced. I think it was the best thing you could have done rather than read another article.

The Website group had similar results with their 2D website and described it as easy, which was rarely used to describe the Oculus Quest VR experience. Clarence (White, Male, Website group) stated, "yes, because it's simply a fun experience." Audria (White, Female, Website Group) stated, "it kept me entertained and I was able to go at my own pace." Out of the sixteen post-survey results, eleven in the Website group mentioned how the 2D website used was easy, fun, and entertaining to use. Within the day 3 writing reflections, Lee (Black, Male, Website Group) stated, "The website tour was very easy to use and I enjoyed it. It helps me learn how conditions were when she was living." Jordan (White, Male, Website Group) said, "The

tour was fun. I liked how you got to see the rooms and the spaces of the secret annex. It helped me imagine how they lived and how cramped it was."

Another benefit of VR use in the social studies classroom from the students' perspective was the level of understanding of the historical content. Students perceived VR to be beneficial in increasing understanding of the historical content. In the post-survey results for the VR group, seven out of the thirteen used the would "understand" to describe their experience with the Oculus Quest. Shelby (White, Male, VR) stated, "I would recommend it because it helps to understand what life was actually like for Anne." Joseph (Black, Male, VR) stated it in a different way by saying, "Yes because it shows you the perspective they had to go through for such a long time." Shelby (White, Male, VR) described his VR experience as, "My virtual reality experience was good. I liked getting to see how Anne lived all around me. I only disliked being so short to the ground. It helps me learn about the life of Anne Frank because you can see and understand more about what her life was like. I would recommend this and use it again." In a follow-up student interview, Sara (White, Female, VR) further explained, "Yes, I think it did help me understand her more. I feel like she really pushed to live a happy and meaningful life and I see now that it wasn't about being bored or anything but pushing in her way for quality and maybe even just seeing a day of real freedom in her case."

Within their post-survey, the Website groups' results did not specifically use the word understanding in their description of their 2D website experience; however, they did use it minimally within their day 3 writing reflections. Audria (White, Female, Website Group) stated, "The website tour helped. I liked how we were actually able to see what the annex looked like and gained information about it. The website helped to learn about Anne Frank because I am a visual learner and it helped me understand it better by being able to see what happened where

she stayed." Candice (White, Female, Website Group) described it differently with the word learn instead when she said, "I liked using the website to see what the annex looked like. Yes, this website helped me learn and see how Anne had to live and to see how difficult it was to survive in a place like that." Neither student in the follow-up interviews used the word "understand" or gave a similar description for the 2D website use within the social studies unit.

Despite the various advantages of VR, the students did acknowledge one key challenge to the VR use in the classroom: equipment use. This lack of pre-knowledge on the equipment was demonstrated throughout field observations, writing reflections, pre and post-surveys, and student interviews. In the pre-survey, 85% of the students in the VR and Website group stated they were average technology users, and while 5% said they were advanced technology users. Despite their familiarity of technology use, this did not seem to help in adjusting to the VR equipment quickly. When asked in the pre-survey, 51% had used VR before for entertainment and 49% had never used VR equipment at all. In the field observations and student interviews, a few students mentioned how they had used VR in 8th grade within their social studies class; however, the equipment was not similar to that of the Oculus Quest. Lorelai (Hispanic, Female, Website Group) used the VR after the unit explained in the student interview, "The hand controllers as feet [to be able to walk around the annex] was hard to get used to and sometimes hard to get to some of the things at times." Melanie (Hispanic, Female, VR) stated in the student interview, "You had to get used to it at first. It would have been a bit nicer if we had like rules at the beginning to help." When asked for clarification she said, "Yes, like which button to use to do this or that." In the Day 3 writing reflections, Malea (Hispanic, Female, VR) described the lighting as too bright. Joseph (Black, Male, VR) stated, "I like it but the only really bad thing was that it was very small." Clint (White, Male, VR) stated a possible solution within his

interview, “I think it would be a great adaptation to the classroom especially if at the beginning of the school year- students had just a day to practice with [the equipment] to familiarize themselves with the controls and basic functions.” Overall, there were challenges using the Oculus Quest equipment at least initially.

Chapter 5: Conclusions

This chapter provides an analysis of the results presented in the previous chapter. A brief summary of the study and its purpose along with a review of the research questions opens this chapter. After a brief summary of the methodology used, an in-depth discussion on the major findings within the study is followed. Lastly, this chapter concludes with implications for instructional leaders and potential areas for further research.

Summary of Study

Instructional leaders play a key role in helping teachers integrate technology effectively into the classroom (Hallinger, 2011). In order to assist teachers with technology integration, instructional leaders should be familiar with emerging technology and its potentials and hindrances. One tool that can support student learning and classroom engagement is virtual reality (VR) (Millican, 2017; Winn, 1993). VR provides students with immersive learning experiences where students interact with others in a virtual environment or visit a computer-generated virtual world (Alhalbi, 2016; Cummings & Bailenson, 2015). While the development of advanced VR technology allowed many scholars in the fields of medicine, architecture, and engineering to explore VR for various activities (e.g., providing a better training and mental treatment experiences), VR has not been widely studied in K-12 classrooms. This study endeavored to incorporate VR into a social studies classroom and determine the impact that VR had on the development of historical empathy, historical knowledge, and student engagement. The challenges and advantages of integrating VR into the social studies classroom has been analyzed using a quasi-experimental mixed method design that included a VR group (experimental group) and control (Website) group. The findings of this study intend to provide

instructional leaders with practical guidance on what support they can provide to teachers for VR to be used within the classroom successfully.

Research Questions

In order to examine the use of VR in a social studies classroom, the study was guided by the following research questions:

1. To what extent does the integration of VR influence students' historical knowledge development?
2. To what extent does the integration of VR influence students' classroom engagement?
3. To what extent does the integration of VR influence the development of students' historical empathy?
4. What advantages and challenges does a teacher experience while integrating VR in a social studies classroom, if any?
5. What advantages and challenges do students experience while learning with VR in a social studies classroom, if any?

These questions were explored to develop a holistic view of illustrating VR use within the social studies classroom and what benefits, if any, VR would be able to contribute to the classroom as a learning tool that instructional leaders can help support within their schools.

Methodology

This study employed the quasi-experimental mixed methods approach. A quasi-experimental study is used to evaluate the interventions that do not randomize their participants (White & Sabarwal, 2014). The study included two groups: a VR group and a Website group. Mixed methods allowed for a comprehensive exploration of the research questions by providing

a holistic picture of the participants' experiences (Schwandt, 2015). This unit lasted for 4 days where data was collected from pre-post surveys, pre-and post-tests, field observations, video recordings, student and teacher interviews, and artifacts (e.g., writing reflections). Multiple data were collected and analyzed for data triangulation to ensure validity when answering the research questions.

Discussion

This study focused on how VR could play a role within the social studies classroom, so that instructional leaders would be able to examine in what ways they can help classroom teachers incorporate this technology effectively within their instructional units. While studies such as Ke and Kim (2017) found significant leaps in student knowledge; the findings of this study did not demonstrate any statistically significant historical knowledge development when comparing students' pre and post-tests. However, the analysis of qualitative data revealed that both types of technology (VR and the Website) provided more detailed information about Anne Frank, which helped students not only better understand the historical facts about the life of Anne Frank but also remember them.

The reasons for no statistically significant differences between the pre and post-tests could be due to the study being conducted in an Honor's class instead of a Standard history class. Students in these classes already have an interest in social studies and chose a higher-level course in that subject area. Also, Anne Frank and the Holocaust was covered in students' 6th grade social studies classes, and they read her diary in their 8th grade English class; therefore, students already had background knowledge of Anne Frank.

Student engagement was another key element within the study to explore if VR has an impact on student engagement when comparing the use of a website. Studies by Dinis et. al

(2018) and Lamb, Antonenko, Etopio, and Seccia (2018) found that students express higher motivations within the learning environment and higher levels of engagement when using technology. In this study, no statistically significant differences were found in the analysis of pre and post-surveys. However, qualitative data showed that both groups demonstrated a higher level of excitement and interest when using technology in the classroom. Students used words such as "fun," "exciting," and "interesting," to describe their technology integration experience. The teacher indicated that he has not been using technology in his classroom extensively; therefore, it appeared that both groups were excited to utilize any new types of technology within the unit.

Interestingly, both teachers and students expressed that after they used VR, students were more excited to talk about their experience in class. The teacher particularly expressed that he felt that VR group's classroom engagement was higher than the website group. Interestingly, the use of VR promoted the interest of some students who were not quite interested in learning of Anne Frank previously. The Website group showed interest in using the website as well. However, using the Website was not particularly a new experience for them although the exploration of the Anne Frank website was new. The difference between the two groups can be interpreted as a novelty effect of VR. Regardless, students' attention and engagement were promoted by using VR in this study. Thus, the findings of this study suggest that integrating emerging technology such as VR is beneficial to promote students' engagement in a social studies classroom.

The post-survey showed an interesting finding where students in the VR group presented some difficulties in using VR. The data showed that there were a few students in the VR group who were struggling to figure out how to use the controller to navigate around the Secret Annex. This indicates the importance of providing adequate training before using new technology. While

today' students are digital natives (Prensky 2001), not everyone can quickly figure out how to use a new technology without guidance. Thus, providing basic training is essential for the successful integration of VR in K-12 classrooms.

Historical empathy is a central concept within the social studies curriculum that can shape how students critique and analyze documents, and how they personally connect to the experiences of people in history (Endacott & Brooks, 2013; Huijgen van Botel, van de Grift, & Holthuis, 2017; Yilmaz, 2007). Historical empathy was measured through perspective taking in the pre and post-surveys and the four elements of *Care* by using a rubric to measure the progress of their Day 1 writing reflections and Day 4 writing assignments within the VR and website group. The analysis of perspective taking presented no statistically significant difference between the pre and post-surveys. However, there was a statistically significant increase in all three areas of *Care* (*Caring About*, *Caring That*, and *Caring For)* when comparing the Day 1 writing and Day 4 writing for both the VR and the Website group. Compared to their Day 1 writing, the Day 4 writing presented students' higher level of understanding of Anne's life and personal connections to the decisions made by Anne and her family. This indicates that using technology such as VR and websites promote students' interest in learning the past and make personal connections to people in the past.

While statistically significant improvements were observed in the three areas of *Care*, no statistically significant difference was observed in the analysis *Caring To* among both groups. This could be due to the fact that technology integration can only aid in building historical empathy to a certain extent. While VR helped them be interested in the past and people in history, it did not lead them to think about specific actions that they could take now based on their understanding of history. This indicates an importance of teacher facilitation when using

technology. Without teachers' guidance, what students learn with technology is limited. The goal of the social studies classrooms has shifted from regurgitating facts to students being able to exhibit four different stances within the social studies classroom (Barton & Levitsk, 2008): identification stance, analytic stance, moral stance, and exhibition stance. In order to reach all different stances, teacher facilitation is critical in social studies classroom.

Individual perspectives were taken into consideration within this study from both the teacher's and students' perspectives of using the VR as a learning tool within the social studies classroom. Both teachers and students showed benefits of each within the classroom. The VR was new and created excitement among the students, but students in the VR group found that it did take longer to adjust the headset and learn to work the hand controllers. Xu and Ke (2016) also noted in their study that using hand controllers of VR were problematic for those who had never used them before. This may not have been a significant issue if the unit had been longer, allowing the students to have an initial set up and demonstration with the VR prior to using as a learning tool. The Website group described it as easy and fun to use to learn about Anne Frank, but they did not mention as often how they were able to "experience" Anne's life.

Implications for Instructional Leaders

The findings presented that integration of VR is beneficial to promote students' classroom engagement and historical empathy. This means that instructional leaders need to create a school environment where teachers can integrate this beneficial technology into classrooms to support student learning. To do so, instructional leaders can help teachers in three key areas: cost of equipment, professional development, and mentoring.

Cost. Instructional leaders can help by finding grants to purchase a school set of VR tools for teachers to utilize within their classroom. The cost of VR has been reduced significantly, and

instructional leaders should research the best types of VR tools appropriate for their students and how to manage them. For example, prices of the devices that are currently available vary Google Cardboard (low cost), Samsung's Gear VR (medium cost), Oculus Quest or Sony (high cost). Each type of VR has its own set of equipment, available apps, and set up requirements. Depending on the type of VR equipment purchased, VR experiences that students can experience differ. Therefore, instructional leaders should begin conversations with teachers about their individual goals for VR use in order to help them decide which VR is best, how much expense is needed, and the quantity needed for their schools. Once instructional leaders decide these three factors, then they can research how to best afford the VR equipment for their school which could range from fundraisers to technology grants.

Professional development. Professional development is a critical component that instructional leaders need to implement when pursuing VR use within their schools. Desimone et al. (2002) found that professional development that intentionally focused on direct instructional practices in their content area increased teachers actively using that practice within their classrooms. This was evident within this study as the teacher became more comfortable with the VR equipment once he had experienced the VR and experienced the Anne Frank tour for himself.

In order to assist teachers with successful integration of VR, professional development should focus on three areas: content, pedagogy, and technology (Mishra & Koehler, 2006). In the case of history, helping teachers understand the importance of historical empathy is particularly important. Social studies teaching has been about the memorization of facts but has shifted to developing critical thinking skills and historical empathy. Social studies teachers need to explore historical empathy as a key area for developing critical thinking skills. Historical empathy will

allow students to further understand the purpose of social studies in the classroom and how the historical past is connected to our present and future. Vanassche and Kelchtermans (2016) found that when exploring personal pedagogy and the purpose of an educator's teaching, it was key to have the professional development include personal reflection. Instructional leaders can emphasize reflection in the professional development where they ask teachers to reflect on their pedagogical practice (e.g., whether historical empathy is already a component of their personal teaching pedagogy).

Social studies teachers need to be provided professional development in a number of key areas for successful technology integration, such as how to use the VR (technological knowledge), best instructional practices when using the VR in the classroom (pedagogical knowledge), and historical facts (content knowledge). These are important components of TPACK as defined by Koehler and Mishra (2006). Since some teachers are not digital natives and VR is still new as a learning tool, professional development highlighting how to use the VR would lead to greater effectiveness as a learning tool (Prensky, 2001). Teachers would benefit from learning what successful technology integration looks like within the social studies classroom. Professional development explaining and highlighting the benefits of historical empathy and its purpose within the classroom would be beneficial to many social studies teachers.

A study by Si, Bai, and Hao (2017) found that the combination of technology integration and traditional learning was key to student success within the classroom. Therefore, one key area for professional development with VR is to teach how to incorporate VR effectively within a lesson that includes traditional methods of discussion and writing for maximum retention. Previous research indicated that teachers' knowledge and confident are critical factors affecting

teachers' integration of technology into classrooms (Hur, Shannon, & Wolf, 2016). Unless teachers feel comfortable using VR, they are unlikely intend to use VR. Thus, professional development should also focus on how to use devices and effective ways to management a classroom while using VR in order to help teachers feel comfortable using the device in classrooms.

Mentoring. Instructional leaders can provide mentoring when using the VR equipment in the classroom to allow teachers to have a higher degree of self-efficacy when using new technology within the classroom. Hutchinson and Woodward (2018) found that using the Technology Integration Planning Cycle Model of Professional Development allowed teachers to be more prepared for their roles in the classroom when integrating technology. This cycle provides teachers with continuous professional development that includes instructional coaches, learning communities, resources, the time and ability to reflect on their technology use, and cumulative project. Mentoring has grown in the educational field (Fletcher & Mullen, 2012). Top et. al (2021) found that technology mentoring was more effective when teachers had the opportunity to actively be involved in the decision-making process; therefore, instructional leaders could allow the teacher to decide how VR would work best within their classroom. Another element of mentoring is providing a safe space for the teacher to learn the new technology. Plair (2008) found that professional development that provided knowledge brokers or an intermediary person that serves as someone who helps learn the new technology but is viewed as neutral within the school helps with technology integration. Instructional leaders can focus on this type of mentoring when incorporating VR in the classroom. Baran (2016) found that mentoring led to more developed technical skills, academic content, and pedagogical practice.

Limitations

There were several limitations within this study. Time constraint was an issue in numerous ways. First, there was a difference in the amount class time between the Website group and the VR group. The VR group was during the school's lunchtime which made the class an extra 40 minutes longer than the Website group. Next, the Website group class period was the first class in the school day and their time was decreased from their normal 52 minutes to 45 minutes by announcements, the pledge, and other various interruptions. Lastly, in terms of time, was the length of the study. It was initially a 15-day unit with multiple opportunities to use the VR, and was limited to 4 days with one VR opportunity embedded in the instructional unit. Another limitation to the study was student absences. Student absences lead to a decrease in participation within the study. The student absences were mainly due to end of the year field trips, sickness, or personal reasons. Covid-19 played a part in restricting the study as well by not allowing group activities to be a key component of the instructional unit and it lowered the number of students in the classroom due to many students opting for remote or virtual learning. Also, the researcher was only able to be present one full day out of the four for full observations. Another limitation was the teacher divided his time as a soccer coach which led to conflict in collaboration and shorter interviews due to his schedule impacting the times he was available. Lastly, this study was conducted at the end of the school year which led to a multitude of distractions externally and internally for all student participants and the teacher.

Future Studies

There are several aspects that should be addressed if this study were to be conducted again: a longer unit, class type, and more participants. The original study was a 14-day unit with a minimum of two times that students would be allowed to use the VR equipment. Due to outside

factors, this study was limited to a 4-day unit with only one VR use. It would be recommended that an expanded unit that included collaborative activities and multiple chances to incorporate the VR would provide further data on VR in the social studies classroom. Next, the study should include all learning levels: standard, honors, and advanced placement. This study used Honors students due to a request from the teacher, and was located at a more affluent school in Alabama. These factors could have skewed the results; therefore, by broadening the study to include regular and honors students it could provide further results of VR within the social studies classroom. Another aspect was the writing reflections. The last writing reflection asked students to write in the third person, and students could benefit from having a first person prompt that allows them to connect more with the historical past. Lastly, more participants within the study would provide a wider spectrum of data. Due to Covid-19 and absences, the student numbers in each group was relatively small which limited the data gathered. By including more participants, the researcher could add to the survey data and interview more students to create a more holistic picture of VR in the social studies classroom.

Conclusion

This study aimed to examine the impact of VR use in a social studies classroom by comparing the experience of VR use and a website used in a 9th grade social studies classroom. The analysis of multiple quantitative and qualitative data reveled that the use of technology is beneficial to promote students' classroom engagement and the development of historical empathy. Students' desire to use VR is particularly high, and the teacher's experience of VR integration was positive. Based on the findings, the study suggest that instructional leaders should find ways to help teachers integrate VR in a classroom in order to facilitate students learning with emerging technology. Instructional leaders need to find ways to purchase this new

equipment and provide professional development focusing on both technical aspect of VR use and instructional use of VR use. Providing continuous mentoring is also important for the success of VR integration in K-12 classrooms.

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Appendix A

Pre and Post Test for VR and Website

1. Type your first and last name.
2. What class period are you in?
    a. 1st Period- 7:50 to 8:44 AM
    b. 4th period- 10:37 to 12:26 PM
3. Which of the following was the location of a Nazi extermination camp?
    a. Berlin
    b. Warsaw
    c. Auschwitz
    d. Dresden
4. Which of the following was addressed by the Nuremburg Trials?
    a. The Holocaust
    b. The use of nuclear bombs
    c. The firebombing of Dresden
    d. The internment of Japanese-American citizens
5. How did Kristallnacht demonstrate Nazi persecution of Jews?
    a. Nazi troops attacked Jewish homes, businesses, and synagogues
    b. A law passed that on that day required Jews to wear yellow stars
    c. That was the day the Nazis began large deportation of Jews
    d. All of the above
6. What was the goal of Hitler's "Final Solution"?
    a. It was a process to divide up his territories among his generals.
    b. It was a system for winning the war before the Americans entered.
    c. It was a way to amass more soldiers for the invasion of Russia
    d. It was a genocide of people the Nazis considered inferior
7. During the 1920s, German families
    a. Were well established in German society
    b. Rejected German culture
    c. Maintained their own dietary, dress, and language traditions
    d. Lived in small, religious rural communities
8. As a result of Hitler's rise to power…
    a. There was a violent revolution in Germany
    b. The German people gained democratic power
    c. Western governments refused to recognize Germany
    d. Nazi beliefs became state policy and law
9. Most of the perpetrators of the Holocaust
    a. Were average, normal people
    b. Did not think beyond their own actions
    c. Believed they were just doing their jobs
    d. Carried on business as usual

e. All of the above

10. The Nazis believed that Jews
    a. Should have their own country
    b. Were good Germans but not good Christians
    c. Were violent and therefore dangerous group
    d. Wanted to control the world
11. During the Holocaust, European Jews
    a. Lost their families
    b. Sometimes gave up their religious beliefs
    c. Lost their home and their possessions
    d. Could not believe what was happening to them
    e. All of the above
12. Non-Jews who helped Jews usually
    a. Knew they were risking their lives
    b. Were Christian clergy
    c. Took money for helping them
    d. Were all in powerful positions
13. The Holocaust might not have happened if
    a. Hitler had not conquered most of Europe
    b. Jews had spoken out against the Nazis
    c. So many people did not cooperate with the Nazis
    d. The United States had entered the war sooner
    e. Both A and C
14. Many Germans accepted Hitler's hatred of Jews because
    a. They were naturally anti-Jewish
    b. He was a power and convincing speaker
    c. They had experienced hard from Jews
    d. His arguments were carefully thought out and logical
15. Where is the "secret annex"?
    a. In the basement of Mrs. Frank's employer's house
    b. In the home of a kind Englishman
    c. In Anne's vacation home
    d. In attic of Mr. Frank's former business
16. What forced the Frank's and others into hiding?
    a. Open persecution of Jewish people in Germany
    b. Changes in home ordinances
    c. Conflicting laws on the legality of Jewish people owning homes
    d. The Franks had a significant loss of income
17. What reminder of the war outside keeps the residents of the "secret annex" up at night?
    a. Ambulances
    b. Soldier's screams
    c. Anti-aircraft gunfire
    d. Bombings

18. Anne described the annex as a “little piece of heaven” surrounded by what?
    a. A vacuum
    b. Heavy rain clouds
    c. Demons closing in
    d. Hot red hell
19. The “secret annex” got a new piece of technology that excited the Franks. What was it?
    a. Television
    b. Telegraph
    c. Radio
    d. Record Player
20. Why would they be excited over this new technology?
    a. It would connect them to the outside world
    b. Give them some warning if the war was taking a turn
    c. Distraction from the day to day struggles in the “annex”
    d. All of the above
21. What historical events and circumstances affected Anne Frank’s life?
22. Why were Anne and her family the targets of hatred and discrimination?
23. How did Anne find inspiration in the face of hatred?
24. Why do we remember Anne today?

Appendix B

Pre-Survey for VR and Website Group

The purpose of this survey is to gather information about your learning experience in your social studies classroom. Your responses will be kept completely confidential (private). All responses will be reported in a summary format (e.g., averages for each item) so that no individual can be identified. Please take a few minutes to complete this survey.

1. Type your first and last initial and your month (MM) and day (DD) of your birthday. If your name is Jessica Parker and your birthday is February 15, you would enter JP0214.

2. What is your Gender?
    a. Male
    b. Female
    c. Prefer not to respond

3. What is your ethnicity?
    a. Caucasian (White)
    b. African American
    c. Mexican American
    d. Chinese American
    e. Other (_____)
    f. Prefer not to respond

4. What level of education do you expect to achieve?
    a. Some High School
    b. High School Diploma
    c. Some college
    d. Four-Year College Degree
    e. Advanced College Degree (Master's or Doctorate)

5. Compared to other students in your grade, do you consider yourself:
    a. An advanced tech user -- more expert than most others
    b. An average tech user -- about the same as others
    c. A beginner -- below the skills of most others

6. I have used virtual reality for a video game.
    a. Yes
    b. No
7. I have used virtual reality for entertainment (e.g., experiencing virtual reality roller coaster).
    a. Yes
    b. No
8. I have used virtual reality for learning (school work, etc).
    a. Yes
    b. No
9. Please indicate the extent to which you agree with each of the following statements:

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
I am enthusiastic about a social studies class.					
I am interested in materials I learn in this class.					
I like using technology in my social studies class.					
I would like to use virtual reality in my social studies class.					
I am an active participant in my social studies class.					
I love learning more about history.					

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate description on the scale at the top of the page. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can.

	Does not describe well	Describes me somewhat well	Neither describes me or does not	Describes Me	Describes me very well

I sometimes find it difficult to see things from the "other guy's" point of view.					
I try to look at everybody's side of a disagreement before I make a decision.					
I sometimes try to understand my friends better by imagining how things look from their perspective.					
If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.					
I believe that there are two sides to every question and try to look at them both.					
When I'm upset at someone, I usually try to "put myself in his shoes" for a while.					
Before criticizing somebody, I try to imagine how I would feel if I were in their place.					

Appendix C

Post-Survey for VR and Website Group

The purpose of this survey is to gather information about your learning experience in your social studies classroom. Your responses will be kept completely confidential (private). All responses will be reported in a summary format (e.g., averages for each item) so that no individual can be identified. Please take a few minutes to complete this survey.

1. Type your first and last initial and your month (MM) and day (DD) of your birthday. If your name is Jessica Parker and your birthday is February 15, you would enter JP0214.

2. The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate description on the scale at the top of the page. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can.

	Does not describe me well	Describe me a little well	Describe me somewhat well	Describe me mostly well	Describe me very well
I sometimes find it difficult to see things from the "other guy's" point of view.					
I try to look at everybody's side of a disagreement before I make a decision.					
I sometimes try to understand my friends better by imagining how things look from their perspective.					
If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.					
I believe that there are two sides to every question and try to look at them both.					
When I'm upset at someone, I usually try to "put myself in his shoes" for a while.					
Before criticizing somebody, I try to imagine how I would feel if I were in their place.					

3. Please indicate the extent to which you agree with each of the following statements:

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree

Using virtual reality increases my attention towards the course.					
Virtual reality makes learning more exciting.					
I believe that if my teachers use virtual reality more often, I will enjoy social studies lessons more.					
I had motion sickness while using virtual reality.					
Virtual reality is easy to use.					
Virtual reality use makes it easier for me to remember what I learned in class					

Please indicate the extent to which you agree with each of the following statements:

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I am enthusiastic about a social studies class.					
I am interested in materials I learn in this class.					
I like using technology in my social studies class.					
I would like to use virtual reality in my social studies class.					
I am active participant in my social studies class.					
I love learning more about history.					
I am excited to come this class.					

4. How was your overall experience using virtual reality? What was good or difficult?

5. What can the teacher do differently when using virtual reality next time to help you learn better the lesson?

6. Would you recommend using virtual reality in another social studies class? Why or why not?

**Note: For the Website group, the word “virtual reality” was swapped with “website”.

Appendix D

Interview Protocol: Teacher (Before Unit)

< Backgrounds>

Before we talk about your lesson with VR, I would like to know more about you. You are currently teaching 9th grade Social Studies classes. Right?

1. How long have you been teaching? Has it always been here?
2. What motivated you to become a social studies teacher?
3. Can you describe a typical lesson in your classroom?
4. What aspects of teaching social studies do you like? What aspects of teaching social studies are challenging for you?
5. How would you describe your 2nd period class? How would you describe your 3rd period? Any key similarities or differences?

< Technology Integration Experiences>

Now, I would like to hear more about your technology integration experience.

6. How much experience do you have with using technology in the classroom? In what ways do you use technology- if at all?
7. How has the use of technology impacted you as a teacher?
8. What kinds of challenges have you encountered with using technology in the classroom if any?
9. How have your students responded to the use of technology in your classroom before?

< VR Integration>

Again, I sincerely appreciate your willingness to use VR in your classrooms.

10. Tell me about what you know about VR. Have you ever used VR before?
11. Are there any particular reasons you want to use VR in your social studies classroom? What kinds of impact do you want to observe?
12. What do you predict might be some potential challenges with using VR in the classroom?

<Historical Empathy>

Finally, I would like to have a quick conversation about promoting students' historical empathy.

1. As a social studies teacher, how do you help students connect to historical time periods or people from history before?

13. Describe ways you have seen that students are engaged in the classroom.

14. How have you seen students' express connection to historical figures or events?

15. Do you find it easy to get students to connect with the historical problems and people of the past?

Appendix E

Post Teacher Interview Protocol

Overall experience

1. Once again, thank you so much for helping me conduct this study in your classroom. How was your overall experience using VR in your classrooms?
2. What aspects of the lesson did you like the most?
3. Were there any parts in your lesson that you would want to change next time? Why do you want to change them?
4. Did you encounter any issues while teaching the lessons? If so, what were they?

Class Comparison

5. We had two groups, one was a VR group and one was a website group. Did you notice any differences between the two groups when teaching the lessons? If so, what were the differences?
6. Do you think you could even compare the VR group with those students who you previously taught without any technology integration?

Perceptions of VR integration in Social Studies Classroom

7. How do you see using technology to teach the lesson about Anne Frank? Do you think using technology is beneficial to teach this lesson?
8. I've noted some enthusiasm among students when they were introduced a VR. What are some ways you saw the students engage in the historical concepts during this unit?
9. In what ways do you think VR enhance students' learning of social studies?
10. As you know, not everyone likes using technology. Do you feel that there are also disadvantages of using technology in social studies classroom? If so, what are they?
11. If you have another opportunity to use VR in your classroom, would you want to VR again? Why or why not?

Teacher Professional Development

12. I now quickly want to hear your ideas on teacher professional development. Do you think that teachers would be interested in integrating VR in their classroom? Why or why not?
13. In order for teachers to successfully use VR in their classrooms, what do you think they need to learn?
14. Do you think that there might be something that school leaders can do to promote the use of VR in classrooms?

Appendix F

Interview Protocols: Student Interview (Post Unit)

<Introduction>

Thank you so much for meeting me today. I really appreciate your time and willingness to talk with me. Just want to emphasize that there are no right or wrong answers. What I am trying to do is to explore students' overall experiences in a social studies class so that I can design a better class for students. So, feel free to share whatever comes to your mind. If you do not want to answer any of the questions, that will be totally fine with me. Do you have any questions before we start?

< General school experiences and social studies learning>

1. Before we talk about the virtual reality activity, I would like to know your classes in general. What is your favorite subject and why do you like it?
2. Awesome. What about the history class? Do you like it? Why or why not?
3. Tell me about one of your favorite history classes.
4. I am glad to hear that you like your history classes. However, unfortunately, history is the least favorite class for many students. Can you guess why students do not like a history class?
5. What do you think teachers can do to make history classes more fun for students?

< Historical knowledge and historical empathy>

6. Now, let's talk a little more about the Anne Frank unit. I was told that you actually learned about Anne Frank when you were 6th graders. Are there anything that you did not know before but learned in this unit?
7. How can you compare the time when Anne was living and now? How are they similar or different?
8. Now, let's compare your life and Anne's life. How are they similar or different?

<Virtual Reality and Engagement>

9. Thank you for your great answers. Now let's talk about your virtual reality experience. Have you ever used VR before you used Oculus Quest last week?
10. How was your overall experience visiting Secrete Annex using Oculus Quest?
11. We could have learned Secret Annex by just reading a book or visiting a website. Do you think that your experience would have been the same if we had used a book or website instead?
12. Do you feel like the use of Oculus Quest helps you understand the life of Anne Frank? If so, in what ways?
13. Did you have any difficulties when using Oculus Quest?
14. Were there anything that you wish that your teacher did differently when you used Oculus Quest last week?

<Virtual Reality in Social Studies Class>

15. Do you want to use virtual reality more often in your social studies class? Why or why not?
16. I am not sure whether any app exists. However, using Oculus Quest, is there any place you want to visit or a person to meet?

Once again, thank you so much for your time today!

Appendix G

Reflection Questions

1. Day 1: What would it be like to live in the "secret annex"? If you were Anne, how might you feel? While living in the "secret annex," Anne wrote a diary. Why do you think that Anne did that if you were Anne, would you do the same activity? Why or why not?
2. Day 2 and 3: How was your virtual reality/website experience? What do you like or dislike visiting the secret annex using the Oculus Quest or website? In what ways does the use of virtual reality help or not help you learn about the life of Anne Frank?
3. Day 4: Writing Assignment- You are invited to a 6th grade students' classroom to share the information about Anne Frank and the secret annex. The students have not learned about Anne Frank and her diary yet. How do you want to introduce Anne Frank? How would you describe the secret annex? Describe specific items that you want to talk about in the classroom. Such as historical background, life of Anne Frank, secret annex.

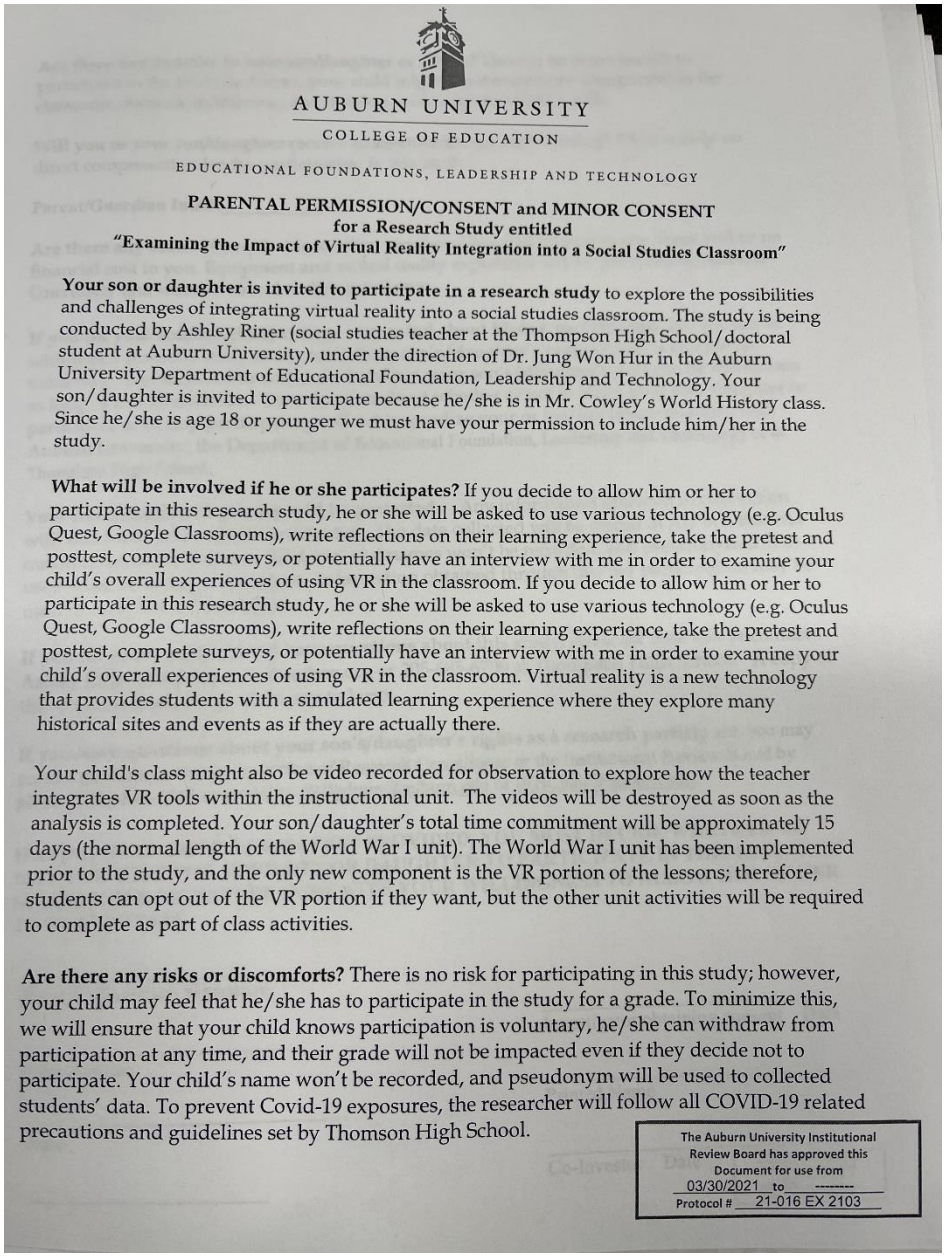
Appendix H

Historical Empathy: Care Rubric

	1	2	3	4
Caring About	Student expresses no interest in the past	Student expresses little interest in the past	Student some interest in the past	Student expresses a large amount of interest in the past
Caring That	Student has no reaction to the consequences of an historical event	Student reaction a little to the consequences of an historical event	Student react some to the consequences of an historical event	Student react much to the consequences of an historical event
Caring For	Student does not desire to help the people in the past because he or she feels badly about what happening to them	Student has little desire to help the people in the past because he or she feels badly about what happening to them	Student has some desire to help the people in the past because he or she feels badly about what happening to them	Student has a large desire to help the people in the past because he or she feels badly about what happening to them
Caring To	Student expresses no call to respond to the present based on one's reactions to past events	Student expresses a small call to respond to the present based on one's reactions to past events	Student expresses some call to respond to the present based on one's reactions to past events	Student expresses a large call to respond to the present based on one's reactions to past events

Appendix I

Parent and Student Letter of Consent



AUBURN UNIVERSITY

COLLEGE OF EDUCATION

EDUCATIONAL FOUNDATIONS, LEADERSHIP AND TECHNOLOGY

PARENTAL PERMISSION/CONSENT and MINOR CONSENT
for a Research Study entitled
"Examining the Impact of Virtual Reality Integration into a Social Studies Classroom"

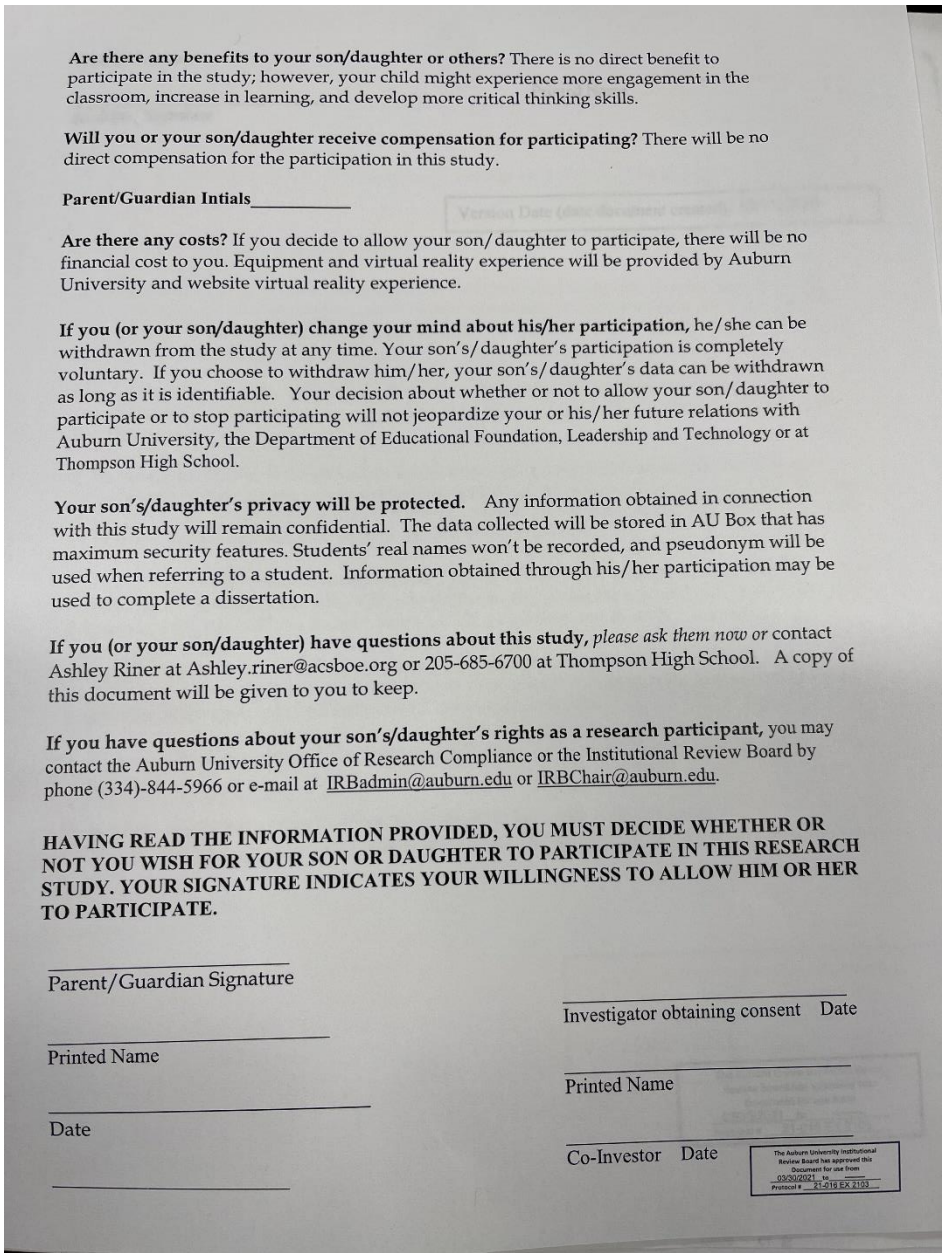
Your son or daughter is invited to participate in a research study to explore the possibilities and challenges of integrating virtual reality into a social studies classroom. The study is being conducted by Ashley Riner (social studies teacher at the Thompson High School/doctoral student at Auburn University), under the direction of Dr. Jung Won Hur in the Auburn University Department of Educational Foundation, Leadership and Technology. Your son/daughter is invited to participate because he/she is in Mr. Cowley's World History class. Since he/she is age 18 or younger we must have your permission to include him/her in the study.

What will be involved if he or she participates? If you decide to allow him or her to participate in this research study, he or she will be asked to use various technology (e.g. Oculus Quest, Google Classrooms), write reflections on their learning experience, take the pretest and posttest, complete surveys, or potentially have an interview with me in order to examine your child's overall experiences of using VR in the classroom. If you decide to allow him or her to participate in this research study, he or she will be asked to use various technology (e.g. Oculus Quest, Google Classrooms), write reflections on their learning experience, take the pretest and posttest, complete surveys, or potentially have an interview with me in order to examine your child's overall experiences of using VR in the classroom. Virtual reality is a new technology that provides students with a simulated learning experience where they explore many historical sites and events as if they are actually there.

Your child's class might also be video recorded for observation to explore how the teacher integrates VR tools within the instructional unit. The videos will be destroyed as soon as the analysis is completed. Your son/daughter's total time commitment will be approximately 15 days (the normal length of the World War I unit). The World War I unit has been implemented prior to the study, and the only new component is the VR portion of the lessons; therefore, students can opt out of the VR portion if they want, but the other unit activities will be required to complete as part of class activities.

Are there any risks or discomforts? There is no risk for participating in this study; however, your child may feel that he/she has to participate in the study for a grade. To minimize this, we will ensure that your child knows participation is voluntary, he/she can withdraw from participation at any time, and their grade will not be impacted even if they decide not to participate. Your child's name won't be recorded, and pseudonym will be used to collected students' data. To prevent Covid-19 exposures, the researcher will follow all COVID-19 related precautions and guidelines set by Thomson High School.

The Auburn University Institutional Review Board has approved this Document for use from 03/30/2021 to ---------- Protocol # 21-016 EX 2103



Are there any benefits to your son/daughter or others? There is no direct benefit to participate in the study; however, your child might experience more engagement in the classroom, increase in learning, and develop more critical thinking skills.

Will you or your son/daughter receive compensation for participating? There will be no direct compensation for the participation in this study.

Parent/Guardian Intials_____

Are there any costs? If you decide to allow your son/daughter to participate, there will be no financial cost to you. Equipment and virtual reality experience will be provided by Auburn University and website virtual reality experience.

If you (or your son/daughter) change your mind about his/her participation, he/she can be withdrawn from the study at any time. Your son's/daughter's participation is completely voluntary. If you choose to withdraw him/her, your son's/daughter's data can be withdrawn as long as it is identifiable. Your decision about whether or not to allow your son/daughter to participate or to stop participating will not jeopardize your or his/her future relations with Auburn University, the Department of Educational Foundation, Leadership and Technology or at Thompson High School.

Your son's/daughter's privacy will be protected. Any information obtained in connection with this study will remain confidential. The data collected will be stored in AU Box that has maximum security features. Students' real names won't be recorded, and pseudonym will be used when referring to a student. Information obtained through his/her participation may be used to complete a dissertation.

If you (or your son/daughter) have questions about this study, *please ask them now or* contact Ashley Riner at Ashley.riner@acsboe.org or 205-685-6700 at Thompson High School. A copy of this document will be given to you to keep.

If you have questions about your son's/daughter's rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH FOR YOUR SON OR DAUGHTER TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO ALLOW HIM OR HER TO PARTICIPATE.

_____
Parent/Guardian Signature

_____
Printed Name

_____
Date

_____
Investigator obtaining consent Date

_____
Printed Name

_____
Co-Investor Date

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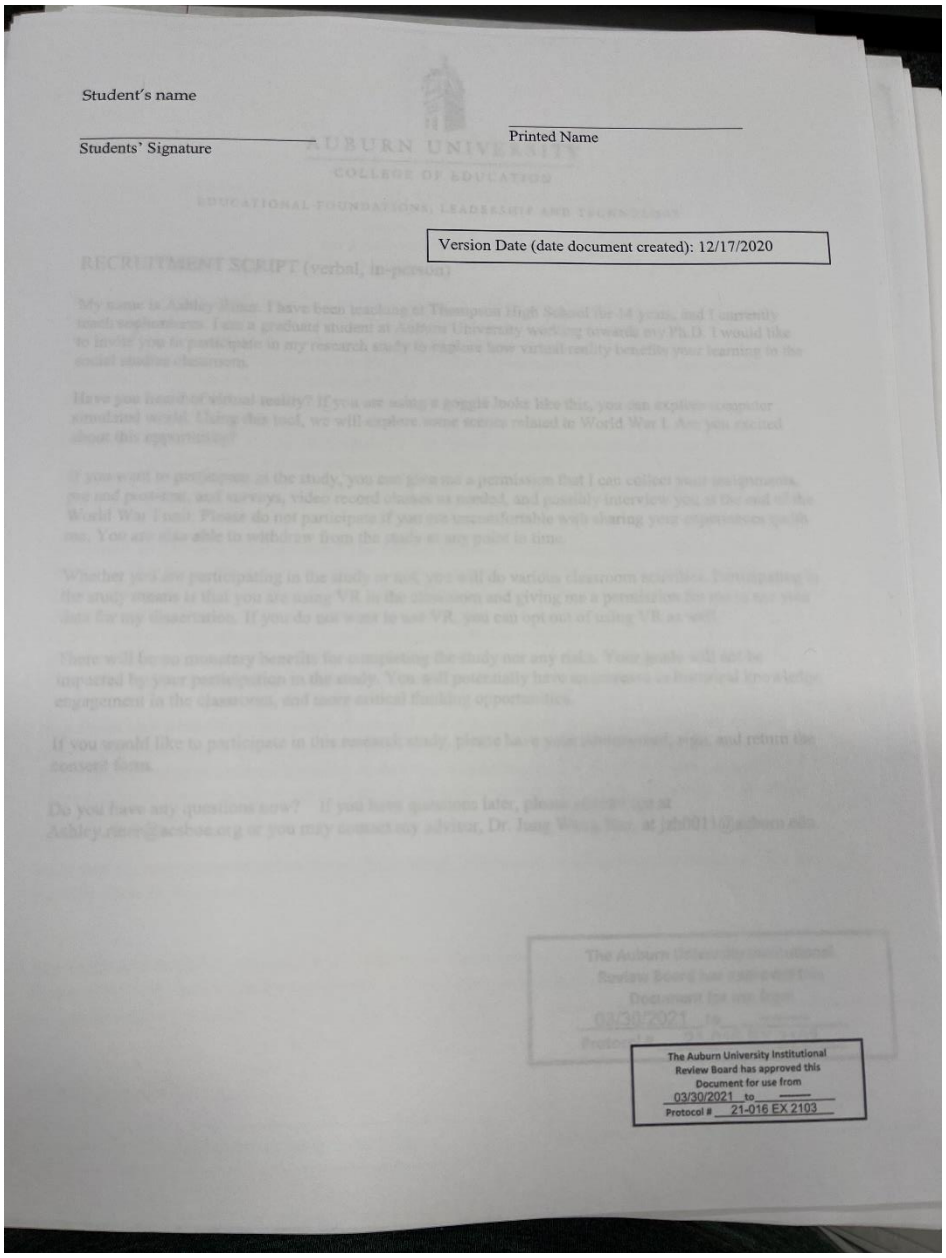

Student's name

Students' Signature

Printed Name

AUBURN UNIVERSITY
COLLEGE OF EDUCATION
EDUCATIONAL FOUNDATIONS, LEADERSHIP AND TECHNOLOGY

Version Date (date document created): 12/17/2020

RECRUITMENT SCRIPT (verbal, in-person)

My name is Ashley Rose. I have been teaching at Thompson High School for 14 years, and I currently teach sophomores. I am a graduate student at Auburn University working towards my Ph.D. I would like to invite you to participate in my research study to explore how virtual reality benefits your learning in the social studies classroom.

Have you heard of virtual reality? If you see using a goggle looks like this, you can explore computer simulated world. Using this tool, we will explore some scenes related to World War I. Are you excited about this opportunity?

If you want to participate in the study, you are give me a permission that I can collect your assignments, pre and post-test, and surveys, video record classes as needed, and possibly interview you at the end of the World War I unit. Please do not participate if you are uncomfortable with sharing your experiences with me. You are able to withdraw from the study at any point in time.

Whether you are participating in the study or not, you will do various classroom activities. Participating in the study means is that you are using VR in the classroom and giving me a permission for me to use your data for my dissertation. If you do not want to use VR, you can opt out of using VR as well.

There will be no monetary benefits for completing the study nor any risks. Your grade will not be impacted by your participation in the study. You will potentially have an increase in historical knowledge, engagement in the classroom, and more critical thinking opportunities.

If you would like to participate in this research study, please have your parent/guardian sign and return the consent form.

Do you have any questions now? If you have questions later, please email me at Ashley.rose@acsbos.org or you may contact my advisor, Dr. Jung Won Hur at jzh0011@auburn.edu.

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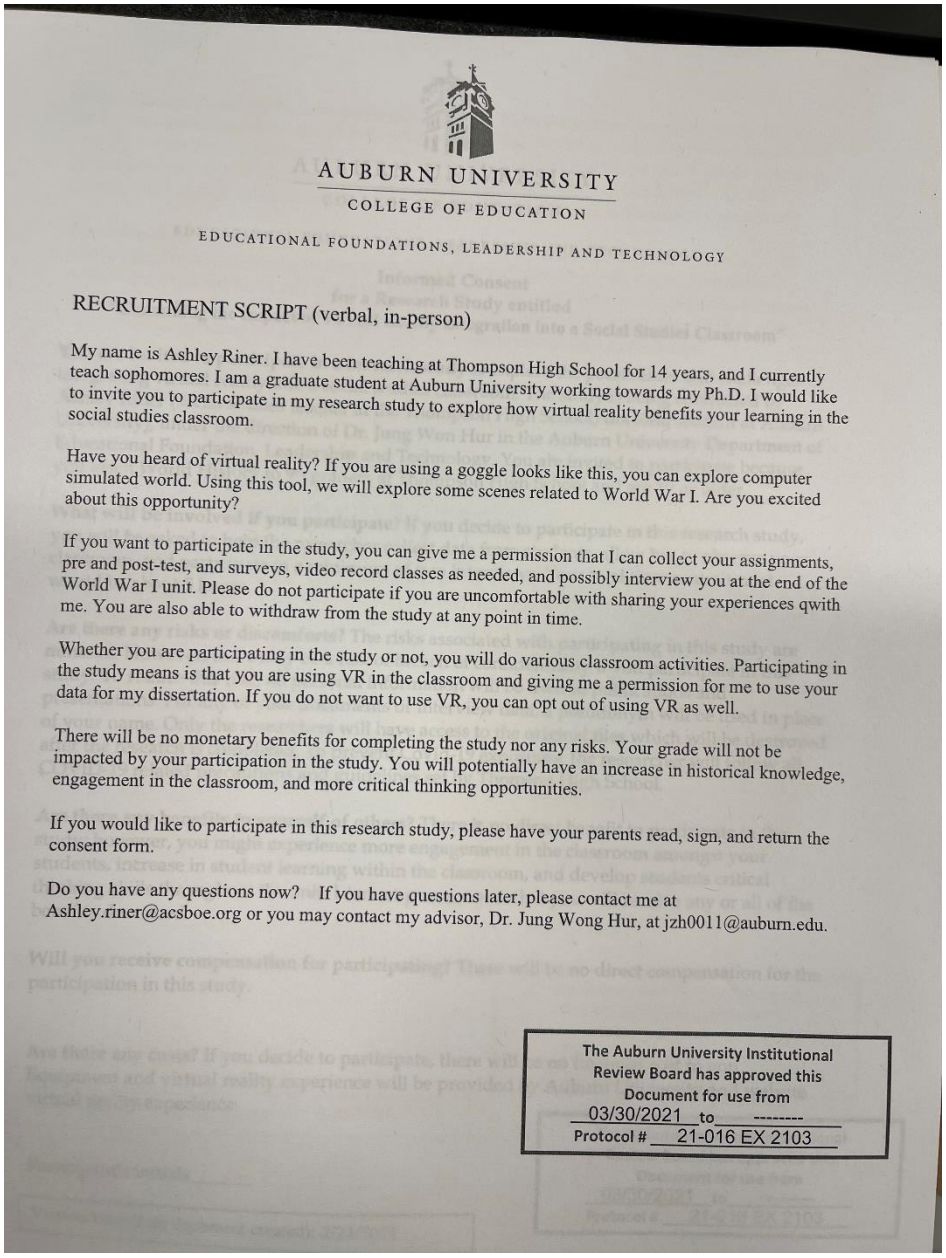
Protocol # 21-016 EX 2103

Appendix J

Recruitment Letter



AUBURN UNIVERSITY

COLLEGE OF EDUCATION

EDUCATIONAL FOUNDATIONS, LEADERSHIP AND TECHNOLOGY

RECRUITMENT SCRIPT (verbal, in-person)

My name is Ashley Riner. I have been teaching at Thompson High School for 14 years, and I currently teach sophomores. I am a graduate student at Auburn University working towards my Ph.D. I would like to invite you to participate in my research study to explore how virtual reality benefits your learning in the social studies classroom.

Have you heard of virtual reality? If you are using a goggle looks like this, you can explore computer simulated world. Using this tool, we will explore some scenes related to World War I. Are you excited about this opportunity?

If you want to participate in the study, you can give me a permission that I can collect your assignments, pre and post-test, and surveys, video record classes as needed, and possibly interview you at the end of the World War I unit. Please do not participate if you are uncomfortable with sharing your experiences qwith me. You are also able to withdraw from the study at any point in time.

Whether you are participating in the study or not, you will do various classroom activities. Participating in the study means is that you are using VR in the classroom and giving me a permission for me to use your data for my dissertation. If you do not want to use VR, you can opt out of using VR as well.

There will be no monetary benefits for completing the study nor any risks. Your grade will not be impacted by your participation in the study. You will potentially have an increase in historical knowledge, engagement in the classroom, and more critical thinking opportunities.

If you would like to participate in this research study, please have your parents read, sign, and return the consent form.

Do you have any questions now? If you have questions later, please contact me at Ashley.riner@acsboe.org or you may contact my advisor, Dr. Jung Wong Hur, at jzh0011@auburn.edu.

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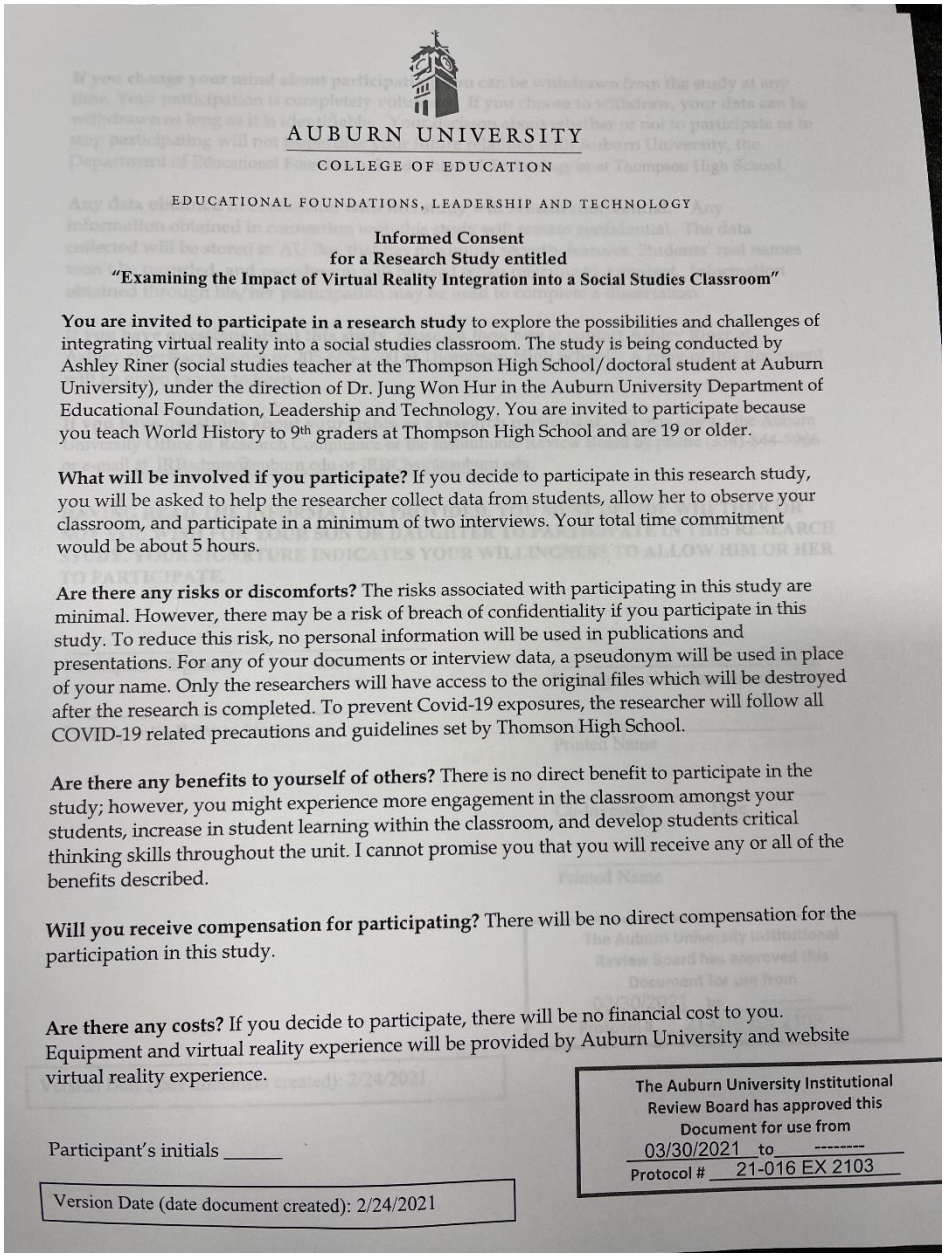
Appendix K

Teacher Consent Letter



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Informed Consent
for a Research Study entitled
"Examining the Impact of Virtual Reality Integration into a Social Studies Classroom"

You are invited to participate in a research study to explore the possibilities and challenges of integrating virtual reality into a social studies classroom. The study is being conducted by Ashley Riner (social studies teacher at the Thompson High School/doctoral student at Auburn University), under the direction of Dr. Jung Won Hur in the Auburn University Department of Educational Foundation, Leadership and Technology. You are invited to participate because you teach World History to 9th graders at Thompson High School and are 19 or older.

What will be involved if you participate? If you decide to participate in this research study, you will be asked to help the researcher collect data from students, allow her to observe your classroom, and participate in a minimum of two interviews. Your total time commitment would be about 5 hours.

Are there any risks or discomforts? The risks associated with participating in this study are minimal. However, there may be a risk of breach of confidentiality if you participate in this study. To reduce this risk, no personal information will be used in publications and presentations. For any of your documents or interview data, a pseudonym will be used in place of your name. Only the researchers will have access to the original files which will be destroyed after the research is completed. To prevent Covid-19 exposures, the researcher will follow all COVID-19 related precautions and guidelines set by Thomson High School.

Are there any benefits to yourself of others? There is no direct benefit to participate in the study; however, you might experience more engagement in the classroom amongst your students, increase in student learning within the classroom, and develop students critical thinking skills throughout the unit. I cannot promise you that you will receive any or all of the benefits described.

Will you receive compensation for participating? There will be no direct compensation for the participation in this study.

Are there any costs? If you decide to participate, there will be no financial cost to you. Equipment and virtual reality experience will be provided by Auburn University and website virtual reality experience.

Participant's initials _____

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If you change your mind about participating, you can be withdrawn from the study at any time. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, the Department of Educational Foundation, Leadership and Technology or at Thompson High School.

Any data obtained in connection with this study will remain confidential. Any information obtained in connection with this study will remain confidential. The data collected will be stored in AU Box that has maximum security features. Students' real names won't be recorded, and pseudonym will be used when referring to a student. Information obtained through his/her participation may be used to complete a dissertation.

If you have questions about this study, *please ask them now or* contact Ashley Riner at Ashley.riner@acsboe.org or 205-685-6700 at Thompson High School. A copy of this document will be given to you to keep.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional Review Board by phone (334)-844-5966 or e-mail at IRBadmin@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH FOR YOUR SON OR DAUGHTER TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO ALLOW HIM OR HER TO PARTICIPATE.

Participant's Signature Date

Participant's Printed Name

Investigator obtaining consent Date

Printed Name

Co-Investor Date

Printed Name

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