UNDERSTANDING STUDENT ENGAGEMENT AND EXPERIENCES DURING THE CONSTRUCTION OF INTERACTIVE FICTION IN A MIDDLE SCHOOL HISTORY COURSE

By

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To Abba for showing me the value of education
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<td>Computer game</td>
<td>A subset of the game form of play activity that involves certain time and space limitations, elements of challenge, competition, and defined victory conditions. Computer games are games that are implemented through the construct of a computer program and are playable on an electronic device. Computer game programs perform the following three tasks: coordinate the game process, illustrate the game situation, and participate as a player (Smed &amp; Hakonen, 2003).</td>
</tr>
<tr>
<td>Constructionism</td>
<td>A practice in which learners build knowledge structures regardless of the circumstance of learning. This happens in the context where the learner builds an outward or physical artifact representing the object of study (Papert &amp; Harel, 1991).</td>
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<tr>
<td>Engagement</td>
<td>A multidimensional construct that encompasses behavior, emotion, and cognition. Engagement is linked to positive outcomes in academic settings such as achievement and persistence in school, and it is related to the time and effort learners devote to activities across these three dimensions (Fredricks et al., 2011; Kahu, 2013).</td>
</tr>
<tr>
<td>Interactive Fiction</td>
<td>A computer program that simulates a bounded world environment through textual descriptions with little or no graphic enhancements. The player interacts within this environment by using text-based commands, and the Interactive Fiction program interprets the text by parsing the input for meaning (Montfort, 2005).</td>
</tr>
<tr>
<td>Narrative</td>
<td>A series of informally connected events or occurrences that are revealed over time (Lamarque, 2004). Narrative in the context of computer games is also referred to as storyline and can promote greater interest in use of computer games (Malone &amp; Lepper, 1987; Prensky, 2001).</td>
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<td>Phenomenology</td>
<td>The study to understand people’s perceptions of a particular situation or event. This involves the description of phenomena as experienced without overlaying theories or interpretations regarding objective reality (Moustakas, 1994).</td>
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Understanding Student Engagement and Experiences During the Construction of Interactive Fiction in a Middle School History Course

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The increased sophistication of computer games and the greater access of computing devices has created more opportunity to leverage the engagement potential of these games in improving student experiences and outcomes. At the same time, the constructionist approach where learners create their own games to understand content could be more effective than simply playing games in the classroom. With free or inexpensive technology and authoring tools currently available to students, game construction does not require significant financial resources for participation and development. One particular form of computer game, Interactive Fiction (IF), may be well suited for integration into classroom environments as both less costly and less complex to develop. This phenomenological study focused on a constructionist perspective of IF game artifact creation as potentially fostering a greater level of learner engagement in middle school.

The study provided a view into the lived experiences of 8th grade students in a Central Florida private school that constructed IF games to learn about Middle East history. Two research questions framed the scope of the study. The first question focused on student experiences, behaviors, and perceptions during the assignment and the essential themes that
emerged during data analysis included collaboration, challenges of work, design process, assumptions and preconceptions, and characteristics of assignment emerging from observations, field notes, and student interviews. How the student experiences building IF games influenced their engagement was the topic of the second research question, and the themes that emerged were enjoyment of assignment, effort and result, looking ahead, and predispositions regarding regular assignment.

Analysis of these themes demonstrates how students reacted to the assignment, interacted with each other in navigating the unfamiliar landscape of computer game development as a tool for mastering history content, and considered the possibility of participating in similar assignments in the future. In general, the students described themselves as having been more engaged during the assignment, and observations by the researcher were consistent with the identified interview themes. This dissertation addresses the feasibility of utilizing IF as a tool that may yet realize some of the beneficial promise of computer games in the classroom environment.
CHAPTER 1
INTRODUCTION TO THE STUDY

The Growing Popularity of Gaming

There is great enthusiasm for the integration of computer games in the classroom environment to improve student motivation and increase student engagement (Annetta et al., 2009; Liu & Chu, 2010; Ritzhaupt et al., 2014). Computer games have demonstrated the ability to improve long-term player engagement, and this characteristic has attracted the interest of educators in the possibilities of utilizing computer games to enhance learning (Begg et al., 2005; Kebritchi et al., 2010). Over the past 40 years (spanning the era of computer games since the introduction of the personal computer) there have been multiple literature reviews examining the topic of computer games in education, and these studies are consistent in their findings that both commercial (or off-the-shelf for casual play) as well as serious (developed specifically for training, simulation, or education) games are effective in promoting learning through various disciplines (Annetta, 2008; Charsky, 2010; Van Eck, 2006a).

While there has been research demonstrating that the use of computer games can result in knowledge gains in an educational context (Halverson, 2005; Rosas et al., 2003; Nemerow, 1996; Wong et al., 2007), the current enthusiasm lies in the realization that computer games may have more significant impact in education. For example, a meta-analysis of 65 independent studies showed that computer games resulted in the achievement of higher declarative knowledge, higher procedural knowledge, and greater retention in comparison to a control group (Sitzmann, 2011). This goes beyond memorization and information acquisition types of activities or exercises, and it speaks to the increase of interest in the use of computer games in a much broader teaching and learning context.
A significant part of this interest is related to the manner in which computer games affect the learning process. Good games allow students to explore a wide range of knowledge areas by motivating them to understand rather than memorize content, and to transfer acquired skills and knowledge into contexts beyond the classroom setting (Oblinger, 2006). Even more broadly, entire educational environments can be built using game frameworks, or gamified, to improve learning outcomes by promoting elements of challenge, collaboration, and engagement (Gros, 2007). There is evidence that elements of play (competition, puzzle solving, appropriate levels of challenge, etc.) may be combined with the elements of interactive entertainment to create an open and fertile environment for ongoing learner engagement (Papastergiou, 2009a; Rieber, 1996; Sitzmann, 2011; Suh et al., 2010; Vogel et al., 2006; Wong et al., 2007). The idea that computer games may have a significant role to play in education is grounded in the concept that they may be good tools to address particular needs around student engagement and motivation.

The Need for Computer Gaming in Education

Over the past decade, there has been concern that the learning needs of growing numbers of students have not been met by the traditional paradigm and methods of lecture, drill, and assessment as practiced within the education environment (Beck & Wade, 2013; Klopfer, 2008). Modern active learning techniques that leverage technology such as game-based learning, for example, have been identified as ways to encourage meaningful learning experiences and engagement (Lombardi, 2007). It is reasonable, then, to consider methods for implementing active learning strategies to better motivate and engage students.

There is evidence that computer games could be effective tools for promoting engagement in the classroom. Computer games demonstrate an intrinsic motivational factor that builds upon natural student curiosity while affording students control of their learning path (Burguillo, 2010; Kumar, 2000). A study on the effects of giving students control over parts of
their learning activity found that the afforded student control led to increased motivation and improved learning outcomes (Cordova & Lepper, 1996). In another study, video game play was found to encourage intrinsic motivation for learner development in much the same way as traditional organized activities such as arts, hobbies, and sports (Adachi & Willoughby, 2012). In fact, it is the motivational characteristic of computer games that can be considered to be a key advantage over other potential educational engagement methodologies (Kickmeier-Rust & Albert, 2010).

Computer games present immersive experiences in which learners (as players) develop abilities to solve complex problems in a variety of situations (Gros, 2007; Oblinger, 2006; Squire, 2005a). Further, faculty themselves attribute value to the use of computer games. In a study of opinions regarding the potential as well as the limits of computer games (McFarlane et al., 2002), faculty involved in secondary education reported very positive views of adventure games in particular (as a subset of the simulation computer game genre).

**Issues with Implementing Games in the Classroom**

Despite the potential upside to the use of computer games in teaching and learning, there are number of weaknesses and limitations that must be considered (Papastergiou, 2009a). First, the computer hardware available to students, whether in the classroom/lab environment or at the students’ homes should be anticipated as a potential limiting factor for the type of games that can be played. This criterion will necessitate the use of computer games at least a generation removed from the current state-of-the-art. From a pedagogical standpoint, the game should not be difficult to learn, and it should not take more than about two hours to complete in order to match the pacing of the course assignments and coverage of the associated learning objectives. Finally, the effort required for development of any game content should be such that a single
person (instructor or instructional designer, for example) will be able to complete development within restricted time constraints.

Researchers have attempted to identify the obstacles to the adoption of computer games in education, and the work of Justice and Ritzhaupt (2015) is relevant to this discussion. They have divided the obstacles to adoption into these categories:

- **Technology Issues:** These issues deal with challenges inherent to technology acquisition and utilization such as prohibitive cost, lack of disabled student accessibility, and the difficulty or inability to pilot or preview particular game content.

- **Issues Specific to Games and Simulations:** There are several concerns that apply to the use of computer games in general, such as the lack of balance between education and entertainment characteristics, the inability to customize games for particular classroom use or relevancy to desired learning objectives, difficulty in determining student progress, and the dearth of games that challenge students sufficiently to maintain their interest.

- **Issues with Games and Simulation in Education:** In this category, considerations such as the comfort level of teachers making use of games, the efficacy of games driving positive learning outcomes, and the perception that using games is more about play than about learning were raised. Even community support for teachers using games could have an effect on the perceived barrier.

- **Teacher Issues:** There are a number of barriers encountered by teachers to the use of computer games including the lack of time to adequately implement games in the learning environment, difficulties in finding games that meet the content criteria and requirements to meet learning objectives, lack of meaningful game lesson plans, and even characteristics of the teacher such as lack of technology skills or “buy in” to the concept that games have value in education.

- **Student Issues:** It is important to be aware of the level of technical abilities students bring to the learning environment as well as their level of motivation or interest in computer games in general. This could be especially problematic if students have had previous bad experiences with the use of computer games as part of instruction.

- **Incorporation Issues:** This category of barriers is specific to the difficulties in the implementation and integration of technology into the classroom environment, such as the complexity of the computer game (making it difficult if not impossible to play adequately during class periods) or having too many students in the class to be able to provide support should there be any technical failures.

These weaknesses and limitations are difficult to address due largely to the fact that the modern (off-the-shelf) computer game software so highly prized by students for entertainment
value and praised by educators for engagement potential is extremely time consuming, resource intensive, and cost prohibitive to develop (Moreno-Ger et al., 2008; Folmer, 2007; Blow; 2004) while the expertise and resources available to educators for the development of custom resources is almost always lacking. The amount of time available for the development and modification of gaming scenarios that can be used in the classroom as well as the availability of computing resources greatly influence the manner in which computer games can be utilized as a component of education (Whitton & Hollins, 2008).

While studies have made use of commercially available software as well as software developed by design for specific learning environments or applications (Annetta, 2008; Thiagarajan, 1998), there is little empirical research on the subject of instructor or student created computer games for classroom use. This is not completely unexplored, but the work in this area is spread over a wide variety of academic disciplines including geography (Brysch et al., 2012), mathematics (Kebritchi, 2010), music (Partti & Karlsen, 2010), social studies (Berson, 1996), with few linkages between them (Gros, 2007).

Further, although there are indications that computer games may have positive impact on learning outcomes among students, integration of game content within assignments and exercises is problematic due to the lack of "off-the-shelf" games that align well with existing (and evolving) curricular standards. Even while some educators and content publishers/providers have developed more enthusiasm as computer games became more robust, complex, and multi-sensory realistic (Egenfeldt-Nielsen, 2007; Kebritchi, 2010; Proctor & Marks, 2013; Van Eck, 2006b), there remains doubt in the value of computer games as a consistent supplement to more "traditional" course materials because of the lack of customization to particular course activities and learning outcomes.
Interactive Fiction as a Possible Solution

Fortunately, there are other game genre options that are fit-for-purpose, customizable, and relatively inexpensive to develop and produce, addressing the barriers identified by Justice and Ritzhaupt (2015). Of the genres of computer games produced and available to wide audiences, Interactive Fiction has been available since the mid-1970s. It first gained popularity through the Colossal Cave Adventure game developed by programmer Will Crowther in 1975 (Jerz, 2007). Interactive Fiction (IF) is a type of game that primarily (and often totally) relies on text-based input and display in terms of interaction with the game player, and because of the textual nature of gameplay, IF games are sometimes considered to be analogous with textbooks that branch into different paths at each point of interaction with the player (Montfort, 2007). The player types commands or instructions into a text parser, which the game program interprets and executes to effect change in the state of the game. Players are able to perform sophisticated interactions with the game environment including movement through various locations, manipulation of physical objects such as opening and closing doors or containers; taking, carrying, or dropping smaller objects (and using those objects based on their attributes and capabilities such as firing a gun or using a telephone); or even interacting with non-player (computer driven) characters in the game. While the implementation style of IF games often are manifested as simulations of real-world environments, the text-based format of IF allows for a reasonable classification of the game genre as “literary simulation”; that is, simulation that operates within the constraints of narrative conventions.

An important characteristic of the IF genre of computer games for instructional designers and practitioners is the fact that IF can be custom developed to meet specific course objectives, and individual developers (such as instructors or instructional designers) may obtain many of the development tools free-of-charge. With the minimal hardware requirements, freely-available
software tools, and ability to be developed by individual designers (Nelson, 2006), the feasibility of designing and implementing IF games in the classroom is much greater compared to commercial-off-the-shelf or serious computer games.

**Promising Directions Forward**

In addition to having a high level of interactivity and capacity for player engagement, computer games exhibit many attributes that are characteristic of sophisticated pedagogical techniques (Mayo, 2009). Interactive Fiction in particular allows players to participate in non-linear narratives by combining education and entertainment (Shelton, 2005), and the text-based format is well-suited to the modern smart device as a delivery mechanism; indeed, the penetration of smart devices into the consumer market is creating a broad field ideally suited for IF content (Alexander, 2012). Popular IF interpreters such as Frotz and Twisty have already been ported to the Android and iOS environments, allowing the easy distribution of works of IF to a wide range of popular smart phone and tablet devices.

Further, the academic publishing industry is looking for new and innovative ways to leverage the e-book format, and IF fits the criteria of engagement and interactivity as compelling content. Handheld readers, including smart phones as well as tablet-sized devices, have advantages both over the desktop computer as a device, including portability, startup speed, and battery life and over paper, including compactness for equivalent amounts of content stored (Alexander, 2012; Styles et al., 2012).

Conditions now appear to be favorable for the development of computer games in education, and IF is a suitable genre for curriculum integration. IF game engines are available and accessible to the non- or novice-programmer, and the format is well-suited for e-book and smart device distribution. A review of the relevant literature demonstrates that there exists little to no conceptual or empirical research regarding the use of IF in the teaching and learning
environment. It is the potential of utilizing IF in the secondary classroom that the study explores; more specifically, the experiences and perceptions of students and faculty regarding the engagement experienced when constructing a game artifact in a middle school history classroom, and whether the IF game format in particular suitably engages students during the specified course assignment.

**Game Construction as a Mechanism for Engagement**

There is ample research indicating that game play is effective as an activity to engage learners (Oblinger, 2010; Oyen & Bebko, 1996); however, rather than the adopting the more common instructionist perspective of play, this study focuses on constructionist perspective of the activity of game artifact creation as contributing potentially a greater level of learner engagement. The fundamental concept that it is more conducive to learning when students create artifacts, particularly through the use of computer, is well-established. Ultimately, content understanding develops through participatory activity (Ainley et al., 2006; Harel & Papert, 1991).

It is possible that the constructionist approach of having learners create their own games in the acquisition and understanding of content is more effective than the more basic activity of playing games. Additionally, with the inexpensive or freely available technology and authoring tools that are currently available to students in the classroom, game construction does not require significant financial resources for participation and development (Kafai, 2006). In a study involving 6th grade students in Scotland that created their own computer game, the resulting qualitative data indicated that the student displayed strong motivation and enthusiasm for learning during the assignment (Robertson & Howells, 2008). Building computer games gives students control over their thinking and learning process (Kafai & Kafai, 1995). Computer games
involve multiple components requisite for a stimulating learning environment and establishing more intrinsic motivation leading to greater engagement (Vos et al., 2011).

**Purpose of the Study**

The proposed study is based on the evidence that construction of computer games facilitates positive learning outcomes (Begg et al., 2005; Kafai, 2006; Kebritchi et al., 2010; Vos et al., 2011) by improving engagement (Kickmeier-Rust & Albert, 2010) and increasing motivation (Burguillo, 2010; Kumar, 2000). This study seeks to determine the perceptions and experiences of students regarding the level of engagement in the creation of IF games, as a genre of computer games, within a middle school history class.

Constructionism, or the notion that learning occurs most effectively when students are given an opportunity to design and create tangible artifacts (Papert & Harel, 1991), serves as the theoretical foundation for this work. Because the focus of this study is on lived experiences of students in an authentic educational environment, this research involves the conceptualization, design, and implementation of a rigorous phenomenological framework. The design of this study is guided by the following research questions:

1. What are the experiences, behaviors, and perceptions of students during the development of an Interactive Fiction game artifact as an assignment in the middle-school History classroom?

2. How do middle-schoolers’ experiences with Interactive Fiction game construction influence their emotional, cognitive, and behavioral engagement?

**Significance of the Study**

Soon after the first computer games became available through personal computers in the early 1980s, a strong interest developed in the education community to leverage the engagement characteristics of the games for the improvement of instruction (Jonassen & Land 2000; Mayo, 2007; Beale et al., 2007). Yet, in the decades that have passed since computer games were
introduced to the consumer market, and likewise available to educators, relatively little progress has been made in using the games to enhancing the teaching and learning environment (Papastergiou, 2009b; Squire 2003). This lack of progress is due largely to the circumstances that the current generation of computer games is so compelling that the majority of educators are not seriously considering older (but perhaps more feasible and appropriate) games, and consequently, the types of games that are nowadays considered for use in the teaching and learning environment are out of reach for instructors in terms of required development resources.

The proposed study should reveal a practical methodology by which an instructor may incorporate the IF computer games into their curriculum, creating activities in which students develop IF games as artifacts that demonstrate their learning. The researcher’s observations regarding student experiences may indicate whether it is possible that IF computer games (while being based on older technology and completely non-dependent upon graphic images, animation, or audio/video capabilities) could be sufficiently compelling in format and implementation to attract and engage students, and this might indicate an area for further study.
CHAPTER 2
LITERATURE REVIEW

Introduction

In this chapter, a review of the literature will demonstrate and summarize the relationship between computer games and how they are utilized in an educational context, from limitations to potential strengths. It is this relationship that serves as a practical foundation for the implementation of suitable game technologies in the classroom, and for the purpose of this study, the focus will be on Interactive Fiction (IF) computer games as artifacts created by students (as well as support materials to be played by students) in response to instructor-developed activities. Additionally, the literature review will provide a contextual overview of the history of computer and video gaming implementation in education, and how instructors have used a variety of computer game types to supplement course curriculum as a method for engaging (sometimes reluctant) learners. For today’s student, the reality is that computer games are already a consistent part of social life. They play games on a regular basis and on multiple electronic devices including computers, tablets, and smartphones. In recognition of this reality, there are instructors that have worked to integrate computer games into their own curriculum (Marzano, 2010).

Beyond the general perspective of electronic, and more specifically non-linear interactive computer games, the IF genre of computer games is conceptualized as an effective artifact for creation and narrative vehicle within the classroom, and this will be the focus of the study. While researching the literature on the subject of computer games, topics included were related to the following areas: the use of computer game technology in education (especially from a constructionist perspective); the differences between linear and non-linear forms of narrative in computer games; the characteristics of narrative that engage students in the learning process;
computer game use in education as a narrative vehicle; and more specifically; the use of IF as that narrative vehicle. Even though the literature related directly to IF is not extensive, these other examined areas provide appropriate context and relevant research to serve as a valid foundation for this study.

Literature regarding both constructionism and engagement theory will be reviewed in order to provide a theoretical foundation in support of IF artifact creation and use as part of the learning experience. Subsequently, a conceptual framework that ties these theoretical elements together with the study’s empirical findings will be outlined and described in detail.

Finally, there will be some discussion regarding data collection within the environment of a History course at the middle school level. As a subject matter area, history is readily interpreted through a narrative lens (Carroll, 1990; Voss & Silfies, 1996), and as such, it provides rich source information for a narrative-dependent game genre such as Interactive Fiction.

Limitations to the Use of Computer Games in the Classroom

Although there exists literature in a variety of topic areas related to computer games as artifacts, aids, and supplements to the instructional process, it is important to understand that there are a number of significant limitations and potential obstacles to making effective development and use (either objectively measured or subjectively interpreted by students and instructor) of computer games in the education environment (Egenfeldt-Nielsen, 2004; Kirriemuir & McFarlane, 2006). The following are several of the greater limitations to be considered.

Unsuitability of General Games for Specific Knowledge Domains

A major challenge for an instructor comes when attempting to map game content to desired content mastery within the classroom (Sanford et al., 2006). An instructor may struggle to find meaningful ways to integrate existing computer games into their courses if the computer
game narratives do not align with the particular academic discipline being explored in the classroom. This phenomenon necessitates the application of particular game titles (in specific genres with specific content) to be associated with very narrow areas of course content as opposed to a more generalized application across a range of discipline areas (O'Neil et al., 2005). Further, for researchers that are interested in understanding how the use of particular (or particular categories of) computer games effect learning outcomes in specific disciplines, the challenge is in locating the research related to those content areas, and then being able to account for the overlap of game usage across the varied discipline areas. In some cases, this process would acknowledge the great level of difficulty when it comes to studying narrow fields of academic research based on computer games in exclusive support of these fields.

**Difficulty Finding Games Appropriate to Course Activities**

Another area that is problematic when it comes to the integration of computer games into the classroom setting is the difficulty in finding games that actually apply to specific assignments and properly align with the desired (or even school-district-specified) learning outcomes (De Freitas & Oliver, 2006). This mismatch between the game and curriculum can result in outcomes that draw no distinction between game-supplemented and traditional instruction (Klein & Freitag, 1991; Cohen & Bradley, 1978). In fact, in a meta-review of 67 studies conducted from 1984 to 1991 regarding effectiveness of computer games as opposed to traditional instruction, only when the game activities closely correlated to the objectives of the lessons were there improved outcomes in the game-based activities (Randel et al., 1992).

One of the main reasons for the difficulty in matching computer games with academic content is the fact that commercial game developers are not motivated to author games with a relatively narrow curricular focus, and consequently for a relatively small educational market. On the other hand, educational software developers tend to create materials that do not engage
students as effectively from the perspective of game play (Papastergiou, 2009a; Papert, 1998). This need for alignment between game experience and curricular requirements leads to the following consideration.

**Impracticality of Instructor-driven Game Development**

While it is an attractive proposition to think of an instructor as being closely involved with the game development process and perhaps authoring academically relevant yet imminently playable games as they create their lesson plans, there are practical considerations that make this scenario highly unlikely. First of all, the sophistication and complexity of modern three-dimensional and graphics-heavy interactive computer games mean that the financial resources and personal expertise are not likely to be available to the instructor. For example, while the cost of development for instructional games may range approximately $100,000 (already out of reach of an individual instructor for a single course), commercial games may run anywhere between $10 million and $25 million (Torrente et al., 2010). Further, these realistic, media-rich commercial computer games often have development teams of 10 or more people with specialization in 3D model development, texture development, animation design, and computer programming.

**Positive Aspects of Computer Games in the Classroom**

Ultimately, there is evidence within the literature to support the idea that computer games can have a positive impact within the teaching and learning environment despite the challenges of either identification or development. A number of studies have shown that the use of computer games enables skills development, improvement in content mastery, as well as engagement and motivation for participation in the classroom (Alessi & Trollip, 2001; Dempsey et al., 1996; Roblyer, 2006). This may be accomplished through the very same mechanisms that influence players to devote their recreational time to deep and robust computer game encounters (Dickey,
At this point, the question is not whether computer games could influence student engagement or learning outcomes, but rather whether computer games could be accepted and feasibly integrated into the teaching and learning environment by an instructor on a wider scale. It makes sense, also, to give consideration to having students develop their own computer game artifacts in support of learning.

Having a rationale for the adoption of computer games is important in particular as a pedagogical tool and in relation to their role in education. Computer games in a wide variety of formats have been used to enhance learning environments and facilitate the development of critical thinking skills, and researchers have been studying both how learning occurs during informal game play as well as how commercial games could be used in education environments (Shaffer et al., 2005; Squire, 2005b; Kirriemuir & McFarlane, 2006). In fact, separate skill sets such as problem solving, strategic planning, analytical thinking, and so on have been developed and promoted through the regular play of computer games, and these skills are important for student success in the academic environment (Clark & Ernst, 2009). Computer games have great utility in supplementing more traditional instructional experiences in the classroom (Alessi & Trollip, 2001; Gee, 2003; Rieber et al., 1998; Van Eck, 2006a).

Simulation games, for example, have had a demonstrated effect on student performance when contrasted with conventional instruction. In the Randel meta-analysis conducted in 1992, 40 percent (27) of the studies found differences that favored simulation games over conventional instruction. Of the 14 studies regarding the effects on student motivation, 12 of the studies showed that students found simulation games to be preferable to conventional instruction (Randel et al., 1992).
Real-time three-dimensional (3D) games have also been shown to facilitate cognitive learning achievement among students. In an experimental study of 115 students designed to compare two different types of instructional treatment by looking at their learning performance, the statistical results demonstrated a significant difference between computer-assisted instruction and computer video game playing in learning achievement (Chuang & Chen, 2007). The study investigated which instructional methodology had greater positive effects on students’ cognitive learning (instruction versus computer video games), and based on the study findings, playing computer video games was found to have more effect in facilitating the students’ average learning outcomes than did the computer-based instruction.

There are several characteristics of computer games that contribute to their compelling nature, making them potentially attractive to the educator as a way of motivating learners to become more familiar with course content. As games present challenges, they also present multiple solution paths that may be taken depending on a player’s goals or problem-solving abilities. This is a key component in game design (Kirkley & Kirkley, 2005; Gee, 2007; Shaffer et al., 2005). Games also sequence their quests or puzzles in order to build one upon the next in appropriate complexity, maintaining the interest of the player without causing excessive frustration during play (Gee, 2007; Reigeluth, 1999). This characteristic of games to “detect” the best level of play and adjust themselves accordingly allows players to progress through the same game experience with varying degrees of expertise—something rather difficult to achieve through modern educational curriculum (Gee, 2007; Squire 2005a). Of great interest and appeal to game players is the way computer games facilitate the adoption of character identities and roles that they would otherwise not be able to experience (Gee, 2007; Shaffer et al., 2005; Squire, 2005b; Steinkuehler, 2004).
It is possible to implement game-based learning and benefit from the positive aspects of computer game integration into curriculum, while bypassing the limitations noted above. The key is in the selection of the appropriate type of computer game that can be feasibly integrated in the authentic educational environment, whether provided in complete ready-to-be-played format or expected to be constructed by students during the education process.

**An Alternative to Media-rich Games: Engaging Students through Interactive Fiction**

As a subset of computer games, Interactive Fiction presents a simulated environment, either fictional or non-fictional, in which the player is able to interact with surroundings as well as other non-player (computer-controlled) characters, manipulate objects, navigate through geography and physical locations, and solve puzzles presented in the context of story elements as a means to advance the game narrative. IF differs from more conventional computer games in that there are no graphics and very little, if any, audio elements involved in support of the game play experience. Games in IF format are presented almost entirely in a text-based format, with game scenario descriptions presented as prose, and with player actions within the game (Montfort, 2005; Moulthrop & Kaplan, 1991; Tavinor, 2008; Ziegfeld, 1989).

It is worth noting that similar in format to the IF genre of computer game is the genre of Multi-User Dungeon (MUD). Like Interactive Fiction, MUD games are text-based virtual environments that rely on prose descriptions to portray locations, interactions between the players and their environments, and so on (Cox & Campbell, 1994; Curtis, 1992). However, MUDs differ from IF in that they involve real-time actions; that is, while the player is typing instructions or responses, other things might occur. Unlike MUDs, IF games are more turn-based. In turn-based games, game flow is divided into well-defined parts, called turns. A player in a turn-based game is allowed a period of analysis before committing to a game action, ensuring a separation between the game flow and the thinking process, which presumably leads
to better choices. Once the player has taken his or her turn, that round of play is over and any special shared processing is done. This is followed by the next round of play. Another important distinction between IF games and MUDs is that, as the name indicates, MUDs are designed for more than one player which requires some form of network (wired or wireless) connectivity. This study will focus on the IF format rather than MUDs.

The following computer screen image in Figure 2-1 depicts a standard text-based IF interface of the game “Whom the Telling Changed” (Reed, 2010) and provides an example of the most common form of IF gameplay implementation.

As can be seen, the body of the game itself is the narrative provided as text descriptions. The player responses are entered as text at the cursors (which are displayed when the system is ready for user input, typically after the processing of a previous turn). Players are able to enter any word or phrase, and the responses generated by the IF program depend on the sophistication of the parser and the response system. Modern IF games are able to respond to player commands, even if the commands are not recognized by the program.

Interactive Fiction games are appealing in an education environment because they can provide the information of a textbook, though with greater capacity for branching and engagement through interactive dialog. Additionally, IF games often involve cognitive puzzles and problem-solving challenges that involve interactions with an external world (Krotoski, 2005; Turkle, 1995), and the exploration of these environments can support engagement through social interaction. Another attractive characteristic of IF games is the (occasional) inclusion and use of additional materials such as maps, letters or correspondence between characters, photographs that help frame the story, and so forth, and these additional materials can be used to help students contextualize the subject matter in which they are immersed (Squire et al., 2003).
A study with an IF class of students ranging from fifth to ninth grade was conducted to determine how reluctant readers (as defined by the Wisconsin Reading Inventory Form II) responded to the IF game genre (Lancy & Hayes, 1988). The study demonstrated that even students identified as reluctant readers (i.e., those having little or average interest in reading) would spend as much as an additional three hours a day in reading activities as they interacted with their IF programs during the full four-week duration of the study.
While multimedia elements may add to the perceived realism and engagement potential of computer games in the classroom (Dickey, 2005; Garris et al., 2002; Wiebe et al., 2014), the complexity, time, and cost for development renders multimedia games a more resource-intensive type of instructional support material. The focus of this study will remain on IF games as instructional materials to be developed as assignment artifacts by the students of a particular History class. The concept is that an instructor will want students to develop and use IF as educational support materials to supplement (if not replace) text books for content value. Additionally, the constructionist implementation of IF may improve the level of engagement even among students identified as reluctant readers. At the same time, assigning IF as an assignment exercise for students will allow the instructor to more effectively utilize limited development resources.

**Leveraging Narrative to Facilitate Engagement**

In order to better understand the connection between narrative and IF computer games, a definition review of narrative may prove to be a useful foundation. “Any definition of narrative must surely revolve around a shared imaginative process of construction” (Rieser, 1997, p. 10), and this provides context for a constructivist perspective even before considering the possibility of reader immersion within an IF environment. A working definition of narrative within IF could be framed as prosaic description consisting of a series of informally connected events or occurrences that are revealed over time (Lamarque, 2004). That these events or occurrences may be considered as separate or distinct from each other (without the informal connections) suggests that events are modular and may be rearranged and reordered by the “reader” (or the game player) for a more active and immersive (engaged) participation experience. In this view, linearity, then, becomes another characteristic to be manipulated, rather than an immutable quality, and the process of manipulation itself would be facilitated by reader (game player)
interaction. Narrative in the context of computer games is also referred to as *storyline* within the literature (Malone & Lepper, 1987; Prensky, 2001), and in some cases narrative may be considered a type of storyline (McKee, 2005). It is acknowledged in the literature that enhancing learning materials with storylines results in increased student interest (Lee & Chen, 2009).

The role of narrative methods in computer gaming has now been recognized as promoting meaningful engagement with players (Ryan, 2001; Robertson & Oberlander, 2002; Robertson & Good, 2003; Qin et al., 2009), while the recognition and use of narrative techniques is widely accepted as an effective method of promoting learning by connecting the student to the content being taught (Battalio, 1996; Slater & Rouner, 2002; Somers, 1994).

The IF format of computer game is often considered to be an ideal vehicle for advancing narrative gameplay, not simply because of the text-heavy nature of the interface, but because of the ability it affords the player to change pacing, events, and outcomes within the game—to the degree that multiple story endings are possible depending on decisions made by the player during the course of play (Goetz, 1994; Plotkin, 2011; Rieser, 1997; Sloane, 1991).

However, while readers are actively engaged in exploring the narrative in IF specifically, this is not an indication that there is any actual action performed in terms of rearranging the structure of the narrative itself (Joyce, 1997). Why might this be the case? One perspective is that interactivity in its current forms merely creates an "illusion of control" for the user (Hockley, 1996). Further, true interactivity is dialectical and such two-way communication is radically challenging to all forms of mediated communication (Joyce, 1997). The following is a segment of conversation from the IF game “Galatea” by Emily Short (2000) that illustrates how the player’s actions direct the flow of the game narrative, and how the game responds, in some cases prompting the player’s actions in a particular direction. User input follows the “>” prompts.
You come around a corner, away from the noise of the opening.

There is only one exhibit. She stands in the spotlight, with her back to you: a sweep of pale hair on paler skin, a column of emerald silk that ends in a pool at her feet. She might be the model in a perfume ad; the trophy wife at a formal gathering; one of the guests at this very opening, standing on an empty pedestal in some ironic act of artistic deconstruction --

You hesitate, about to turn away. Her hand balls into a fist.

"They told me you were coming."

The Gallery's End
Unlit, except for the single spotlight; unfurnished, except for the defining swath of black velvet. And a placard on a little stand.

On the pedestal is Galatea.

>Read the placard.
Large cream letters on a black ground.

47. Galatea

White Thasos marble. Non-commissioned work by the late Pygmalion of Cyprus. (The artist has since committed suicide.)

Originally not an animate. The waking of this piece from its natural state remains unexplained.

>Touch Galatea.
You put a hand on her shoulder: the skin is smooth and warm, though it lacks the velvety finish of a vintage Hazar.

"You might try speaking to me," she prompts. "It's not polite merely to prod at me. And I've gotten very bored, standing here."

(An attempt to engage the audience -- the proactive element... you frame the words for your review, but you find that you can't get as far as a complete first sentence. There's something more here; anxious, chilly, visceral. Better pay attention.)

>Ask her about life.
“What do you know about life?” you ask her. (General questions: you can almost always find ones that haven't been anticipated.)

"Nothing," she says, "except what I saw of his; and that seldom made any sense to me. He told me that people are born, and that they die, and that there are stages in between-- childhood, adolescence... I asked him why he didn't carve me as a child so that I could grow up." There's a pregnant pause. "I never heard him laugh so hard as when I asked him that. And he said that I certainly had the brain of a child."

You take a deep breath.

>Ask her about death.
(Galatea about the death)
Her head moves -- as though she were going to turn and look at you properly -- but then she thinks better of it. "Mine? Or yours?"

Before you can answer, she lifts one shoulder in a delicate shrug. "It doesn't matter which you mean, since I know nothing about either. You will go your way when the time comes; and I-- Who can die who is not alive?"

Figure 2-2. “Galatea” Game Dialog and Interface.

The input from the player (commands such as “Ask her about death”) are free form; that is, there is no set menu of questions or statements that must be used by the player, and the resulting branching flow of the game may be dependent on both the sequence and timing of the input statements. The program’s responses should be clearly relevant to the player’s input, and if the IF game is well written, the program responses have contextual meaning; they are not random or seemingly non-sequitur. Notice, for example, the difference between the above sequence and the program response to “Read placard” compared to the response to the same command in the altered sequence below. There is an additional exchange of dialog, perhaps due to the timing involved in reading the placard.
The Gallery's End

Unlit, except for the single spotlight; unfurnished, except for the defining swath of black velvet. And a placard on a little stand.

On the pedestal is Galatea.

>Examine her (Galatea)
She is facing away from you. You cannot see her face, only her hair, and the line of her shoulder. It's hard to know what she's looking at -- the velvet backdrop, if she has her eyes open, but there's not much to see in that. Mostly, it is obvious, she is not looking at you.

Her green dress widens out at the knee, falling over the pedestal on which she stands in a way that would probably be very awkward, if she wanted to move.

>Galatea, hello
"Hello," you say -- and stop. What would you say next? 'I'm a famous critic, be on your best behavior'? There's no etiquette established; and then it strikes you as strange that you should bother to be concerned.

Fortunately, the little awkwardness is lost on her. "Good of you not to walk away again," she replies.

>Read placard
Large cream letters on a black ground.

47. Galatea

White Thasos marble. Non-commissioned work by the late Pygmalion of Cyprus. (The artist has since committed suicide.)

Originally not an animate. The waking of this piece from its natural state remains unexplained.

You become aware of her breathing -- the slight expansion of her ribs, the soft exhalation -- natural, and yet somehow studied. "Ah -- by the way," she says, in a way that utterly fails to be casual, "have you seen the artist out there? -- My artist, that is."

"No," you respond, uneasy. You open your mouth and close it again.

Figure 2-3. “Galatea” Game Dialog Altered by Timing.
Often, changes in narrative are because of the particular order of actions taken by the player, the timing within the game chronology, or even a randomized response as an easy mechanism to provide textual variety. This additional text is not part of the first dialog sequence:

You become aware of her breathing -- the slight expansion of her ribs, the soft exhalation -- natural, and yet somehow studied. "Ah -- by the way," she says, in a way that utterly fails to be casual, "have you seen the artist out there? -- My artist, that is."

"No," you respond, uneasy. You open your mouth and close it again.

Figure 2-4. “Galatea” Game Dialog Altered by Player Activity.

The idea that linearity is a requirement of or a limiting factor within narrative may be overstated. The traditional narrative forms are not, in fact, dominated by linear composition even though this is often claimed to be so; for example, there is the film industry’s use of "back story" or modern fiction’s form of time shifting as examples demonstrating the effective development of non-linear narrative (Rieser, 1997). On the other hand, the implementation of non-linearity does not imply interactivity, as "non- or multi-linearity is not by itself the defining criteria of interactive forms” (Rieser, 1997).

From the perspective of students either playing or authoring IF, consideration of linearity or non-linearity is not as important to engaging game play as is the framework for interaction between player and game (which students as IF developers should understand). There is importance for authors to comprehend interactions within the medium of IF for effective and believable reader immersion, and authors must understand the dynamics of reader-text interaction (Rieser, 1997). For students working as novice IF developers, however, the complexity of non-linear interactive design are sophisticated issues that may best be addressed as
reference materials included with the assignment rather than used by the instructor as actual assessment criteria.

**Interactive Fiction as a Vehicle for Simulation and Engagement**

The idea of IF serving as a simulation of the real world is something that has been considered fairly deeply (Montfort, 2007). Products of IF offer to the participant a wide range of simulated worlds, apart from, but as robust as our own real world. However, the simulated worlds are not simply the settings within which story telling is given tangible form; these worlds serve as boundaries, and they define the operational parameters of the narrative-producing program in which the reader finds him or herself. In navigating within the IF simulated world, the immersed participant actually directs the activities of the player-characters that reside within that world. IF worlds are depicted within, though not equivalent to, descriptive text, maps, physical objects, and so on. There is a parallel in that just as the IF world is the content plane of IF, story is the content plane of narrative (Montfort, 2007). Part of the function of the IF simulation is to model the real world (Mar & Oatley, 2008).

Interactive Fiction can be an engaging type of game play even for reluctant readers (Lancy & Hayes, 1988). Key characteristics of IF are the ideas that it is about completing quests and that IF offers challenge which is a critical driver of participant persistence in the play experience (Papert, 1998). It is this driver of persistence that influences a player of IF to read more than he or she may be inclined to do with traditional reading materials (Lancy & Hayes, 1988). Additionally, skills such as mapping, maintaining inventories, and puzzle solving contribute to the play attraction in IF. Puzzle solving is one of the major components of IF that contributes to player engagement, and there are several general categories of puzzles including recognition of patterns, interaction with characters, manipulation of objects, and so on to be solved (Jerz, 2000).
Interactive Fiction has the potential to liberate writers from the illusion of authorial control (Rieser, 1997). To do so allows the reader to engage in the narrative at an apparent level of agency that does not constrain the imagination. This creates an illusion of complexity regarding the interface between player and software.

**The Effectiveness of Interactive Fiction in the Classroom**

There are contrasting views regarding the effectiveness of IF as a tool to impart or facilitate some particular set of learning outcomes, with some of the contrasting views based on the foundational question of whether or not fiction has value for learning. For example, there exists some significant doubt that literature in the form of fiction provides any useful information to the readers (Narvaez, 2002), and the argument is specifically that storybooks are flawed as a form of providing education to young children—which is due to factors of misinterpretation of authors’ intentions, for example. However, there can be some reconciliation between these views and those opposing: readers actively construct their textual meanings (rather than receive meaning) from the texts they read.

Setting up the reasoning behind the negative viewpoint, fiction literature historically has had little connection with empirical validity (Mar & Oatley, 2008). The justification is that fiction has functioned primarily as an entertainment medium: literary stories composed with great care are not flawed accounts or factual events in the real world, but they are rather simulations with room for interpretation of our selves set in a social world construct. This is demonstrative of the placement of the reader into the text (Niesz & Holland, 1984). The whole idea of simulations of selves in the social world brings us back to the concept that the reader is connected with his or her “self-representation” within the narrative. This, then, implies that there is no requirement for an avatar representation in a simulation needing to be depicted through a deeply detailed visual representation, which recalls Pot’s (2004) observation that sophisticated
visual elements are not necessary to have an impact upon learning. Instead, a virtual representation within one's own mind will suffice to provide that connection and immerse reader in the text.

The enjoyment in connecting with IF is a result of the participant’s freedom to access a broad range of action and behavioral scripts (Douglas & Hargadon, 2001). Further, it is in the interaction where participants explore the narrative seeking the places where the story aligns with often mutually-exclusive scenarios (i.e., the puzzle-solving process) that the whole of the work begins to make sense.

It is the narrative within fiction that serves as an environment to allow the simulation of reality through simplification (Mar & Oatley, 2008). The narrative framework helps people understand certain generalizable principles that make up the human experience, most importantly how people act or react in particular circumstances and situations. In this context we begin to see the ultimate utility of IF as a tool for facilitating the understanding of real-world principles. Literary simulation is a simplification of any actual situation, after all, and only the important factors should be worked into the simulation as part of the simplification process. There are parallels with IF, and the wisdom of including only important factors pays off during the creative development phases for any particular IF title in terms of development time and resources required. However, part of the value of the IF format is that it allows the development of any number of side- or unrelated stories for integration into the central narrative without great difficulty or the requirement of excessive development resources.

There are significant benefits in the integration of narrative into a learning environment: it offers the student ample opportunities for the cognitive operations of reflection, evaluation, illustration, exemplification, and inquiry (Crawford, 2003; Eisner, 1991), and comprehension is
enhanced by the use of narrative (Laurillard, 1998). In terms of IF game design, narrative assists in the construction of meaning within the context of the game, and this serves as a framework for problem solving (Dickey, 2005). Additionally, studies have demonstrated the positive impact of IF types of narrative experience having positive effect on learning outcomes such as reading comprehension, ability to apply rules and strategies, problem solving skills, and acquisition of knowledge of facts and substantive materials (Mcquiggan et al., 2008; Shelton, 2005; Squire, 2008). All of this would indicate the value of having student construct IF games as well as using IF to build learning activities for the classroom.

**The Relationship between Interaction and Engagement in IF**

Interactive Fiction can be both immersive and interactive, as long as the authors understand the actual reading and writing processes that form the foundation of the experience of immersion and interactivity (Miall, 2002). This acknowledges the reality that the development of IF entails somewhat different authoring skills than traditional non-interactive fiction (in text format). Authors of IF must be able to anticipate to a great extent the possible actions, responses, and avenues of exploration that readers immersed within IF environments may choose to follow. In fact, the development of IF content requires cognitive flexibility, which is an ability to build knowledge structures that can be depicted by multiple representation, interconnectedness, and the idea of contingency, which is to recognize the possibility of “it depends” rather than a more discreet if/then/else logical construction (Spiro et al., 2003). The transactional relationship between author and reader within IF is different, and one of IF's great contributions to the narrative cycle may be the reduction of the barriers that separate authors and readers; between what was created and those that consume the product (Douglas & Hargadon, 2001).

If the concept of narrative does not make the transition of print into the digital world, its cultural significance could shrink (Skains, 2010). The resiliency of the novel as a storytelling
form can be seen. As of this writing, for example, seven of the top 10 grossing films worldwide are based on written story and character properties including comic books (Box Office Mojo, 2015). This transition example (from print to film) does not address the potential shrinkage of the actual print format, however, which may be mitigated by the immersive experience of IF. The rules of engagement between reader and text are fundamentally changed in the IF format, and the experience introduces aspects of game play that readers may find compelling. The relationship between the author and the reader has been redefined through the implementation of a multimedia digital environment that affords and promotes reader interaction within the narrative (Cover, 2006; Plowman et al., 1999). This, in turn, encouraged readers to become more interested in changing or manipulating the flow of the narrative and take on the more active role of co-participation in authorship, facilitated by cognitive flexibility in the development of the IF experience (Spiro et al., 2003). It is this redefining of the relationship that opens the door, thereby allowing IF to engage readers in a deeper, meaningful way to comprehend the text within which they have been immersed.

In the short time that interactive narrative has been part of the digital media world, it has been "transformed and reinvented both in its form and through users' increasingly sophisticated understanding of interface conventions" (Rieser, 1997, p. 10). This hints strongly at the potential transformation not only of the narrative structure but of the way in which narrative is used for the conveyance and construction of meaning to the immersed reader. One of the key compelling features of IF is its facility for allowing the reader at his or her own pace and direction to progress forward in order to fulfill the desire to discover “what happens next.” Unlike the linear reading of a text, nonlinear reading is a task of self-directed exploration analogous to the physical exploration of virtual worlds players encounter in nonlinear computer games. When the
reader controls both the pace and direction in which the narrative unfolds, the level of engagement is elevated (El-Nasr, 2007).

The concept of having students connect to personas with which they may identify in an imaginative or virtual setting is essential to learning. Well-constructed IF can move students along this path, essentially by creating a map of how the mind overcomes challenges, if not an actual map of the mind itself (Kozdraz et al., 2006). Further, models of minds can be built in order to gain access into and understanding of particular behaviors (Frith & Frith, 2001). The advantage of IF as a narrative form is that it provides a mechanism for mapping readers’ minds by offering an environment in which multiple behaviors are facilitated and can be acted upon multiple times in multiple ways. As readers select their paths and actions, IF not only immerses readers within narrative, it gives insight into the motivations and thought processes that lead to particular decision points as the readers reconstruct the narrative in original and unanticipated ways.

Even though IF as a game format peaked in popularity in the mid-1980s, there has been continued interest among game designers to develop games in which the players perform an active role in the creation of the narrative within the game. This, in turn, provides the player with a better game experience by directing him or her toward particular story arcs that advance the play (and narrative) in the most meaningful fashion (Nelson et al., 2006). Further, there is some indication that the complexities and distractions of 3D or visually-oriented computer games may result in less cognitive engagement, suggesting that IF is a format better-suited to improving engagement (Lim et al., 2006).

With the proliferation of smart phone and tablet devices in both the consumer and education space, the game industry may be on the verge of re-entering the IF market because of
that game genre’s suitability to the physical format of the new devices. In an interview written for the online game developer website Gamasutra, Alexander (2012) suggests that a broader gaming audience more interested in “lean back games” (games that require slow and thoughtful progress rather than the rapid-fire, rapid-pace of many of the typical console games) is largely to credit for the resurgence. In another Gamasutra interview, the highly-regarded IF game designer Emily Short commented, “There's also an increased interest from people in the publishing industry in looking at what they can do with books that really takes advantage of the ebook form.” The traditional publishing industry has developed a strong interest in understanding how interactivity and new technology can enhance the text book format, and that is where IF is a potential fit.

**Interactive Fiction Development Platforms**

More people are thinking of books as interactive companions through the implementation of dedicated ebook readers such as Kindles and the more general purpose devices such as iPads and Android tablets, in addition to the more traditional forms of the desktop and laptop computer. While there are several technical challenges in developing IF across multiple platforms, there are a large number of available game production middleware and gaming engines that have been made available by the industry to balance the rapidly rising costs of development (Whitton & Hollins, 2008). Specifically for IF, there are several systems that aid in the development of game scenarios (Roberts, 2013; Jackson, 2012; Ward, 2012), and the systems themselves vary in their implementations. Inklewriter (available for use at http://www.inklestudios.com/inklewriter/) is a more traditional programming language, very similar to C, while Inform 7 (available for download from http://inform7.com) is a language based on a more English-style syntax. Adrift (available for download from http://www.adrift.co)
is a visual development system using maps and pull-down menus to select from available action options.

The availability of these user-friendly development tools offers a mechanism for instructor and students to create IF games in a natural language environment, minimizing the need for more technical programming expertise (Mehm et al., 2009). It is through the use of these tools that the development of IF games can become an integral part of the curriculum, and this will be an important aspect of the study. Ultimately, if students are creating their own IF games as artifacts that may be played, the burden of (even manageable) software development is removed from the instructor. Rather than create individual or custom game modules for the course, the instructor is able to develop curriculum that utilizes a reusable assignment template, directing students in the design of their own games.

**The Importance of Experience and Perception in the Study of Interactive Fiction**

While the tools now exist for instructors to develop technology-enhanced narrative-based assignments and for students to actively participate in the creation of digital narrative artifacts as noted above, understanding the experiences and perceptions of students is an important piece to determining the overall usefulness of these tools in the classroom environment and to what extent learning may occur.

**The Student’s View**

There is evidence indicating the experiences and perceptions in the form of self-reporting is a valid means of measuring learning (Rovai & Barnum, 2007). In fact, the study of experiences and perceptions is the focus of most empirical research that uses qualitative methods of data collection and analysis. Students’ self-reporting of learning showed alignment with more objective assessment measures as compared over time and across diverse populations (Pace, 1990). Additionally, the variations in perception reporting were similar to those noted in direct
assessments. In fact, there is a considerable amount of literature that establishes the validity of using student self-reporting of perceptions and their experiences in the classroom compared to data obtained from more direct assessment methods (Corrallo, 1994).

Many of the studies that attempt to measure student performance in online (technology facilitated) courses rely on student perceptions of their experiences in the courses, examining qualitative issues such as “how much” or “how well” they felt they learned (Picciano, 2002). It is not unreasonable to suggest that student perceptions may have as much validity as other measures of learning because the perceptions may actually serve to motivate continued commitment to mastering the course content. When students’ experiences were perceived as enriching, they are more likely to participate in a variety of educational activities that can have great academic benefit (Laird & Kuh, 2005). Certainly, we can see the potential importance of experience and perception to student engagement and learning outcomes.

The Instructor’s View

An instructor’s perception of technology-supported learning experiences often revolves around the instructor’s level of comfort regarding the integration of technology into the curriculum (Straub, 2009). For instructors, the concern is not about teaching students how to make use of particular technology, but rather whether the instructor is able to receive support in order to integrate the technology into the classroom experience (Gorder, 2008). In this case, it is of great importance to instructors to have confidence that their support infrastructure will be able to meet their needs effectively.

To some degree, integration of technology in the classroom ultimately connects student and instructor perceptions so that both experience success through their own unique perspectives. While the studies discussed in the examination of the experience and perspective issues were
relevant to classroom technology in general, their findings can be legitimately applied to the
more specific area of IF computer games.

**Establishing an Appropriate Conceptual Framework**

Non-electronic games have been used within the context of education with positive
learning outcomes well before the introduction of computer games into the education
defines the role of imaginative play in the development of thinking skills, and games are the
vehicles of systematic play from early childhood through adulthood. For the purposes of this
study, the specific category of IF games will be considered as both the vehicle of systematic play
but also as desired artifacts for student construction, with the entire process of assignment
development and artifact construction to be the subject of detailed observation.

**A Constructionist Foundation**

A strong research design requires the selection of a suitable theoretical foundation that is
consistent with the researcher’s beliefs regarding the nature of reality, knowledge, learning, and
teaching (Burrell & Morgan, 1979; Mills et al., 2008; Morgan, 2007). This particular study is
based on the theory-based prediction that the development of an actual IF experience will foster
and promote learning by having students construct their own understanding through the creation
of an artifact representative of the subject matter. The theory of constructionism (Papert & Harel,
1991) seems to be the most appropriate foundation for the study.

With access to the modern development tools as listed above, the creation of IF games
shares some commonality with the task of more robust game programming activities. As such, it
is useful to examine “MOOSE Crossing,” a text-based MUD that was created as a framework to
allow students to construct their own computer game environment rather than simply play a pre-
constructed one (Resnick et al., 1996). The idea is that design and development projects provide
valuable opportunities as a “constructionist” approach to learning (Papert, 1993) that gives students a greater sense of both participation and control over the process. Rather than embedding lessons into computer games or other artifacts, constructionism facilitates opportunities for students to represent their skills and knowledge via artifact creation and further build relationships with knowledge during the development process. This is relevant to the classroom application of computer game development, as the process of creating computer games has great potential in facilitating robust learning environments in which students may exercise broad skill sets. Ultimately, game development actively engages students in the learning activity at hand (Robertson & Howells, 2008).

In making IF games, addressing activities such as mapping, maintaining inventories, and puzzle solving is necessary for a constructionist approach, and making games could have a positive impact on significant student learning by encouraging critical thinking skills, ability to solve problems, the decision-making process, and so on (Gee, 2003; Kirriemuir & McFarlane, 2006; Wideman et al., 2007). An assignment can be crafted in such a manner as to address these components of IF design: maps are used to understand the layout of locations, characters, and so on in the game; inventories are lists of objects to be manipulated in order to progress toward a goal; and puzzles are the constructs that add the element of challenge (how does the player open a hidden panel or where does the player find a key to a lock, for example). These design activities will assist in the acquisition and contemplation of subject matter content, again, allowing the student to build relationships with relevant knowledge. Those relationships are manifested as a deep sense of engagement and even enjoyment (Kafai, 2006), so building upon the framework’s constructionist foundation, it follows to examine and apply a model of engagement in order to facilitate meaningful analysis. Ultimately, computer games hold the
promise of enhancing motivation within the context of learning, through the methodology of combining activities into meaningful learning contexts (Kirriemuir & McFarlane, 2006),

Framing a Model of Engagement

The measurement of student engagement can be problematic, as there is a variety of ways in which engagement can be defined. Engagement may be thought of as something that can be measured by observable behaviors such as time spent on task (Brophy, 1983; Natriello, 1984), or engagement might be viewed through emotional measures such as happiness, satisfaction, belonging, or attachment (Connell, 1990; Finn, 1989). There are studies that link student engagement positively to traditional measures of academic performance (Carini et al., 2006; Newmann, 1992), and it is apparent that engagement itself can be enhanced when an instructor fosters more active and collaborative learning environments, allowing students to learn experientially and through a more constructionist “learning-by-making” paradigm (Dickey, 2005; Umbach & Wawrzynski, 2005).

As discussed above, IF effectively conveys non-linear narrative experiences (Shelton, 2005), and use of narrative in the classroom environment enhances positive engagement with students (Ryan, 2001; Robertson & Oberlander, 2002; Robertson & Good, 2003; Qin et al., 2009). For the purposes of this study, an appropriate model of engagement must be framed around a core that acknowledges the importance of narrative as it is facilitated by IF. In the proposed model, the outer layer of engagement is connected through the core IF element through a central layer of narrative. In a constructionist-based framework, narrative is both the method by which students engage with IF as well as the filter students use in gathering, arranging, and presenting subject matter as they create their IF artifacts.

This can be visualized in the following figure:
In considering engagement relevant to the development of IF artifacts as well as the assessment of subjective experiences as opposed to objective learning outcomes, it is appropriate to examine models that focus on “metric scales” that can be reported by the respondents in survey or interview format. Fredricks’ model categorizes engagement as having behavioral, emotional, and cognitive components (Fredricks et al., 2004). Behavioral engagement can be viewed from the standpoint of participation in assignments or activities that are relevant to positive learning outcomes or consistent attendance and academic persistence (Connell & Wellborn, 1991) or positive personal conduct in the classroom setting that does not disrupt the learning process (Finn & Rock, 1997). Emotional engagement is associated with the extent of positive or negative reactions to various areas of the academic experience including school identification, reactions to students or faculty, or the feeling of accomplishment in performing course-related activities (Finn, 1989). Commitment to learning is a significant characteristic of cognitive engagement. This is associated with the amount of effort a student is willing to expend in order to master difficult subject matter or skill sets (Fredricks et al., 2004).
Measuring Engagement

Behavioral, emotional, and cognitive engagement have been measured through a number of existing and validated survey instruments (Fredricks et al., 2011) such as the High School Survey of Student Engagement (HSSSE), the Motivated Strategies for Learning Questionnaire (MSLQ), the Motivation and Engagement Scale (MES), and the Student Engagement Instrument (SEI). Of the 21 instruments identified by Fredricks and her colleagues, 14 are student self-reporting instruments, 3 are teacher report instruments, and 4 are observational instruments. Of the 14 student self-reporting instruments, 5 attempt to measure engagement across behavioral, emotional, and cognitive domains; however, the measure is focused on engagement with the school rather than a particular course or assignment.

The other instrument that looks at engagement across all three domains is one of the teacher reporting surveys, the Reading Engagement Index (REI), and that is focused on eight characteristics as follows (Guthrie, 2004):

1. This student often reads independently.
2. This student reads favorite topics and authors.
3. This student is easily distracted in self-selected reading. (reverse scored)
4. This student works hard in reading.
5. This student is a confident reader.
6. This student uses comprehension strategies well.
7. This student thinks deeply about the content of texts.
8. This student enjoys discussing books with peers.

In the REI, the teacher would complete an assessment for each student in the class. Using a 1-4 scale, in which 1 = not true to 4 = very true, a student’s total score would range from 8 to 32, with a score of 8 indicated the least amount of engagement and 32 indicating the most.

Engagement across the three domains (i.e., behavioral, emotional, and cognitive) are often measured through responses to survey instruments, with the language of the responses guiding researchers to make the connection to the particular engagement category (Fredricks &
McColskey, 2012). For example, a response such as “when I am in class, I listen very carefully” is associated with behavioral engagement, while “I enjoy learning new things in class” is interpreted as being an emotional engagement response, both from the Engagement vs. Disaffection with Learning (EvsD) instrument. An example of a cognitive engagement response from the Motivated and Engagement Scale (MES) instrument is “I ask myself questions to make sure I know the material I have been studying.” We see that the predicate in each response (“listen very carefully,” “enjoy learning,” ask myself questions… know the material”) is strongly indicative of the type of engagement occurring.

All three domains of engagement can be rated through either interviews or observations; however behavioral engagement seems better suited to observation, and interviews mean to determine the level of behavior engagement are often framed in language meant so solicit or determine actual behavioral responses.

**Emotional Engagement**

The interest that students place in a particular learning activity along with the value that students place on the particular activity are the basic components of emotional engagement (Fredricks et al., 2004). This domain of engagement is framed in terms of student feelings and attitudes toward their academic environment or activity (Archambault et al., 2009). Emotional engagement is about the range and intensity of both positive and negative feelings that students may have toward their school, fellow students, instructors, or their learning experiences in particular. Some researchers will define emotional engagement as the student’s overall feeling of involvement, belonging, or even importance to the school (Finn, 1989; Voelkl, 1997), and positive feelings of emotional engagement are thought to create a bond between the student and institution, which in turn motivates them to perform their academic tasks (Finn, 1989).
Measures of emotional engagement are most often focused on emotional reactions to school activities or relationships, and are identified through keywords such as happiness, excitement, interest, enjoyment, safety, and so on. The negative version of these keywords may be used to measure emotional engagement as well.

**Cognitive Engagement**

Cognitive engagement is about student’s cognitive processing of learning content, self-regulation strategies (such as study habits, memorization, and task planning) and the application of learning strategies. It may be defined as how invested a student is in his or her learning. This can be described as how thoughtful a student is regarding his or her learning experience or how much effort a student is willing to expend in the mastery of academic content (Archambault et al., 2009; Fredricks et al., 2004).

Beliefs a student might have about the value of education, goals for an academic career, plans regarding what do to after obtaining a diploma or degree are all categorized as cognitive engagement measures. Further, cognitive development focuses on how effective students study their materials, how students manage their academic time (both on-task in the classroom as well as homework and study activities), and whether or not students go beyond the requirements and expectations in the classroom and perform additional work.

**Behavioral Engagement**

Behavioral engagement is often thought of as time on task when associated with student academic activities (Fredricks et al., 2004). Involvement in academic or extracurricular activities is considered to be very important in the attainment of positive learning outcomes, and this is an important pillar of behavioral engagement (Finn, 1989). Behavioral engagement can also be associated with student compliance to rules such as attendance or courteous behavior (or at least
the absence of disruptive behavior and disciplinary issues), and it is very often considered to be a part of class participation (Archambault et al., 2009).

Observation is a primary methodology to assess levels of behavioral engagement, although survey instruments or interviews may be utilized. Keywords or phrases that are useful to assess levels of behavioral engagement include attention, time spent on homework, class preparation, class participation, attendance, participation in class or school activities, and compliance to school or classroom rules and policies.

**Observation and Analysis from a Phenomenological Perspective**

While the learning theory of constructionism and Fredricks’ model of engagement theory provide an important theoretical foundation for this study’s conceptual framework, phenomenology will serve as the methodological approach to study the lived experiences of students and an instructor using IF in a middle school History class (Antonenko, 2014). In order to gather data and perceptions through qualitative methods including observations of participants, interviews and discussions that focus on the lived experiences of the participants, a phenomenological approach is usually selected as the most appropriate (Lester, 1999). Additionally, it is the intent of the researcher to describe rather than explain the participant experiences reported or behaviors observed, and this is a characteristic of phenomenological research (Husserl, 1970).

The diagram in Figure 2-6 is a representation of the conceptual framework elements that align the components of this study. The relationship between Papert’s theory of constructionism and Fredricks’ model of engagement as they relate to IF are understood from a Husserl-derived phenomenological methodology. The model of engagement specific to this study (IF connected to engagement through the narrative experience) is passed through instructor-designed activities that result in student artifacts. This is the constructionist foundation of the study. The resulting
experiences of both the curriculum and artifact design and development are interpreted through a phenomenological methodology which will yield the results of the study.

![Diagram](image)

**Figure 2-6. Visualization of Conceptual Framework.**

As an aside, we can see how this framework might be applied to a future quantitative study that examines learning outcomes rather than participant experiences. The student-created artifacts could be evaluated using objective measures tied to specific learning outcomes, and the subsequent study results would be applicable to understanding the value of IF-based curriculum from a perspective of outcomes efficacy.
CHAPTER 3
CURRICULUM DESIGN AND FACILITATION

Integrating Game Construction Activities into Instruction

The integration and utilization of computer games into education environments has been practiced as activities for students to play through as part of assignments or curriculum, but also as artifacts to be developed by students in the construction of knowledge (Tüzün et al., 2009; Carbonaro et al., 2010). As a core part of this study, students were asked to create an Interactive Fiction game using a freely-available authoring tool called Inklewriter.

Teachers developing a game-construction assignment may want to instruct students to maintain a journal to document the choices they make throughout the creative process. This will allow students to reflect on their choices, and later students may share with each other their thoughts and decision-making process.

The Game Construction Assignment

In the last quarter of the 2014-15 school year, the 8th grade students in the participating private school studied the Middle East as part of their established curriculum. The researcher was able to work with the middle school history teacher to create an assignment for the students to create Interactive Fiction games based on their Middle East research as an alternative to writing a report or giving a presentation on what they had learned. The following game design tasks were addressed during the curriculum development process:

- Brainstorming and designing the game experience
- Learning how to develop Interactive Fiction using Inklewriter
- Converting historical events into accurate game scenarios
- Playtesting, modifying, and improving the game artifact

The following section describes how the researcher established a relationship and rapport with the teacher as well as how the assignment instructions and rubric were created by the researcher and the teacher whose students participated in the study.
Initial Conversations and Planning

Before starting any initial assignment development work, the researcher had several informal conversations both in person and through email with the teacher of the selected 8th grade class in order to answer a variety of questions regarding curriculum, technology requirements, assessment methodologies, and so on. The first conversation was in person, and it served as an introduction as well as an opportunity for the researcher to describe the model for the study in which the students would construct Interactive Fiction game artifacts as part of an assignment. During this conversation, the teacher was most curious regarding the nature and operation of Interactive Fiction games as well as the complexities of Interactive Fiction development, and whether the students could be expected to master the development system as well as utilize it appropriately and without undue frustration in completing the assignment.

The researcher first described the Interactive Fiction game genre, drawing the distinction between traditional text-adventure style IF games and those games structured as Choose Your Own Adventure (CYOA) games, the type that would be used in the context of the study and class assignment. Additionally, the researcher explained that CYOA game development through the use of freely available web-based tools such as Inklewriter is straightforward, and anyone with basic computer skills would be able to operate these tools, especially with the support that the researcher would provide during the study. The teacher appeared naturally predisposed to utilize technology and computer games in the classroom, so this conversation satisfied the teacher that the assignment was definitely worth considering. The teacher agreed to give serious consideration, and the researcher expressed the intent to provide more information and answer other questions in continued dialog.

Over a period of one week, the teacher and the researcher exchanged several email messages that helped them both develop more detailed understanding regarding the format of the
assignment and study. As the researcher explained the concept of branching narrative, decision points, and multiple story levels as well as multiple story outcomes, the teacher’s understanding of the CYOA game format increased until she was able to see how an assignment might be successfully based on having the students develop games. The teacher asked the researcher to suggest game development criteria and parameters, and based on this information, the teacher developed the foundation of the grading rubric for the assignment. All support materials including the instructions, rubric, and the document “A Beginner’s Guild to Inklewriter” (Appendix A) were developed during the email communications in collaborative engagement between the teacher and the researcher.

In the second week of this relationship-building phase, the teacher and researcher met for an in-person planning session, which was the final meeting before the actual start of the assignment. During this meeting, they reviewed the materials and documentation to be provided to the students. Additionally, they tested the technology to be used in the classroom for instructional purposes: a laptop computer that would be connected to the large-screen classroom monitor through the school’s wireless network for Internet connectivity. The students would bring their own laptops or tablet devices in order to use Inklewriter, and the teacher would have several spare devices on hand should they be required.

The researcher found that this period of time in which discussion and planning was handled in a more informal fashion (and during which time the teacher understood that no commitment to conduct the assignment or study was necessary) was instrumental in providing the teacher with a sense of confidence that the whole activity could be successfully conducted. This was a critical component of the study’s implementation.

The instructions below were provided to the students for assignments.
Middle East Interactive Fiction Game Instructions

Everyone will construct an interactive storyboard including Middle East historical information. Your storyboard must include factual interactions/responses and information in regards to the History of the Middle East. It will be a fictional story including historical facts. Below are things it must include.

- historical facts and information in regards to interactions in the story/game
- has 6 Levels, 19 segments, 32 choices, and 3 endings (see attached maps for different “grade” levels)
- all 3 types of interaction included – navigation, manipulation/action, and narrative/conversation
- bibliography (must use resources other than class notes)
- test game due May 12th – must have at least 5 choices and use at least two types of interaction
- paper document with the game narrative and “navigation map”

In addition to the assignment instructions, the students were provided with a grading rubric, also created by the researcher and the teacher. A document on the use of Inklewriter authored by the researcher (Appendix A: A Beginner’s Guide to Inklewriter) was also given to the students as a basic guide, and the researcher was available through the assignment period to answer questions and to provide continued support.

Middle East Interactive Fiction Game Rubric

____ /5 Test Game Template – produced and saved, demonstrating at least 2 types of interactions and at least 5 choices

____ /5 Paper document showing game development framework, major narrative segments and action points of the game along with a navigation map to show the flow of the game

____ /40 Narrative and Dialog Flow – has 6 Levels, 19 segments, 32 choices, and 3 endings (see attached maps for different “grade” levels) – is historically accurate in the interactions and historical figures and places represented. Using all three interactions.

____ /10 Mechanics (spelling, grammar, punctuation)
Bibliography and research material included
Use of Inklewriter Tool – game functions properly without technical errors
Creativity – use of pictures and/or other additional elements to enhance game play
10/75 total points

Learning Objectives

For the assignment, the teacher specified three basic learning objectives:

* Students will be able to integrate historical content from Middle East research (conducted earlier in the quarter) into a fictional game setting using the Inklewriter Interactive Fiction authoring software.
* Students will be able to describe and justify possible outcomes to past events in the Middle East based on alternative actions or decisions that key historical figures could have made.
* Students will be able to explain the historical impact of actual actions or decisions made by key historical figures.

Assignment Time Frame

The students had a total of four weeks in which to complete their IF game artifacts. Students were given time during class sessions as well as having the option to spend as much or as little time at home as desired to work on the artifacts. The 45-minute class sessions were conducted as follows:

Week 1: The first week was the only week in which a single class session was devoted to the assignment. The session on Friday was used as an introduction to Interactive Fiction, Inklewriter, and the assignment. The researcher attended this class to provide introductory information and to answer any initial questions.

Week 2: During the second week (as well as the following weeks), the class sessions dedicated to the assignment were on Thursday and Friday. The teacher allowed the students to work on their assignments in class collaboratively or individually during both days, and the researcher attended class on Friday to provide additional support.
Week 3: The third week followed the same format as the second week.

Week 4: The final week of the assignment was also students’ last full week in school for the year. During the class session on Thursday, the teacher encouraged students to make final edits to their artifacts, and the students spent much of the session playing each other’s games by sharing their laptop or tablet devices. During the last session on Friday, all work was to have been completed. The session was devoted to students demonstrating their artifacts to the class by using the classroom computer and projector. This was done on a volunteer basis, and no demonstration exceeded five minutes. During the first class period, a total of seven students demonstrated their artifacts to the class, and during the second class period, six students shared their work with the class.

**Interactive Fiction Game Construction Framework**

In the instructions provided to the students, they were informed that there were three types of interactions that were to be included in their game artifacts:

1. Movement or navigation through different physical locations
2. Conversation or interaction with characters connected to the narrative of the game
3. Examination or manipulation of physical objects such as books, artifacts, food, etc.

Since these game-centric interactions were to be used in the context of a history assignment to convey fact within a fictional framework, the researcher attended two class sessions to provide guidance to the students before they started work. During these sessions, the researcher demonstrated the basic use of the Inklewriter tool, and examples were provided on how to incorporate the interactions into their artifacts. A document on the use of Inklewriter authored by the researcher (Appendix A) was given to the students as a basic guide, and the researcher was available through the assignment period to answer questions and to provide continued support.
It was communicated to the student participants that the main point for them to keep in mind was that the game player would learn or understand the information being conveyed purely by the prose descriptions in the game itself, without any additional documentation (such as reports) or reference materials. So, just like a book, information was to be presented as text, with the supplemental graphic images that Inklewriter supports. When deciding on the overall framework of the game, the students had to carefully think about what information they wanted their player to know. The game framework would facilitate that.

What is the framework? The game framework is the main narrative device that carries the story forward from the perspective of the player’s character in the game. For example, the story can be of a tourist wandering through Jerusalem, buying items from street vendors, talking with the merchants, and perhaps exploring some of the buildings in the city. Or the story could be about a news reporter traveling from oasis to oasis in the desert, interviewing the various tribes and learning about the different cultures he or she encounters. The framework sets up the situation for the historical facts to be revealed to the game player.

In addition to the paper documentation provided to the students, the researcher created three example game segments that the students could play, and they could also use the game segments as starting points both for ideas as well as the simple programming required. These game segments were available to the students online. The examples represented the three types of interactions that were to be included in the game artifact: navigation, conversation, and manipulation. Each example had the elements necessary for complete gameplay including narrative text segments, the branching choice points, and a map that diagramed the flow of the narrative. By walking through these game segments, students would see by example how to make use of the Inklewriter software and where the components should be created within the
software. Figure 3-1 depicts the narrative input area of Inklewriter, and Figure 3-2 shows an example of the map (both for the conversation interaction example).

![Inklewriter interface](image)

**Figure 3-1. Narrative Segment in Inklewriter.**

To teach the concept of navigation, a narrative segment was developed in which the choices given to the player were based on compass heading choices:

You are in the Library. There are a lot of books here. There is a door to the south and an open hallway to the east.

The choice points are based on letting the player either go through the door to the south or go through the open hallway to the east. The students would add the choice points and then add narrative segments that described what they would find in the subsequent locations. As they added these choices in the narrative interface (Figure 3-1), the map within Inklewriter (Figure 3-2) would be built out automatically.
Figure 3-2. Map Depicting Game Pathways.

For the concept of conversation, the choice points were based on the player being able to talk to characters in the game, while the concept of manipulation involved physical objects described that could be used by the player during the course of the game.

The three game segments were designed to teach the students how to use the Inklewriter software by providing actual designs that the students could examine and modify, experiencing what the modifications or edits would change. This allowed the students to gain hands-on experience with Inklewriter prior to beginning work on their own game artifacts.
Additionally, the researcher demonstrated the process of mapping the game environment on paper by using boxes to represent individual locations, then drawing lines to connect other locations based on compass directions (north, northeast, east, southeast, etc.). These manually-produced maps serve as templates for the game flow within Inklewriter. The students were encouraged to play the example segments and examine the Inklewriter-generated maps to develop familiarity through repetition and experience.
CHAPTER 4
RESEARCH METHODOLOGY

Research Designs and Research Questions

The integration and utilization of computer game construction activities into education environments and curriculum is largely dependent upon the perceived value of the activity to the instructor, both in terms of how engaged the students are in the activity as well as whether or not the instructor feels learning is taking place (Straub, 2009). While a proxy for the educational value of computer games might be realized in terms of a quantitative analysis of learning outcomes (mastery of content as demonstrated by test scores, for example), the level of effort of integrating active learning assignments into curriculum and the observation of student engagement is often a pre-requisite consideration for instructors (Kumar & Lightner, 2007).

This study made use of the Interactive Fiction (IF) computer game genre, and the researcher assisted a middle school history teacher in the development of curriculum for which students created IF game artifacts as representations of their content knowledge, as an alternative to the traditional assignments like writing a report or preparing a presentation. This study determined the perceptions and experiences of students regarding the development of curriculum and the level of engagement in the creation of IF games within a middle school history class. Specifically, this study focused on addressing the following research questions:

1. What are the experiences, behaviors, and perceptions of students during the development of an Interactive Fiction game artifact as an assignment in the middle-school History classroom?

2. How do middle-schoolers’ experiences with Interactive Fiction game construction influence their emotional, cognitive, and behavioral engagement?

The methodology as laid out in this chapter provided a roadmap for the study with the intent to allow other researchers to replicate the study among other participant groups and potentially expanding the relevance of the findings to computer game genres other than IF (and
possibly other education technologies) in other subject matter areas. In this way, interested
researchers will be able to collect data and draw conclusions based on a broad array parameters
(subject matter area, computer game genre, student grade level, and so on).

It is important to consider overall goals in order to both establish the value of the study as
well as to justify the study and move forward (Maxwell, 2005). This researcher determined that a
qualitative methodology was best suited to describe the use and effect of constructing IF games
within the teaching and learning environment from the students’ perspectives, as well by
providing information to the readers in a form in which they are likely to experience it (Lincoln
& Guba, 1985). Qualitative research is rich with information detail and insight into the
experiences shared by the participants, and this can result in more meaningful study results
(Stake, 1978).

This study design was based on a constructionist narrative-engagement paradigm as a
conceptual framework integrated with a phenomenological methodology for identifying issues of
importance to the participants within this study. The data collection process was addressed along
with the coding and analytical processes required as a part of the study research framework.
Phenomenological techniques used are described, and the actual interview questions are provided
within. Issues of privacy and confidentiality were addressed appropriately and credibility,
transferability, dependability, and confirmability issues were considered along with potential
limitations of the study.

The Phenomenological Approach

A phenomenological approach is well-suited when research seeks to uncover or identify
how phenomena are perceived by participants in particular situations or circumstances (Lester,
1999). There are two main approaches to phenomenology that differ philosophically in the way
data is collected, organized, and analyzed (Moerer-Urdahl & Creswell, 2004). While
hermeneutic phenomenology necessitates a reflective interpretation of a historical study or text in order to derive meaning, the transcendental phenomenological approach is based on finding meaning through a design that gathers data to interpret the essences of personal experience (Moustakas, 1994). As the intent of this study was to examine and describe participant perceptions of artifact creation rather than to explain their experiences (or to examine a historical design scenario), the transcendental phenomenological methodology was applied (Moustakas, 1994; Husserl, 1970).

Moustakas advocates a four-step process of collecting and analyzing phenomenological data that is systematic and rigorous while presenting itself as accessible to those involved in qualitative research. Prior to the collection of any participant data, the researcher performed epoché, which was the first step in which the researcher recounted his own experiences resulting in increased sensitivity and a reduction of bias to any underlying feelings regarding the subject of study (Creswell, 2012; Moustakas, 1994). There is importance in the researcher having experienced the same phenomenon (in the case of this study, that phenomenon was the design and development of IF games) so both the researcher’s and participants’ experiences were considered together. Ultimately, this allowed the same phenomenon to be described from a variety of perspectives (Moustakas, 1994).

In the second step, phenomenological reduction, the researcher performed the task of using textural language to describe what was observed, avoiding abstraction and generalization. This observation was applied not only to external objects or activities, but also to the internal activities that take place within the conscious mind and the experiences driven by perceptions—those perceptions that resulted from the intersection of phenomenon and self (Moustakas, 1994).
Imaginative variation is the third step in transcendental phenomenological analysis that took place after several participant experiences were described. It was at this stage in which the researcher explored possible meanings through imaginative examination from a variety of divergent perspectives, roles, functions, or frames of reference (Moustakas, 1994). By employing imaginative variation, structural themes emerged (Ryan & Bernard, 2003) from the textural descriptions that were developed during the process of phenomenological reduction.

Lastly, the textural descriptions and structural themes collected and developed by the researcher were integrated into a “unified statement of the essences of the experience of the phenomenon as a whole” (Moustakas, 1994; p. 100). This fourth and last step of synthesis of meanings and essences is the place in which participant experiences and perceptions were distilled to their elemental condition where there can be nothing else; it represents the point of final truth (Moustakas, 1994) and is represented in Chapter 6 of this study.

Participants

The researcher identified a teacher and a middle school history class at a private institution located in Central Florida. The selection criteria of a private institution were based on the greater flexibility teachers have in terms of developing course materials and scheduling of particular assignments. This allowed for a more meaningful and less constrained integration of IF into the curriculum. The region was specified to facilitate travel by the researcher to conduct in-class observations and to provide guidance to the class students as well as for working with the teacher. The researcher contacted three private institutions in the Central Florida area, and selection of the teacher and class was made based on the institution’s receptiveness to the study and the teacher’s willingness to participate as well as on the level of adherence to the variety of criteria as listed below.

Selection criteria and characteristics for the participants were as follows:
• The institution was to be a private school in order to more readily accommodate changes in curriculum for the newly-developed game construction activity.

• The teacher had to be teaching in the subject area of history.

• The teacher had to have no prior working experience with IF as supplementary educational materials.

• The classroom environment had to provide students with ready access to appropriate computer hardware to create and run their IF game artifacts.

• The teacher was to have students in the 8th grade (middle school).

• Students had to be proficient in basic typing and computer operation skills (so that was not a barrier to creating or playing the game).

IRB approval was obtained for this study (see Appendix B for the approved IRB parent consent and student assent forms). No incentives were provided for participation, though the teacher received copies of all Interactive Fiction development materials used in the creation of the assignment.

In selecting the middle school history classes to be used for this study, purposive sampling was used. The participants were selected based on the criteria of being in a private school setting (thus allowing for assignment flexibility) and having access to the necessary technology. The researcher contacted three private institutions (and one public middle school initially contacted but ultimately not considered) to determine interest and openness to participating in the study before selecting the particular school located in Central Florida. Having no prior experience with Interactive Fiction (though with computer games in general) was desired prior to working on the assignment, and that was also a characteristic of selection.

Between the two history classes selected for the Interactive Fiction assignment, there was a total of 36 students that built game artifacts. Since an appropriate sample size for a phenomenological study can fall between six and 10 participants (Haase, 1987), the two middle school classes provided a suitable population from which to determine a subset of students to
participate in the interview process, and all students in the pool would have had the requisite experience with Interactive Fiction that was the subject of the study. Fourteen students were selected from the larger pool of 36, by the teacher as willing to participate, and all 14 students met the interview criteria. These students were observed using the Engagement Observation Protocol (Appendix C). At the end of the assignment, a random selection process was ultimately realized, as the researcher requested interviews with all 14 students, scheduling actual interviews with the first six students to respond with their availability.

**Study Context and Interactive Fiction Artifact Development**

Once the school and the teacher were selected, the researcher had an initial meeting with the teacher to determine the assignment to be created or modified that included tasking students with design and development of their Interactive Fiction artifacts. The assignment was associated with their Middle East history module. In the span of two weeks, the researcher assisted the teacher in developing curriculum that guided the students through the IF game design process. Prior to the two weeks of development, the researcher provided the teacher with introductory materials regarding methodologies of IF game development.

This teacher had a total of 36 8th grade students taking the same history course, but the students were split into two separate classes of 18 students in size (due to space considerations of the classroom). The classes ran back-to-back, and the researcher attended and observed both classes during the study.

Immediately following the two weeks of curriculum design, the students were provided with sample IF game templates in Inklewriter format and basic guide materials to become familiar with the conventions of building game in Inklewriter (Appendix A). Additionally, the development of game maps, narrative conventions regarding conversation, navigation, and
branching choices, were demonstrated so that the student had the opportunity to understand how to incorporate or account for these elements in their game artifacts.

The outcome of this curriculum development process was an IF game creation document that the teacher will be able to use for other course modules in the future, expanding the use of IF artifact building. This document included resources for both the teacher and the students on the use of Inklewriter. These resources were made available to address technical development considerations using the software as well as the pedagogical uses of Inklewriter to create middle school historical text-based simulations. The Inklewriter software itself is freely available online as a web application (and required no download or installation), and the researcher assisted the teacher and students on how to run the software on their personal computers or smart devices including both Android and iOS platforms.

After the assignment was prepared and announced, the students began development of their Interactive Fiction game artifacts. This took place in the last month of school before summer break. This segment of the study was a four-week process (in addition to the two weeks of development work with the teacher), and students worked both individually and collaboratively on their own artifacts, finally handing in individual projects.

Assignment Week 1 (Project Week 3): The students were introduced to Interactive Fiction as a game genre, and they were shown several example games. One 45-minute class period was set aside for game play in small groups, and the researcher answered miscellaneous questions about the game genre.

Assignment Week 2 (Project Week 4): The students began planning their IF game designs. The provided instructions and Inklewriter examples helped students understand expectations. Also during this week, students started the process of gathering and organizing the
appropriate historical materials for their game artifacts. Two 45-minute class sessions were devoted to the assignment during this week as well as the following two weeks.

Assignment Week 3 (Project Week 5): Students constructed their IF game using examples and templates provided by the teacher (as developed during the assignment development phase).

Assignment Week 4 (Project Week 6): During the final week, students completed development, tested, and shared their constructed games. During the first class session on this assignment week, students played each other’s games by sharing and exchanging their laptop computers and tablet devices in a non-systematic manner. On the final class session, students volunteered to demonstrate their games to all of their classmates by using the class computer and projector. While individual students were demonstrating their games to the class as a whole, their classmates were sharing their computers and tablets with each other so that they could actively play the completed games. There was great enthusiasm among the students during this activity, and clearly the overwhelming majority of the students were proud of their accomplishments.

Data Collection

Semi-Structured Interviews

Recounting narrative descriptions has been the most common method that humans have used to make sense of their experiences throughout history (Seidman, 2005), and it is useful to take advantage of people’s natural predisposition to discuss their experiences openly as a way of gathering important data. There is a context around all action and behavior, and while the actual participant may not be in the best position to provide contextual meaning (due to lack of introspective skills, the possibilities of flawed recollections, and so on), the study focused on understanding perception, and the research would not have been possible without having conversations with the participants.
Contextual meaning can most effectively be solicited through the interview process, allowing for meaning to be clarified during the interview in ways that are not possible through the use of surveys or questionnaires (Brenner et al., 1985). However, contextual meaning is fragile and can be altered during the interview process if sufficient instructions regarding the interview are not provided at the beginning, including the need for the participants to vocalize their “inner speech,” allowing for their thoughts to be vocalized and included (Seidman, 2005; Ericsson & Simon, 1993).

Semi-structured interviews were used as the main data collection method in this study. These interviews were conducted during the two weeks following the end of school and the completion of the assignment. The purpose of in-depth interviewing as a research technique is to cultivate an understanding behind the meaning that people derive and construct from their life experiences (Seidman, 2005). Since the goal of this study was to determine the levels of engagement, experiences, and perceptions of students building IF artifacts, a qualitative research methodology was implemented. The qualitative methodology is appropriate as a means to explore and determine the functional process of a particular initiative, the effectiveness of its implementation methodology, and, ultimately, the level of success or acceptance achieved by the initiative. In the context of this study, the success of the integration of IF into educational curriculum is a more subjective measure. Here, student phenomenological interviews and field notes served to illuminate the perceptions and experiences of working with IF as a component of the education experience.

All interviews were conducted via Skype™ and were recorded to accurately capture and verify the content of the interview for coding purposes. While establishing rapport might be more difficult in some circumstances via Skype™, the researcher had already established
comfortable relationships with the participants during the artifact development phase of the
study. Skype™ was utilized rather than face-to-face interviews because the artifact development
time extended to the end of the school year, and after that point, students were no longer
available for conversation at the school. Traveling to each student’s home location for interviews
was impractical. Each student was at his or her home location, while the researcher was at his
home office location. The interviews lasted approximately 45 minutes to one hour in duration.

Each interview started with the researcher reading the following statement.

Researcher: I want to thank you for your willingness to meet with me today. Now I’d like to
talk with you about your experience with the Interactive Fiction game assignment. I have a series of questions, and there are no right or wrong responses. These are all questions regarding how you felt and what you thought about the assignment. So, any positive thoughts, any negative thoughts, any neutral thoughts. It doesn’t matter that you think, and no one will see your responses other than in writing, so no one will recognize your voice. Also, your name will not be seen anywhere, and you will not be otherwise identified. So you can say anything you want about the assignment, and none of your teachers will have any idea about what you said. You can be completely honest, and remember that there are no right or wrong answers since these questions are about your experience. Please answer the questions in depth. No thought is too little for you to share. I want you to feel free to share information you feel hasn’t been covered through the questions. So let’s begin.

The participants were asked to describe their experiences, thoughts, and feelings in
response to a series of eight questions covering emotional engagement, cognitive engagement,
and behavioral engagement, including a couple of general questions.

**Interview Protocol**

The semi-structured interview questions composed were crafted to elicit informant
reflection and explanation of the use of IF in the classroom environment, determine the
effectiveness of IF in facilitating the achievement of learning objectives, and assess the
likelihood of continued acceptance of IF as a learning tool. The interview questions were framed
to address the core issue of the purpose of the study, and guided by this study’s research questions, the following protocol was developed for the interview.

1. **IF Perceptions and Preconceptions**: What were your thoughts when you first found out that you would be working on an Interactive Fiction game?

2. **Emotional Engagement**: How did you feel while working on your IF game? Think about things such as enjoyment, what you might or might not look forward to doing, and how comfortable you might or might not have been making a game out of your course material.

3. **Emotional Engagement**: Were you pleased or disappointed with your final game product for the assignment?

4. **Cognitive Engagement**: What did you find to be the most interesting aspects of working on the assignment, and what were the parts of the assignment that you found uninteresting?

5. **Cognitive Engagement**: How enthusiastic or unenthusiastic were you during the construction of your game?

6. **Behavioral Engagement**: How did you spend time outside of class thinking about or working on your game assignment, and if so, what did you hope to accomplish?

7. **Behavioral Engagement**: Did you feel motivated to work on your game during the class time?

8. **IF Perceptions**: What advice might you offer to students doing this assignment in the future so that they get the most out of the experience?

The interviews were conducted in the semi-structured framework as is most appropriately utilized in this context (Laforest et al., 2012; Woods, 1998). The interviewer was able to guide the conversations in the directions most appropriate in the interviewer’s estimation (Corbetta, 2003). The inherent flexibility of the semi-structured framework allowed for the deeper pursuit of discussion themes that displayed the most probable valuable during the course of each interview. The questions themselves were written to be open-ended, to encourage reflection among the participants, and to elicit responses that probed at deeper issues of perception and experience.
Memoing Observations and Field Notes

Memoing is a technique that allows researchers to capture their experiences, impressions, and observations during the course of the study (Miles & Huberman, 1994). The researcher utilized memoing to maintain an audit trail and to collect information through field notes during the curriculum development process (with the teacher) as well as the IF game artifact development process (by the students) in order to gather data relevant to behavioral engagement.

The interview questions listed above were designed to explore the emotional, cognitive, and self-reported behavioral components of students’ engagement as identified in Fredricks and colleagues’ (2004; 2011) model. The third component, behavioral engagement, was identified and assessed through direct observation by the researcher of student behavior during the duration of the study in the classroom. In keeping field notes, the researcher had a chair and table on the side of the classroom that provided a good vantage point for observations. It was from this position that the researcher made most of his notations. In some cases, the researcher would stand and move to the front of the classroom in order to have a better view of student facial expressions as they worked on the assignment.

Behavioral engagement was measured by observing participants during the execution of particular tasks or activities. In this case, the observer looked for both positive and negative evidence of engagement. This included examination of how intently focused the students were on the task (actively working on the computer, talking with their classmates about assignment details, sharing work the teacher in order to show off progress made) and how easily the students were distracted during the assignment (having unrelated side conversations, looking out of the classroom windows, frequently walking away from the work area, etc.). Appendix C is the Engagement Observation Protocol that was utilized during the course of this study. In addition to measuring behavioral engagement of the participant subset of 14 students, several of the items
included in the protocol were focused on emotional and cognitive engagement. This served as an additional data source and provided some amount of triangulation of data by having more than the interview measure of the emotional and cognitive engagement variables. This allowed the comparison of interview and observation data.

**Privacy and Confidentiality**

It is of great importance, especially in qualitative research, that researchers consider the overall quality of the data they are able to gather in interviews against concerns of privacy and confidentiality. Pseudonyms were used to protect identities of the participants. Details of the exact private school and location were obscured. The Skype™ interviews were transcribed into written transcripts, and the identities were tracked by pseudonym, and only by the researcher. However, the participants were also be made aware that complete identity protection and confidentiality was not completely possible, especially using narrative-oriented interviews (Ensign, 2003; Howe & Eisenhart, 1990; Richards & Schwartz, 2002).

**Study Timeline**

The overall timeframe for the data collection portion of the study was eight weeks, starting from curriculum development with the teacher, then to artifact creation and completion with the students, and finally to the interviews with the selected student participants after the end of the assignment. Phenomenological interviews and memoing activities took place in this timeframe. Data analysis and completion of the reporting took place in the weeks following the completion of the interviews. The timeline of the participant interaction and data collection portion of this study is depicted in the following table.
Table 4-1. Proposed Study Timeline

<table>
<thead>
<tr>
<th>Study Week</th>
<th>Activity Conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher curriculum development</td>
</tr>
<tr>
<td>2</td>
<td>Teacher curriculum development</td>
</tr>
<tr>
<td>3</td>
<td>Students are provided with IF game example segments to play</td>
</tr>
<tr>
<td>4</td>
<td>Students plan their IF games</td>
</tr>
<tr>
<td></td>
<td>Students gather game content materials</td>
</tr>
<tr>
<td></td>
<td>Researcher observes student activities</td>
</tr>
<tr>
<td>5</td>
<td>Students begin construction of IF games in Inklewriter</td>
</tr>
<tr>
<td></td>
<td>Researcher observes student activities</td>
</tr>
<tr>
<td>6</td>
<td>Students complete construction of IF games</td>
</tr>
<tr>
<td></td>
<td>Students conduct testing of their IF games</td>
</tr>
<tr>
<td></td>
<td>Teacher and researcher select student to participate in interviews</td>
</tr>
<tr>
<td>7</td>
<td>Researcher conducts participant interviews</td>
</tr>
<tr>
<td>8</td>
<td>Researcher conducts remaining participant interviews</td>
</tr>
<tr>
<td>9</td>
<td>Researcher transcribes interviews</td>
</tr>
<tr>
<td>10</td>
<td>Researcher begins interview coding process</td>
</tr>
<tr>
<td></td>
<td>Research concludes interview coding</td>
</tr>
</tbody>
</table>

**Interview Process and Transcription**

Each interview was conducted via Skype™ and digitally recorded. The procedure of recording allowed the interviewer to capture the core meaning and intent conveyed by each participant as well as more subtle messages that could only be detected through reviewing the interviews more than once in the participants’ own words (Brenner et al., 1985; Maykut & Morehouse, 1994; Myers & Newman, 2007; Rubin & Rubin, 1995). Letting the participants know that the interviews were being recorded provided assurance to the participants that their words were to be examined in the larger context of their complete statements. This assurance, in turn, provided the participants a greater level of confidence in being candid and forthcoming during the interviews. Allowing the participants to review the transcripts of the interviews (provided to them by the researcher) also allowed them to conduct member checking, a qualitative strategy for improving rigor of the research (Creswell & Miller, 2000), be acquainted with the research at a somewhat deeper level as well as having provided them with the opportunity to correct inaccuracies or misconceptions that would have altered meanings and have
had an adverse effect on the whole research (Grundy et al., 2008; Hagens et al., 2009; Poland, 1995; Radnor, 1994).

In order to assure accurate organization and facilitate appropriate analysis (McLellan et al., 2003), the dialog of each interview was transcribed soon after the completion of each interview. The researcher transcribed all dialog for more accurate and effective organization and analysis of the information obtained during the interview process (McLellan et al., 2003; Glesne, 2006).

Informed consent was obtained from the participants’ parents prior to study implementation. The interviews were scheduled and conducted after the assignment was completed, allowing time for the participants to form their thoughts. Lengthy interviews are difficult to sustain for both interviewer and participant (Measor, 1985); therefore, each interview lasted no longer than one hour. Additional follow-up conversations were discussed as a possibility, but none were conducted. Prior to the initial interviews (and after informed consent letters were signed), each participant was given a copy of the interview questions to be covered during the session.

**Procedure**

The initial setting for the study was the classroom environment in which the researcher was able to observe the students work on their game artifacts, interact with their classmates, and communicate with the teacher. The researcher captured these observations in a field journal, making notations regarding a variety of verbal and non-verbal student behaviors. After the students completed their coursework and submitted their IF projects for grading during the last week of the school year, the students left school for summer break. All the participant interviews were conducted in the first two weeks after the start of the break, in June, 2015.
Data Analysis

In applying the transcendental phenomenological methodology to the study of the codes of semi-structured interviews and observation memos, a “picture” (or essence, in phenomenological terminology) should emerge regarding the value and utility of IF in the teaching and learning environment. For the purposes of this study, data analysis was performed utilizing the Modified Stevick-Colaizzi-Keen method as detailed by Moustakas (1994). This method was more appropriate for the study than the widely used Modified Van Kaam method largely because of the researcher’s invested nature in the subject matter of Interactive Fiction. Also, the clarity of the process steps may contribute this method’s desirability among researchers (Creswell, 2012).

The Modified Stevick-Colaizzi-Keen method is based on performing phenomenological reduction, and this includes bracketing, horizontalization, organizing invariant qualities and themes, and the construction of textural description of the phenomenon (Merriam, 2009; Moustakas, 1994). The initial set of data (on which analysis was conducted) was obtained directly from the researcher’s experiences. Horizontalization resulted in the assignment of equal value to each statement connected to a segment of meaning, and these segments were grouped into themes. As a method of organizing the themes identified after reduction and horizontalization, a process of open coding was used for structural categorization. While not a necessarily a standard component of the Moustakas approach, conducting the open coding process at this point was a very useful organizational step. Ultimately, the segments and underlying coded themes were synthesized into textural descriptions. Imaginative variation was used to examine the textural description from a number of differing perspectives, leading to a conceptualization of the structure. Textural-structural descriptions were developed for each study.
participant, and all the descriptions were coalesced into a universal description of the entire participant group experience (Moustakas, 1994).

For example, the researcher utilized the practice of writing memos throughout the study, from the developing of the curriculum and actual assignment activity phase in the classroom to the interview sessions with the participants. This was performed as a way of facilitating the researcher’s self-examination and reflection regarding the process and the nature of the data being collected. The memos were free form, sometimes capturing the researcher’s thoughts regarding the work of the study, interacting with students as a support mechanism, and even answering questions after the assignment was completed on questions regarding the technical operation of Inklewriter. In other instances, the memos recorded researcher impressions of the assignment process, challenges in communicated technical information to middle school students, and what might be improvements to the assignment should it be offered again in the future.

Originating with Husserl’s (1970) work, phenomenological reduction is focused on an analysis to reduce the data to that which is relevant only to the phenomenon. The researcher’s process was to carefully examine the interviews, field notes and journal, and the survey in order to eliminate from consideration all data that not related to the activity of Interactive Fiction artifact development in the context of the classroom assignment. It was during this process of reduction that bracketing was performed. The bracketing process allowed the researcher to develop insights regarding preconceptions of student and teacher skills and advance preparation required or desirable for a game development project.

Once all the data was gathered as a result of memoing, observations, rubric evaluation provided by the teacher, and the participant interviews, the researcher examined the data without
assigning greater weight to any particular source. Since any particular phenomenon may be experienced through multiple differing perspectives, horizontalizing is a continual process. A second check was conducted to verify that none of the originally excluded data should have been retained as being relevant to the phenomenon. This dual-pass horizontalization process allowed for a confident integration of data and subsequent development of codes, eventually grouped into themes and then essential themes (and data deemed not relevant at this point were permanently excluded from further consideration). The themes that emerged from the data were reflective of student experiences, behavior, and perceptions, and this provided a foundation for the rich textural descriptions provided in the Findings presented in Chapter 5 of this study.

As a secondary, indirect measure of cognitive engagement (examined in Research Question 2), the teacher used the collaboratively developed IF activity rubric and assessed the students’ artifacts for appropriate historical content as part of the usual grading process. Later, during the interview process, participants commented on what course content they perceived themselves to have retained during creation of their artifacts (and during the final class session, the researcher also recorded in memos the comments students made regarding satisfaction in their work).

Before further reviewing the transcripts, the researcher listened to all the interviews again to form a general understanding of the participants’ experiences in the context of their verbal accounts, and the research recorded additional reflections as part of the memoing process. Later, the researcher listened to the recorded interviews while reading the transcripts. The researcher then undertook a second reading, at which time notes were made in the margins of the printed transcripts as a first step toward thematic analysis, and subsequently the researcher compared these margin notes with the memos taken earlier. In two cases (one related to the amount of time...
spent outside of class on the assignment and the other related to using pictures in Inklewriter) there appeared to be contradictions between the transcript notes and the memos. To resolve the apparent discrepancies, the researcher referred to the observation notes taken during the class periods and determined that the memos provided a more accurate interpretation of the transcript data for purposes of coding and developing themes. Ultimately, each transcript was reviewed multiple times in order to have confidence that sufficient and accurate thematic information was extracted and comprehended.

The transcripts were processed through QSR NVivo 10 for Windows, which is software specifically developed to aid in qualitative research data analysis. As a platform for reviewing unstructured data such as interviews, NVivo allows the researcher to manage and facilitate the process of coding narrative data, specify coding categories, and reference the associated narrative passages across all interview subject data.

The coding process took place after transcription of the interview and inputting the data into NVivo. With the transcripts now in the NVivo software and available through the software interface, the researcher was able to study the transcripts to develop a strong sense for the data and relationships of ideas as a starting point. A more detailed reading was conducted, and common information points were tagged and coded within NVivo as “nodes.” This coding was conducted across all interviews (initially categorized by interview question) with the goal of understanding the student participant experiences in totality rather than individually. Figure 4-1 is a screen shot of the NVivo interface.
After the first complete round of coding, performed in three passes of data review, the researcher identified 167 discrete codes which were categorized and coalesced into 25 themes through the six interviews. Further, each thematic statement was again read, keeping in mind the context all interviews in order to determine essential themes as expressed by the participants. In this process, the initial 25 themes were combined and distilled to nine essential themes as well as 61 final codes as listed in Table 4-2.

As a validity check of the researcher’s coding process, a peer of the researcher also went through the process of coding one of the interviews for a comparison of the resulting codes and identification of essential themes. The peer coding process yielded similar codes, even considering the researcher’s greater familiarity of the interview material as well as personal knowledge of the student participants during the weeks of the game development process.
<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Essential Themes</th>
<th>Final Codes</th>
</tr>
</thead>
</table>
| **What are the experiences, behaviors, and perceptions of students during the development of an Interactive Fiction game artifact as an assignment in the middle-school History classroom?** | Collaboration (C) | C::Communication  
C::Collaboration  
C::Assistance  
C::Privacy  
CW::Idea Challenges  
CW::Structure Challenges  
CW::Frustration  
CW::Technical Difficulties  
CW::Lack of Knowledge  
CW::Initial Reticence  
CW::Prefer Traditional Assignment |
| **Challenges of the Work (CW)** | Design Process (DP) | DP::Story Creation  
DP::Creative Flexibility  
DP::Character Creation  
DP::Game Ideation  
DP::Choice Development  
DP::Error Troubleshooting  
DP::Map Layout Development  
DP::Inklewriter Questions  
DP::Time on Task  
DP:: In Class Work  
DP::Out of Class Work  
DP::Time Considering Game |
| **Assumptions and Preconceptions (AP)** | Enjoyment of Assignment (EA) | EA::Fun Assignment Overall  
EA::Creative Enthusiasm  
EA::Writing Enjoyment  
EA::Interactivity Enjoyment  
EA::Enjoyed Gameplay  
EA::Enjoyed Gameplay |
| **How do middle-schoolers' experiences with Interactive Fiction game construction influence their emotional, cognitive, and behavioral engagement?** | Characteristics of Assignment (CA) | CA::Assignment Documentation  
CA::Traditional Assignment Comparison  
CA::Creative Opportunities  
CA::Different Assignment Type  
CA::Combining Fact and Fiction  
CA::Grade Earned  
CA::Excitement  
CA::Research |
After coding and coding comparisons, the researcher continued with the Moustakas approach by working to develop structural and textural descriptions based on the identified essential themes gleaned from the interview transcripts. With the essential themes and code categories functioning as guides for the extraction of meaning, descriptive text was produced and utilized in conjunction with participant statements for a rich description of the essence of the experience. This described text was specifically selected and used in order to highlight the participants’ experiences while retaining the depth and texture found within the unprocessed interviews.

Imaginative variation is a process by which a researcher interprets experiences in order to understand what meaning the phenomenon to the participants. Here, the researcher aligned the meanings that emerged from the participants’ interviews with the meanings derived from

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Essential Themes</th>
<th>Final Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort and Result (ER)</td>
<td>ER::Satisfied with Result</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Dissatisfied with Result</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Retained Content</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Ease of Game Creation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Ease of Story Writing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Fewer Limitations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ER::Greater Engagement</td>
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<tr>
<td>Looking Ahead (LA)</td>
<td>LA::Brainstorm</td>
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<tr>
<td></td>
<td>LA::Collaborate</td>
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<tr>
<td></td>
<td>LA::Research</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LA::Plan Story</td>
<td></td>
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<tr>
<td></td>
<td>LA::Plan Map</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LA::Do Not Procrastinate</td>
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</tr>
<tr>
<td></td>
<td>LA::Enjoy the Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LA::Select Good Topic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LA::Improve on Game</td>
<td></td>
</tr>
<tr>
<td>Predispositions Regarding Regular Assignment (PRRA)</td>
<td>PRRA::Restrictive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRRA::Lacks Creativity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRRA::Lacks Flexibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRRA::Quicker to Completion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRRA::Less Complex</td>
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</tbody>
</table>
classroom observations, more subjective interpretation of the context behind the interviews, survey response data, and conversations with the participants’ teacher. The alignment performed through the exercise of imaginative variation supported particular interpretations which were subsequently utilized in identifying and extracting particular descriptive passages in the interviews. The textural descriptions were written for each participant and organized in such a way as to assist in arriving at the essence and meaning for the experience. Finally, categorization and grouping of each essential theme within the context of the research questions was initially determined and then revised during the process of aligning findings and the subsequent discussion sections of this study.

**Credibility, Transferability, Dependability, and Confirmability**

The rigor of qualitative research was accomplished through the application of the following: credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). For this qualitative study, the internal validity was represented by the establishment of credibility; i.e., the level of confidence in the believability of the study’s findings and the interpretation of the data (Glesne, 2006; Rubin & Rubin, 1995). In order to assure greater credibility of the study analysis, the transcendental phenomenological methodology was sufficiently transparent, which included checking the interpretations made against the raw interview transcripts. Additionally, there are eight methods to be utilized by qualitative researchers in establishing credibility (Creswell, 2012). These are prolonged engagement, triangulation, peer review, negative case analysis, acknowledging researcher bias, member checking, thick descriptions, and external audits.

Of these methods, peer review, acknowledging researcher bias, member checking, and external audits primarily were used for the establishment of credibility. A selected colleague (someone who has had experience with the coding process) was tapped as a peer to provide
external review and thoughtful commentary regarding the methodology and study conclusions (Glesne, 2006). The strategy of reflexivity (critical self-reflection) was utilized to consider predispositions and possible researcher biases regarding the research. In this way, the increased self-awareness of the researcher allowed for the measurement and maintenance of control over any potential biases (Johnson, 1997). Sharing the transcripts of the interviews with the participants was the process of member checking (also known as participant feedback), and this allowed the participants to correct any misinterpretations or miscommunications so that an accurate representation of the interviews is provided in the study (Johnson, 1997). The member checking process was also useful in providing another check against researcher bias by ensuring relevant points were not overlooked and minor points were not overemphasized, both with the effect, intentional or not, of skewing the analysis and interpretation of data gathered. Transcripts were emailed to the student participants for their review.

Looking beyond credibility, dependability is addressed by reporting the study processes in rich detail herein so that future researchers may repeat the work (though obtaining the same result is not necessary). Additionally, the greater the reported detail, the greater the likelihood that the reader will conclude that proper research practices have been adhered to (Shenton, 2004).

Confirmability was most effectively established through the performance of audits of the research process. Process descriptions provided in this study allow the reader to determine whether to accept the data obtained during the interview process. An audit trail is critical to the process allowing any reader to follow the course of the research step-by-step via the decisions made and procedures described. The audit trail for this study is described in Appendix D.
Study Limitations

To the extent that the research illuminated the subjective interpretation of the usefulness of IF of the participants as well as the researcher’s observations of participant experiences (Fossey et al., 2002), the researcher took care to not incorporate existing knowledge of the field with the conclusions based on the conducted interviews and observations. Written transcripts assisted in separating researcher knowledge from the conclusions obtained from the interviews, especially with the report framework that referred concluding statements back to specific interview question-and-answer exchanges.

While selection bias might have posed a problem for consideration (Collier & Mahoney, 1996), of greater concern was the identification of a suitable class for the study, based on the limited geographic area of selection. Also, there were additional limitations to the use of self-reports including the exaggeration of responses, the lack of complete answers to prevent embarrassment regarding private or personal details, and the possible non-recollection of pertinent details. It was important for the researcher to consider that self-reports may have been biased by participants’ emotional states at the time the interview questions were answered. If a participant was in a depressed or sad mood, for example, provided answers might have tended to be more negative. The researcher was aware of this during the interview process.

Epoché Statement

Much of the challenge around this research was in filtering out bias and preconceptions based on the researcher’s own history and experiences with the IF computer game genre. A researcher’s background can affect a variety of aspects of the research including the angle of investigation, the findings considered to be most important or significant, and the conclusions drawn from the investigation (Malterud, 2001). This researcher has had extensive experience in both playing and writing IF games since 1980, beginning with experience playing the classic
mainframe version of the Colossal Cave Adventure as well as Infocom titles and the original text adventure games published by Scott Adams.

Additionally, the researcher is actively involved in the IF community, regularly participating in online discussions with IF authors and players. A potential for bias existed in the selection of participants; the researcher took steps to ensure the class selected was not part of the active IF community so as not to be pre-disposed favorably or unfavorably to the use of IF in education.

The topics of computer gaming (specifically Interactive Fiction) and how people learn have been parallel themes running through both the researcher’s personal and professional lives. The researcher’s interest in computer gaming started to develop in the early 1980s when he first became aware of the Interactive Fiction game format. Because of the lack of graphics capabilities in the typical personal computer, Interactive Fiction was the most popular genre of computer game in that timeframe. It was at this time the researcher started programming his own Interactive Fiction games, usually on the BASIC programming language that was included with computer operating systems.

Developing the puzzles that were a critical part of Interactive Fiction games became a favorite activity of the researcher, and as he created more and more of his own puzzles, he also researched different types of puzzles as well as their history. He came to learn that the ability to solve puzzles could vary from person to person, and much of that was dependent on the way in which the puzzles were presented. This exploration and discovery on his part led him to want to understand more regarding how people learn and acquire new skills and abilities, especially through play-related activities (Hedges, 2000; Roussou, 2004). In 1995, the researcher designed and published a children’s interactive CD-ROM game titled *Tonio Tee* (Figure 4-2) which was a
narrative about a malformed golf tee searching for meaning in life, realizing that he could not be a successful golf tee due to his convex head. The game included a number of puzzles to solve, many based on classic puzzles such as the Tower of Hanoi.

When the researcher entered higher education in the mid-1990s, he began working in the area of curriculum design with faculty and departments, always with the concern of retaining students while improving successful outcomes among the students that persisted to graduation. This is where the researcher began integrating the idea that narrative is a key component for effective learning experiences in terms of engagement, and he combined that with his understanding that content from learning exercises and experiences is more likely to be absorbed if the learner is participating in activities that incorporate elements of play.

Figure 4-2. Tonio Tee Interactive CD-ROM.

In 2012 while the researcher was still refining his dissertation research topic, he was on a family trip visiting Colonial Williamsburg, which has been a recurring vacation spot ever since his father started taking his family there in the late 1960s. Now the researcher takes his wife and
children there at least once a year, as he has a deep affection for the way in which this historical period is brought to life, largely in an interactive narrative manner. It was during the visit in 2012 when the thought occurred to the researcher to focus his doctoral research on the use of the older style of Interactive Fiction games in education rather than the more immersive (and resource-intensive) simulation types of games played on modern computers. To fund some the research, the researcher launched a successful Kickstarter campaign for his game, the Historical Williamsburg Living Narrative. He selected his development platform, and he began work on the game. In 2013 the game was recognized by the NMC Horizon Report for Higher Education as an example of an effective use of computer games as a supplement to instructional materials in the classroom environment, and the researcher’s intent is to finish the game after completion of his doctoral work. Once the game is ready, he hopes to provide it to educators and students as a supplement for studying colonial American history.

The researcher’s interest in and experience with Interactive Fiction and narrative games spans approximately 35 years. In his current varied professional roles, the researcher works extensively in curriculum development in which he incorporates narrative gaming techniques and practices, and he has identified a potential opportunity for IF to supplement instructional materials in an effort to improve student engagement while also allowing instructors to the ability to develop IF content on their own. It is in consideration of these personal interests, attributes, and potential biases that the researcher must be careful in data collection and subsequent analysis. The researcher’s efforts to bracket his historical experiences with IF gaming includes the memoing of his observations and documentation of his thoughts and reflections through field journal notes as part of his audit trail, and as a means of triangulating the identification of themes during the coding process.
CHAPTER 5
FINDINGS

Introduction

The purpose of this study was to develop an understanding of the experiences and perceptions of 8th grade students constructing their own Interactive Fiction (IF) artifacts as part of their history curriculum at a private middle school in the Central Florida area. In this chapter, the study findings will be presented, including discussion of the study setting, review of the individual profiles of the participating students, the stories shared by the participating students (as well as observations of student experiences and behaviors made by the researcher), and a summary of the essential themes uncovered during the course of the study.

It is important to remember that the success in implementing the study was due in large part to involving the teacher at the very earliest of the planning stage and providing a level of confidence through open communication, willingness by the researcher to consider and to make modifications where appropriate based teacher input, and to help the teacher develop an understanding of the CYOA game format, including potential challenges, technical or otherwise. Facilitation of this is accomplished through communications availability and transparency on the part of the researcher. In this way, the assignment and study implementation is a strong piece of collaborative work.

Participant Profiles

The researcher interviewed a total of six students from two 8th grade classes at a private school in Central Florida. Although the interview participants were not identified until after the game artifact assignment was completed, the observations memoed by the researcher regarding all the students included observations of the participants. The notes and reflections in those memos will be discussed along with the interviews.
The students all had access to the required technology tools (Inklewriter software as well as computers or mobile devices) both in class and at home, and the participating students had at least a basic level of competency with the technology required to complete the assigned work. The students were either 13 or 14 years old. In this study, the student participants are identified by pseudonyms. The gender split (five female and one male student) as well as the ethnicity and background representation is a result of selecting interview participants as the only six students (out of the selection pool) to have volunteered to be interviewed within an acceptable period of time before it became necessary to conduct the interviews.

**Anna**

A native of the Central Florida area, Anna is the oldest of four sisters in her family, with about a decade separating her from the youngest sibling. Her father moved to the region from Arkansas, while her mother was originally from the borough of Brooklyn, New York. Anna’s recreational interests are not connected to computers or video games, as she enjoys spending her time outdoors riding horses or playing volleyball. Her indoor activities lean to the musical arts as she plays piano and violin, and she sings.

With the least amount of computer experience using applications other than the Microsoft Office™ tools for schoolwork, Anna was initially very nervous at the thought of creating a “big computer game like Minecraft.” She was very relieved to find out that Inklewriter was primarily text-based, and the task of development was more like writing an outline in her opinion. Interestingly, Anna often uses her cell phone to work on her writing assignments; she texts herself as she composes her thoughts. She felt that this method worked well for her work with Inklewriter, as she was able to text descriptions and plot elements to herself during long car rides, and she would later be able to take those text messages and input them into Inklewriter where appropriate.
Anna’s naturally effervescent nature was the main reason that her interview was relatively lengthy and filled with rich details of her experiences as well as personal thoughts about the assignment and how she felt completing it. Even though she described herself as being somewhat of a technology novice, her use of her cell phone to compose her various assignments in such a non-traditional manner was very innovative. She was an extremely verbal processor, and it was typical of her during class sessions to discuss her thoughts and ideas regarding the assignment with several of her classmates.

Caroline

Caroline’s family roots are in Germany and England, though she was born and raised in Florida. She has one sister about a year younger. Caroline is a member of her school’s volleyball team, and she sees herself entering a career field that involves the subject matter area of biology in some way.

Describing herself as a person who greatly enjoys mystery and spy-based books and movies, Caroline was initially very intrigued about the idea of IF. Her first impression was that it would be entertaining to develop games because of the enjoyment she observed in her father as he played video games. And though she soon understood that IF was a different sort of computer game, this, then, gave Caroline the opportunity to leverage her personal interest in spy stories, “I wanted to make a main character who was really good at breaking codes.” The potential for having storylines that involved criminal investigations was very appealing to her. Caroline describes herself as been naturally competitive, and she wanted her game to be one of the better ones in her class.

From the early stages of the assignment, it appeared that Caroline was very focused on “pleasing” the researcher, trying to determine what it is the researcher wanted out of the activity. It was during the third class session in which the researcher felt that he was able to convey to
Caroline that the point of the study was not to perform to a certain set of expectations, but rather to consider her own feelings about the experience. Even so, Caroline’s demeanor during the interview suggested that she was trying to get the “correct” answer to the researcher’s questions.

Gisela

Though her mother is from Rhode Island and her father is a Florida native, Gisela’s heritage is traced back to Italy and Sweden respectively. She was born in Florida, and she has three siblings: a sister who is seven years older, and a brother and sister just a few years younger. Dancing is Gisela’s main passion, and she spends much of her time outside of school in a formal dance program.

Of all the students, Gisela initially was the least interested in the game assignment. She does not enjoy playing computer games, and while she enjoys the subject of history, she is not particularly interested in fiction, even if it has an historical context. Gisela characterizes herself as a “school nerd person” who loves writing research papers, and her first thought upon understanding the class assignment was that she “really did not want to write.” However, she described the process of writing the first paragraph of her game as surprising; upon seeing the number of choices her first paragraph presented, she became more interested in developing a narrative. Gisela appears to be the most quantitatively-minded student, in that she planned her game in a very numerically methodological manner: there would be only three endings, there would be a set number of branching choices to use—and she determined a number before composing a narrative and letting the number flow from there—and so on.

The manner in which Gisela organized her IF content materials and planned the outline of her game was very appealing to the researcher, as it was very similar to the process he used in game development. Although she was not greatly interest in computer games, she was very willing to talk about them and ask questions of the researcher during the interview in order to
better understand the questions being asked. Gisela was a very pleasant student to interview, happy to talk about her experiences.

**Javier**

Javier’s Hispanic heritage comes both from his father who was born in Puerto Rico as well as grandmother on his mother’s side who was born in Cuba. Like his mother, Javier was born in the Central Florida area. He was the youngest of the participants at 13 years (the others were all 14 years of age), and he has one sister about two years younger. Javier does enjoy playing computer games, and acting is one of his main interests.

Javier was the least talkative of the six students interviewed, while he was also the student with the most experience in game programming on computers. However, his programming experience has been in platform or sprite type of “video” games rather than IF. Javier was clear that he does not like writing papers, but the idea of coming up with his own story framework for the assignment was very appealing. He considers himself to be a good student, and in addition to his coursework, he enjoys his extra-curricular activities. During the course of the assignment, several of the students from both classes experienced a particular technical error with the Inklewriter software, and Javier was the one to discover the solution to the issue.

At first, the interview with Javier was slow-paced due to his naturally introverted nature. However, once discovering his strong interest in Science Fiction, the researcher was able to connect with him on a more personal level, allowing Javier to feel more open to express himself. However, his answers were still fairly short in comparison to the other participants’ interviews.

**Sybil**

Sybil was born in Central Florida, and she was adopted by her parents who are also Central Florida natives; all share a Caucasian ethnicity. She has three half-brothers, though they
are grown and she does not live with them. Like Javier, Sybil enjoys playing video games, and she uses her computer to stay in touch with friends and relatives through Skype. She loves cats and has one named Missy as a pet.

Sybil is very much interested in graphic arts and illustration, and she maintains her own website on which her work is displayed. While not as interested in narrative fiction, when she found out that she could incorporate graphic images into Inklewriter games, she became much more interested in the assignment. Unfortunately, she was ultimately frustrated because she was unable to learn how to use the graphic images she created and displayed on her website. Ultimately, she used images not of her own creation, but even so, she discovered that authoring the IF game was able to hold her interest “all the way until the end of the school year.”

Sybil’s interest in graphic arts was the basis for many conversations with the researcher during the class sessions regarding how to go about selecting appropriate images for the game artifact, and this tone continued into the interview. She appeared to be as interested in the researcher’s experience as was the focus on hers, so she asked several questions regarding his thoughts on her game.

**Zeta**

Zeta’s mother is from the South Florida area while her father comes from Florida’s Gulf Coast. Zeta, though, was born near Atlanta, Georgia, and her family (including one older sister) moved back to Florida when she was still very young. Zeta enjoys artistic activities including singing, acting, and drawing. As with several other participants, she has little interest in computers generally. Zeta’s favorite academic subject is English literature.

Describing herself as a “social person interested in what my friends are doing,” Zeta says that she most enjoyed working on her game and sharing her work immediately with her classmates. She liked to actively incorporate feedback in her design, making adjustments in
response to others’ comments. She is not particularly interested by research paper assignments, and she was happy for the change as the last history assignment of the year. Often during the interview Zeta would refer to Nancy Drew stories as providing templates for her own thinking, and she actively tried to find illustrations fit her perception of what Nancy Drew would look like working on a case. During class periods, Zeta would get up from her seat and walk over to different classmates and offer friendly critiques of their work.

Zeta seemed to think the interview was about soliciting why she thought IF game artifacts were superior to written paper assignments, and she entered the interview slightly defensive of those more traditional assignments. Once the researcher explained that the interview was not about comparing types of assignments, her posture visibly loosened, and she took on a much more relaxed appearance which continued for the duration of the interview.

Presentation and Summary of Essential Themes

During the coding process, nine essential themes emerged from the textual content of the observations recorded in the field journal, the notes memoed by the researcher, and the participant interviews. Although the essential themes emerged primarily during the interview coding process, initial readings of the field journal and memoed notes gave the researcher a frame of reference as a starting point. After the first coding pass of the interviews was completed, content from the field journal was folded in as a check. Codes were compared to initial interview memos to ensure the context of students’ statements remained aligned with the essential themes. Analysis and commentary on these essential themes are provided below, presented under the associated Research Question from which the thematic analyses were extracted.
**Student Experiences, Behaviors, and Perceptions During IF Game Construction**

The first research question asked: What are the experiences, behaviors, and perceptions of students during the development of an IF game artifact as an assignment in the middle-school History classroom?

In addressing this question, three of the essential themes: *collaboration, challenges of the work*, and *design process* focused primarily around a) the manner in which students interacted with each other; b) the conceptual difficulties students experienced in understanding the process of providing a fictional game framework around historical research along with the technical difficulties of working with the Inklewriter software and the requisite hardware platforms; and c) the potential complexities of the creative process associated with story ideation, plot and character development, as well as time on task and time management details important to completing the assignment in the allotted time. Additionally, examination of the research question reveals the importance of context; how, for example, understanding of the scope of the game assignment affects student perception of enjoyment or even *anticipated* enjoyment of constructing the artifact. The final essential theme categorized under this first research question, *assumptions and preconceptions*, addresses student perceptions before having gained any experience in constructing IF game artifacts and their retrospective perceptions regarding their experiences and behaviors after having completed the assignment. After the assignment is over, the students have perspectives allowing comparison between constructing IF and working on other assignments types such as writing reports or giving presentations. Being able to compare and contrast student perceptions from before to after provides a good opportunity to see changes that result from the IF assignment.
Collaboration

For all but one of the participants, the ability to collaborate on the IF assignment, especially during the early stages of the project while everyone was learning about the Inklewriter software environment, was a way in which they were able to support each other through the process of becoming familiar with the game development process in general as well as the process of IF game ideation and development specifically. (Even so, the body language exhibited by the one participant did not indicate any hostility or suspicion of her classmates; rather she was intent on developing her artifact with little interaction, and she was not interested in discussing her ideas.) During the first two class sessions of the activity, the researcher demonstrated several sample games (authored specifically to provide examples specific to the assignment), gave presentations on the basic use of the software and the creation of accounts, and diagrammed how to build a game map that met the criteria the instructor gave for the development of the game artifact.

After these informational sessions, the class periods were devoted to hands-on exploration and experimentation in which the students worked through some simple exercises designed to help build familiarity with the process. During these times, the researcher observed the students working together to help each other complete the exercises. Not only would the students work with the classmates with whom they were directly adjacent, they would freely get up and move about the classroom when seeking help for particular questions.

During the interview Anna stated, “I didn't know much about it but in class it was valuable for me because then my friends, some of my friends, knew how to do it so I could just ask them. So that was helpful.” Anna’s process, as was the behavior of many of the other students, was to go from table to table (students were seated at tables in the classroom grouped by fours) asking if anyone knew how to perform a task or could offer suggestions for a problem
(either design or technical) she was having. This was very much an open and reciprocal process among nearly all the students in the class. In addition to moving from classmate to classmate, the researcher observed a unique method of collaboration when students passed around the laptop computers or tablets rather than move themselves around the room. Students would actually type comments or make Inklewriter edits before handing the devices back to their owners.

Some of the students in the class preferred to work in a closer circle as exemplified by Gisela’s behavior. She was a quieter student, more inclined to speak primarily with her direct neighbor.

Gisela: Yeah I worked with I think mostly one person. I think I like went to somebody else but uh, that person I worked with was right by me and we actually swapped our things sometimes just to look through which was like, hey, I have a loose end here. Okay, well you've got this here. And so that was really helpful. I was grateful I did things in classwork… the things that made it easy was working in class because I could kind of ask the person sitting by me, “do you how to do this?” And we mostly like helped each other out you know get that thing through. So everything was, it was pretty smooth sailing.

Interestingly, while Gisela typically did not get up to move about the classroom to ask questions or join in broader conversations, the researcher noticed that she appeared to be aware of conversations in other parts of the room, and on occasion she would offer verbal feedback to conversational sidebars taking places at other tables. Also though Gisela was a quiet (and somewhat introverted student), she did not seem to mind if other students approached her with questions, and on several occasions, other students from various parts of the classroom approached her with their devices in hand, asking for her opinion on their works in progress, and she never hesitated to oblige them.

The freedom to openly collaborate through the entire classroom was, in part, attributable to the perception of a typical lecture-based class having different expectations regarding acceptable collaborative behavior. Anna noted that, “it wasn’t as strict it would be in a lecture
where you’d have to listen, and you can’t do anything.” Zeta said similarly, “Instead of feeling liked I’d get in trouble for talking, the teacher made it clear that we should be open to working with others and sharing whatever we figured out.” The researcher observed during one class session that as the students discussed their individual artifacts, laughter would occasionally erupt. Rather than ask the students to moderate the laughter or noise in the classroom, the teacher would often remain seated at her desk and smile with some level of amusement.

In class, the researcher spoke with the teacher and several of the students regarding the collaborative dynamic during the assignment. The teacher’s response was that the students were typically very well-behaved, and they were very capable of giving full attention to a lecture assignment without being disrupted or overly conversational (though low-tone conversations about the subject matter were not discouraged).

The researcher’s observations confirm the teacher’s assessment of general student behavior: whenever the teacher addressed the students as a group, the activity in the classroom tended to slow down, and the sound levels dropped so that the teacher could speak without difficulty. The classroom itself did not afford a luxury of space for the 18 students it held, so the seating arrangements were shoulder-to-shoulder. Students attributed their usual discipline to overall interest in the subject matter, and this interest was demonstrated through posture, direction of gaze, and apparent level of focus as noted in the researcher’s field notes.

The introduction of the game development software late in the school year and without any prior experience, and the fact that the teacher had no experience with the software did not appear as a lack of preparation from the students’ perspective. Zeta observed that the teacher, “didn’t know a lot about Inklewriter or making a game, so she wanted us to discover things.”
The students took advantage of the flexibility given for discovery during class time, and given Zeta’s strong interest in fiction along with her social nature, this was a welcome development.

While the researcher was available during the class periods to provide assistance, the students typically tried to answer their questions through conversation and the collaborative process. Gisela adds, “What really helped was all my classmates’ interaction.” In response to this particular comment during the interview process, the researcher asked if that helped more than having the researcher present to provide help. Gisela’s candid response revealed an attitude about ownership of the game artifact and enjoyment of the game development process: “making the game felt more like making an art project in class to me. I wouldn’t want [the teacher] to do it for me, but I didn’t feel weird getting help from my friends. That was just part of the fun of it.” It was apparent that Gisela felt student feedback was less directive or insistent than the teacher’s comments would be, and as a result, she was easily able to heed or discard any suggestions made by her classmates, while she might feel more compelled to accept the teacher’s suggestions as “strong recommendations” toward building a proper game artifact.

Of the participating students, Caroline was much more guarded in her willingness to share her work, and that informed her attitude about collaboration during the project. Her sentiment was, “I didn’t really feel comfortable sharing my game until the very end when it was complete.” The key to her feelings appeared to be both a feeling of self-consciousness about her work as well as the desire to protect her ideas.

Caroline: I didn't really show anybody, specifically, my game until we had to because I was kind of self-conscious about it, like nobody's going to like my game, I don't want to show other people so they can quote unquote cheat off of me. I mean, I'm kind of that person where it has to be original, it has to be, um, what I really want it to be, but I mean, one of my classmates that was seated to the right of me, he would always be commenting on my game, like he'd peak over, look at the pictures I was putting on. He just, he was really interested in my game, and his game turned out to be really well also.
Caroline also readily admits that she is a very competitive student (which the researcher observed in her non-verbal behaviors of becoming impatient when others wanted to see her artifact—she became more relaxed when her laptop computer was again in her possession, and she was able to work on her game with urgency and intensity), and she mentioned during the interview process that she wanted her game artifact to be one of the best in the class. As a result, Caroline was willing to collaborate to receive assistance as that would help her attain the result she expected of herself.

Caroline: I got help from, I believe, [Zeta] and some of my other classmates that were at my table. They kind of helped me out with my project a little bit and that was useful information. And of course when you came and did your presentation and came to answer any questions and help out with this assignment.

For Caroline, communication with her classmates was more about getting assistance when she encountered challenges as opposed to the sharing of ideas and more general conversation regarding the assignment and the game creation process. Which leads into a discussion regarding the challenges encountered by the students regarding both the conceptual and technical aspects of the assignment.

**Challenges of the Work**

Students encountered a number of challenges while working on the IF game construction assignment and the themes distilled from the participant interviews give clear indication about the students’ thoughts and concerns. Difficulties with the assignment, uncertainty around IF development, and lack of prerequisite skills or knowledge were the top challenges that were derived from the coded interviews.

Difficulties were categorized primarily as technical difficulties in terms of understanding how to use Inklewriter as well as technical glitches or errors encountered, and also difficulties related to designing a game that appropriately integrated the required historical information into
the game framework. This framework piece also included questions around building a game “map” that defined the flow of the narrative structure.

Gisela expressed a common theme among the students in saying, “I was excited, but I was also nervous because I don’t know any computer programming. I have never done a game before.” She clarifies further that her concern wasn’t simply about understanding how to program (use the Inklewriter tool), but more fundamentally about knowing what the outcome of her work would be like, since she had never worked on this type of assignment before: “It was hard for me to know what my game would be like after I was done, and I really didn’t know anything about Inklewriter, so I was nervous about that.”

This nervousness and uncertainty was common among the other participants. Anna recounted, “Well, first it kind of scared me because I was like, oh dear! I have to make up something, and then also apply it to what we’re learning.” Zeta observed, “at first when I was trying to come up with my idea, I had no idea what that was, what I was going to do, so that took quite a while and was stressful.” For Javier, the technical aspects of the assignment were less troublesome than the concept, “Figuring out how to include the history stuff was hard and I wasn’t sure how to make it fit right. I didn’t like it as much. I wish I could have made up everything in the game.”

Sybil, however, represented the minority view of being comfortable at the early stages of the project.

Sybil: Like as opposed to other things, like as opposed to writing materials I enjoyed it a lot more. And I prefer it much more than having to write a 10 page paper or something. Um, as for, let's see... well, it gives us a break from like, we have our other classes, um, and we're just so used to having to write papers and it gives us and extension into new realms, that we aren't able to use often. And it's, you know, we just, with us liking technology, it gets us to have a little fun with that. And just after years and years of doing writings on, you know, paper, and stuff like that. You know, it's a nice change.
In this passage Sybil does not directly address the issue of nervousness or uncertainty, nor does she make any explicit statements regarding such. She is, however, consistent in that, other than technical issues, she felt no discomfort regarding the assignment and, rather, she enjoyed it from the beginning. In response to an interview question regarding whether or not there were any aspects of the assignment that bothered her, Sybil responded, “I guess potentially when I got technical errors I didn’t enjoy that because I’d have to delete parts, but I guess I enjoyed most of it. There really is nothing that I didn’t enjoy.” And later in the interview, “besides the fact that there was technical errors, I didn’t find anything really difficult.”

IF development was an unknown to the students, and this was cause for some level of concern and uncertainty about how to approach the assignment. The researcher observed that during the first two class sessions, there was much conversation between the students around story ideas. Overheard in class discussion were phrases such as, “how did you make the person answer questions?” or “can you make your character go back to a room he came from?” or “I need my map to branch back together,” indicated that the questions students had about the assignment were about building an IF artifact and very little to do with the content material on the topic of the Middle East.

Gisela’s comment indicates a greater level of certainty around more traditional assignments, “The thing is that I like when you do papers is that you know exactly what you need to put in, and I don’t like to have to guess too much about what the teacher might grade me on if they don’t like my ideas.”

As Javier stated, “I’ve never done interactive story games. I wasn’t sure what that would end up being like.” As with the other participants, Javier didn’t let that thought become an
obstacle to his progress, “It was cool because it was more interactive, and you could do what you wanted with it.”

**Design Process**

The IF design process was the element of the assignment that was both most challenging and most gratifying to the participants. This included both the technical aspects of the assignment as well as the conceptual pieces of building a fictional framework for the researched historical facts, authoring narrative and dialog passages, and creating a unique branching structure of choices to move the narrative forward in dramatic fashion. Part of the enthusiasm for the assignment was connected to the novelty and opportunity for more unstructured creativity compared to the more traditional types of work such as papers and presentations. Several of the students in the class expressed gratitude that they were not assigned another research paper or report to present when it was so close to the end of the school year.

Zeta: Basically we were designing a game and writing a story around the certain topic that we were learning. So that we could, so that was like a different way to look at it and a different way to be able to understand what we were actually learning in that class… I really liked the different type of, like, learning format that it was instead of just testing or writing an essay on it.

Even after expressing some initial trepidation about an IF project, Anna touched on the creative aspect, “also it was like I could be creative, and make up my own story that would still be relevant to what we were learning.” However, for Anna, that creative flexibility had its downside. “That was so hard because I had all these crazy ideas, then trying to make it actually flow into the story. It’s probably… oh, that was frustration work for me.”

Javier noted “I feel that it allowed me to be more creative with what I wanted to do, and that I could pretty much—you could have given me another topic, and I could have done something else the same way. It seemed easier for me to think of ideas and ways to put the history into the story.”
One of the main design considerations for the IF game is the “map” structure within Inklewriter. By visually depicting the connection and relationship between the narrative pieces of the game, it reflects the flow of the story, the circumstances for branching storylines based on player choice (or joining branches together), and it shows the potential pathways for gameplay leading to any one of the variety of possible game endings.

Part of the grading criteria was based on how the students’ game maps met the minimum map specifications as defined in the assignment rubric. The participants’ interview comments were often related to their thoughts regarding Inklewriter maps.

Javier commented, “When I printed out the map, I had the options.” By options, Javier was speaking to the possible player pathways through his game. “It was like the layout, but there was something different—it just looked weird but it really wasn’t. So it was kind of complicated just by looking at it. You’d have to actually study it to get it.” Javier is expressing how he experienced a conceptual gap between the game narrative in text form and a visual depiction. While the visual depiction was somewhat confusing but accurate, “it just looked weird but it really wasn’t,” it took some effort to become accustomed to the map view, “you’d have to actually study it to get it.”

There were other expressions of difficulty in grasping the visual depiction. Zeta pointed out, “Sometimes I would get frustrated because the map was turning out really strange, and I didn’t… I didn’t know how to deal with that.” For Zeta, processing the map visually allowed to think of her narrative in terms of how she saw the flow of the story, “There was one time when I had to go back and basically rewrite my entire story because the way I wrote it was wrong, like it wasn’t fitting correctly. But I would just go back and adjust it until eventually it looked right to me.”
The key word in the above interview quote is “looked,” and in the following passage Zeta uses words such as “structure,” “balanced,” and “hourglass” that demonstrates her visualization of narrative as a diagram (the “book” or “booklet” to which Zeta is referring is the Beginner’s Guide to Inklewriter in Appendix A).

Zeta: When I wrote it the first time, it was so imbalanced that it just looked like the story was progressing very strangely, and that it wasn't going to turn out like the levels that you had talked about, or like the basic structure that it had said in the book, or the booklet. And it ended up like completely opposite of that, like it was just all spread all over the place and it looked just wrong to me, and it wasn't turning out right in the end. I couldn't get to the three endings. So I would just have to make the choices and the scenarios more balanced like that kind of like hourglass type of figure that you were talking about.

There was some reluctance to veer from the patterns or shapes that were defined by the maps provided in the Beginner’s Guide. Many of the students admitted in class that they still struggled with the idea of more “open-ended” assignments, which, as a category, were introduced to them in middle school. As noted by Anna, “the map… at first I was scared to move away from it, but then I realized how hard it would be to follow the exact pattern.” It is important to consider that both the teacher and the researcher advised that the provided map examples were only examples, and there was no requirement to replicate the visual pattern. However, the students put themselves at ease on the topic through their own discussions.

Anna: So at first and like after three hours I kind of like to try to fit my map exactly like the example was, but then I was like, okay you know I'm just going to go off and do whatever, and it's so much easier. So, and then I talked to some of my good friends who were, you know, we're not copying the map, or we're still going to have all the levels or whatever. So their perspective definitely eased what I was wondering about.

For Sybil, the map was from the beginning more of a guideline than a perceived constraint. She explained, “I am actually a visual learner so the diagram really helped me. The explanation you gave in class was very good as well, but the diagram definitely helped me
follow how I was supposed to do it, where should I start branching out even further, that type of thing, and that was really helped for the project.”

Other considerations within the Design Process essential theme concerned working in class versus at home or other locations outside of class and the overall effort devoted to working on the game project. Among the participants, the ability to discuss aspects of the game assignment was one of the main positive reasons for working in class, while working outside of class, most often in isolation, allowed the participants to perform the greater parts of entering the narrative components into the Inklewriter system after story elements and flow were discussed in class. “I worked on it more outside of class,” was Javier’s response in the interview to the question of where he did most his work within Inklewriter, and to the same question, Anna’s response was, “I spent the most, the biggest percentage definitely outside of class.”

For other students, more mundane tasks as opposed to thinking about plot or integration of fact and fiction were better handled at home. Zeta observed that she, “mostly searched for pictures, and kind of indulged it more at home.” Gisela tied her work habits to having a better work environment at home. “I wasn't very motivated to do it during class. I wanted a quieter place to do my work, so that was like the whole swapping thing. I preferred to read other people's and do critiques, so I would go through mine, but I never really wrote stuff in class.”

Sybil, however, made no distinction between working at home or in class, and she rather expressed a desire to maximize her time working on the project. “Probably this assignment was the one I was most motivated about all school year because normally I just find everything else just so dull. I mean, I’ll do it, and normally I'll get a pretty good grade on it, just, I dread it. And, yeah, but in this case like I said, I just wanted to do it all day.”
The essential theme of assumptions and preconceptions establishes a baseline of engagement from an anticipatory perspective: what are students thinking and feeling before experiencing IF—before having an understanding of what IF is? Understanding this is especially useful when determining whether students’ actual engagement reflects any preconceived notion of an appropriate level of engagement based on their thoughts, opinions, impressions, and imagination prior to starting the assignment and participating in associated activities.

Assumptions and Preconceptions

When first hearing that the assignment would be the development of a computer game about the Middle East content they were studying, most students in the history class immediate thought of modern computer games that include sophisticated animation, video segments, high-quality audio soundtracks, and the like. Caroline’s experience with computer games, for example, is primarily in watching her father play video games at home, while she rarely played games herself. Javier described himself as having had some experience creating sprite-based arcade-style video games, and both he and Sybil are most familiar with games in the first-person shooter format (such as Microsoft’s Halo™ series or Activision’s Call of Duty™ games). Minecraft™ by Mojang is the game that immediately came to Anna’s mind. There was an element of disappointment among many of the students when they learned of the text-based and “low-tech” characteristics of IF, and this was clearly reflected in the statements of the study participants.

Sybil explained that, “Originally when I heard the term "video game" I thought it was going to be like first person actual video game, like you go in and like have a little story instead of the IF video game,” and then remarked that she was, “a little disappointed at first,” while Javier’s response summed up the misconception and initial feeling of excitement based on that misconception that was shared by many of the students, “Well, the assignment, when I heard it I
was like we have to make a game, and make an interactive story about a historical fiction or maybe non-fiction of something we had learned in class about the Middle East, I was like, yes! This is going to be cool.” Anna’s interpretation was the same, “well the assignment was to create a game based on what we had been learning in history, in the history class. So when I first got it before I heard much about it, and [the teacher] had briefly explained it, I thought we were making like a literal computer game, like in Minecraft, like something like that.” This is an expectation based almost completely on personal experience and knowledge, and reflects the dearth of discussion (within this particular private school at least) of computer games and video games, the different genres common now and in the past, and how different types of games might be used in the classroom environment.

As the students began reviewing their course materials, the assignment rubric, and the Inklewriter guide, they began to see the potential for satisfaction or enjoyment in the game project (again, related to the novelty of the different kind of assignment), but they still had many questions regarding the format of the game artifact they would be developing as well as the flavor of their experience. Talking about the artifact, Javier said, “I wasn’t sure what that would end up being like,” and Zeta said similarly, “I’ve never done something like this before, and even after playing the example games, I didn’t know how mine would work. It was like a mystery really.”

The researcher found it worthwhile to note that while there was considerable variation in the level of technical experience the students (and the participants) had regarding computer skills and actual game development experience, the students as a whole approached the assignment with a fairly common attitude regarding their ability to succeed. For example, Javier had previous game programming experience, while Zeta had none, yet both participants were able to
quickly develop competence with the Inklewriter tool and fulfill the requirements of the assignment. Caroline responded in the interview as having no game development experience, “I was excited, but I was also nervous because I don’t know any computer programming. I have never done a game before.” Likewise, Gisela responded when asked about having any previous experience, “Well, um, not really actually, I just watched some shows and movies that have people that are intelligent with coding and encryptions and all that type of stuff. And I just find it really interesting. I don't have any knowledge of coding though.” Gisela did fold her interest in computer coding as a character attribute in her game artifact.

In summary, four essential themes emerged when addressing Research Question 1 that were related specifically to the student experiences, behaviors, and perceptions. **Collaboration** is both part of the assignment experience as well as behavior exhibited by the students. Students made use of collaborative strategies to explore ideas and directions for their work as they sought to understand what was expected of them and where they could take the assignment. The students’ collaborative behavior in the classroom had the effect of drawing all students into a larger discussion about the assignment as well as the historical content they were meant to study.

Challenge of work is primarily a perception-relevant theme also touching upon experience. When the students felt challenged by various aspects of the assignment (using the software, developing narrative choices, etc.), they were apt to turn to collaboration as a coping strategy. However, much of the work challenge was related to students’ lack of familiarity with the IF game development process. As the assignment progressed, students expressed that the level of challenge became less concerning.

Design process deals primarily with the students’ experiences with some overlap into perceptions (what did students understand the game task to be?), while the assumptions and
preconceptions theme is directly connected to perceptions. When reflecting upon their design experiences, students focused on challenges related to what they termed as “creative” in nature: story creation, game ideation, character creation, combining factual history with the fictional scenario construct, etc. Additionally, students considered design to include technology, along with the difficulties associated with acquiring competency in the use of the technology. In this area, students were mostly likely to refer back to disappointments or frustrations they experienced during the assignment. The researcher observed, however, that the frustrations were often short-lived, and the students were able to quickly move to other segments of the project even as they were working through the challenges at hand.

Student Engagement During IF Game Construction

Research Question 2: How do middle-schoolers’ experiences with Interactive Fiction game construction influence their emotional, cognitive, and behavioral engagement?

Five essential themes emerged within the context of this second research question and are discussed below. The theme enjoyment of assignment frames much of the students’ emotional engagement with the assignment. During the interviews, the participants expressed how they found activities such as writing the story, developing their characters, and weaving history into their fictional scenarios connected them to the assignment such that they looked forward to class time to work on their artifacts. Within the theme characteristics of assignment, students exhibited awareness of the overall assignment experience, which included the materials they were given regarding the assignment, their own comparisons between building a game and writing a paper, and even their grades for the assignment. The researcher observed students working enthusiastically on their artifacts, and cognitive and behavioral engagement is evidenced in the effort and result theme. In addition to the researcher’s observations, the interview participants
expressed their level of satisfaction with their completed artifacts as well as the perception that they retained more than they might have, had they written a report instead.

The theme of looking ahead is based on students’ responses to interview questions asking how they might advise future students or what their reactions would be to experiencing similar assignments in the future. As such, it is primarily an aspect of cognitive engagement. This approach in the interviews allowed the students to “get outside of themselves” and project engagement hypothetically, freeing themselves from biasing responses to meet expectations (whether perceived as coming from the researcher or self-imposed) about their own performance during the assignment as well as during the interview sessions.

The last theme to emerge from the consideration of this research question is that of predispositions regarding regular assignment; that is, what the participants may have thought about the artifact assignment through a lens of more traditional assignments, with the thoughtful comparison tied to cognitive engagement. The researcher acknowledges that much of the students’ enthusiasm regarding the game artifact may be related to the novelty of the type of assignment; however, the interview participants were very pointed in their comparisons between constructing game artifacts and writing reports or making presentations. The students expressed that they appreciated the flexibility and opportunities to exercise some creative framing of their historical research.

**Enjoyment of Assignment**

During the span of classroom work on the assignment, the researcher attended the class on a weekly basis, observing the activities and behaviors of the students. The majority of students appeared to be engaged in the assignment, based on the level of activity and focus on the work. While a small number of students seated at the back of the classroom exhibited body language of disregard for the work (and the teacher commented that those students were typically
as disengaged with their other assignments), the rest of the class was sharing computing devices, drawing maps on notebook paper, talking in enthusiastic tones while gesturing energetically and pointing to their computer screens, and on occasion students asked the teacher or researcher to troubleshoot technical problems related to saving files, making choices within Inklewriter, or reestablishing Internet connections. Those students (such as Caroline) that worked more quietly and in greater isolation than the others were still visibly on task with their devices and paper notes depicting drawings of maps and narrative flow as boxes connected by crisscrossing lines and arrows.

The participants were straightforward in their language expressing degrees of enjoyment in working on the assignment, sometimes in relation to their usual assigned work. Zeta talked about enjoyment as a factor in providing motivation to work on the game during class time, “And I did feel very motivated in class to do it because, I mean I found it much more fun than the other kind of stuff that we did in class, so it was just kind of like a fun, almost like treat thing for me to be able to do that instead of the normal classwork.” Anna described the game project as fun as well, though without drawing a direct comparison to other kinds of assignments, “The project itself was like fun to do, so I think it was easier to stay, you know, it's easier to focus on it,” though she did connect her enjoyment with both the level of ease and her ability to stay on task.

For many of the students, working with the technology—computers and software—was appealing as well as working on the creative elements of game design. The researcher observed students making comments during class stating that they wished to use computers more in assignments, and this attitude was reflected by the participants. Sybil was one of the participants to draw attention to the technology component of the assignment, “And it's, you know, we just,
with us liking technology, it gets us to have a little fun with that.” Javier also mentioned in his interview that he “liked the computer part” of the assignment, and it was clear he had an affinity to computer hardware, as he was interested in the types of computers and tablets his classmates used during class sessions.

At the beginning of the third class session attended by the researcher, there was a technical difficulty with a cable connecting the researcher’s computer (used for demonstrations) to the large flat screen monitor in the classroom. Javier was quick to offer suggestions as to what the particular problem might be, and when it was determined that the connecting cable was at fault, he volunteered to help the researcher disconnect the bad cable and attach the replacement. However, Javier enjoyed the game development process just as his classmates did. “I liked how you would do, you would write two options and then you'd have to write two complete different stories for each option. And also the, um, the way you could connect all of them together… that was satisfying.”

Working on the computer to author narrative segments facilitated the process of placing content into Inklewriter easier, and several students realized this. Caroline was one of the students to find this pipeline of composing on the computer to be satisfying, “I was really interested in the fact that I was able to do this pretty much all on my computer and didn't really have to write stuff out.” Several students expressed the same thought as Caroline. “I prefer typing on the computer a lot more to writing out things, even though I like writing either way. On the computer was better for me, especially with the Inklewriter site in the format that's it's in, that's really, it was great.”
In addition to using the computer, Caroline appreciated creating choices in the game, and this was a preferred activity of most of the students, “Well I liked the choices… I was okay with doing the choices but the branching in was harder for me than branching out.”

Gisela expanded on her feelings regarding the ability to create branching choices.

Gisela: I enjoyed making my own choices, like where you could click and add an option, add an option, you know. I just sort of liked the big concept of it, it's like you get to make the choices, I would think like, okay, you can go either this way, or this way. And I loved that. I was like okay, so then we'll go to the same place but I think it’s fun that you can just like click on one thing and go this whole separate way to a whole other war. Or you could click the other and maybe just wait and talk to someone. You know, like, I love that. It was really cool to keep going like that.

In one case, Sybil attributed enjoyment of the assignment to her ability to link the activity to an existing hobby interest of hers: art.

Sybil: I liked that you could do pictures, I like to animate and so I was putting together pictures that I've made. You know, using models and stuff except I tried to uploading it to me Deviant Art, and seeing if I could use the link from there to put it on the page but unfortunately it wouldn't work. That's the part I was most excited about and just, um, once I got my story going, um, I just you know, it was my favorite part of the work, yeah, instead of doing the regular school work... I preferred doing that.

Another activity that was a core part of the assignment and was mentioned repeatedly by participants during their interviews was the process of writing the story itself. Zeta shared that she was very excited by the assignment and continuing to work on it because she liked writing the story (she describes herself as enjoying fiction writing). Caroline enjoyed the writing process as well, and she likened it to writing a paper, though she did not state if she had a preference of types of assignments one way or another. She said simply that she “was fine with it either way,” and she went on to add that with “writing, I find ways to put my emotions into words on paper and it's a lot easier for me.”
Zeta was very thoughtful regarding the writing process and why it was something she enjoyed as part of the assignment. A strong connection for her was the fact that she already had an interest in fiction going into the IF game project.

Zeta: I mean like I enjoyed overall writing the whole thing, just because I do, like, I do enjoy writing, and fiction is the most fun for me. And I liked being able to kind of create the game around what I wanted, like so I knew exactly how people were going to be playing it, and how it was going to turn out. And that was just enjoyable for me to be making it complicated but like, I don't know, for me being the one to be planning it, it was fun for me.

While on the topic of enjoyment, it is important to note that there were some activities that the students did not particularly enjoy. Most of this was related to technical issues, such as the mechanics of meeting part of the assignment requirements. One part was the requirement that the game map was to be printed out and submitted with the assignment. (This was to allow the teacher to more easily verify what level of rubric elements were accomplished.)

Javier mentioned a common complaint of the students in that he “didn't like have to print everything out. Like all the words, because that was kind of complicated having to print out the map and all that.” Inklewriter was not intended to print portions of game code or the maps themselves. Printing was accomplished by taking screen shots and printing those. The process was not straightforward, and if multiple screenshots were required, this became very tedious for the students. Zeta was the only participant to state her dislike of “having to plan it out first, and then do it the way that I plan. I kind of like to just go straight through it.”

Finally, there were students that expressed a dislike of several activities that were not particular to this assignment, such as the research required, the subject matter of the assignment, or the technical difficulties related to bandwidth bottlenecks when all the students in the class were trying to access the Internet simultaneously. The students understood these elements were not part of or unique to creating their IF game artifact for the course.
Characteristics of Assignment

Even with the initial misconception that the assignment would be to create a modern video game, the students were still enthusiastic about the IF assignment when they understood the actual nature and scope of work. In class there was little vocalization of disappointment or preference for working on an actual a video game over IF game, and there was no hesitation in beginning the assignment. (The researcher believes that there was some unvoiced relief that an actual video game was not assigned, as there was some understanding among the students of the level of complexity that such an assignment would represent.) Caroline, however, did not waver in her feelings at any stage, “But I really enjoyed the assignment and was excited about it when I first heard about it and throughout the entire project.”

Several of the participants were quick to identify elements of the game assignment that put the artifact development work in a positive light for them. Gisela pointed out, “And so at this point instead it was like... okay, well, I'll just start with creativity, and when I like get going then I'll start getting better. I was pleased with the fact that I finally was able to branch out with myself rather than knowing, okay, I need this, this, this, this. Instead I could just go everywhere with it, you know?”

The context of Gisela’s comments was that she was looking at the assignment as an opportunity to explore different ways of completing classwork, and the thought of building a game instead of writing a paper was appealing to her. Being able to “go everywhere with it” was an indication of Gisela’s preference for more open-ended work in this particular assignment, which is interesting considering that Gisela admits of herself that she is a “school nerd person” who enjoys writing papers because the expectations are clear and straightforward.

The researcher finds Gisela’s attitude to be very interesting, especially in view of the fact that Gisela also admits to never having written fiction before. There is an aspect of the
Inklewriter software that allows an author to determine with certainty the number of choices to incorporate and therefore the branching structure of the narrative. In fact, these decisions can be made before composing any part of the story or game narrative, resulting in a framework that is defined and needing “only” to be filled. Gisela expressed that this characteristic of Inklewriter greatly appealed to her, and she discovered that writing IF was easier than she had anticipated, mainly because she could establish her own quantitative boundaries from within Inklewriter, regardless of the narrative flexibility it afforded.

**Effort and Result**

Rather than examine engagement through a lens of enjoyment of the activity and process during the assignment, this theme reveals how the participants weighed the results of their work, and how they assessed the experience based on the effort they made in the artifact. After having had time to reflect, did the participants feel that their efforts were justified? Understanding this is an indicator regarding whether similar activities would be worthwhile (and positively engaging) in the future. Several patterns emerged from the interviews that were identified as components of the effort and result theme: impression of finished artifact, perceived effect on learning outcomes, and the experience in review.

During the last two class periods of the quarter and school year, the students were asked to share their finished games on the classroom main computer screen so their classmates could experience the results of their creative efforts. The majority of students were enthusiastic about doing so (with the exceptions being the somewhat disengaged students that sat in the back of the classroom). However, even the disengaged students had artifacts to share, and the teacher reported that all students performed sufficient work to obtain passing, if not exemplary grades. Without asking for actual grades on the assignment, the researcher asked the participants how
they felt about the grades received, and all expressed strong satisfaction. Caroline explained, “I mean, the grade is what really got me... I think I was very happy with the grade at the end.”

One of the key indicators of satisfaction was the enthusiasm with which the students displayed their games to the class, and also to the extent they participated in shared play during class time, handing their computers and tablets to each other and verbally encouraging each other to try a variety of path choices in order to experience the multiple endings of their games. Even Caroline who was initially reticent to share her work with others appeared to take pleasure in demonstrating her finished game with her classmates. Caroline explained, “When everyone’s game was finished, I wasn’t worried about who might have what ideas, if people would try to copy what I was thinking of.” Indeed, watching Caroline during the last few class sessions, it seemed that her attitude resisting collaboration became one of encouraging her classmates to display their games and offering positive and encouraging critique of their efforts. After the class had ended, Caroline commented, “I enjoyed playing my game even after I turned in the assignment just to be like, oh I remember doing this, this was so much fun!”

For the participants, how they perceived that their games supported desired learning outcomes (such as retention of information) was also a way of measuring satisfaction.

Anna likened the experience to the process of note taking, and how she believed that facilitated remembering important content. Recounting the process of game creation, she stated, “I think it's valuable and it helps me remember things more. Especially when you're spending that time writing it out yourself instead of just reading over facts.”

Anna: I probably could have, um, researched a lot more and I probably should have, but the way--the path that I was going on, it kind of turned more into my own writings. So, if I were to, like, do it again and focus more on the research part, it would definitely help me retain that because of how much I was working on it, and how it was just more interesting to me to be doing that, and so it just made the overall information more interesting to me.
This sentiment may or may not be true objectively from a grade or content retention perspective, but it could serve as a general endorsement of the game assignment being linked to a stronger student perception that building an artifact is worth the effort. This demonstrates value in the constructionist approach as a component of the study’s conceptual framework. Zeta’s comment addressed the general (subjective) perception by the participants that they better understood the subject matter, and in this context the phrase “I got more out of it” is a justification of that effort.

Zeta: But overall I, I think it was, it was like... it was just more fun for me than writing an essay or answering a worksheet kind of thing, and I do think that I got more out of that, like I really do understand the subject that I was talking about.

Often during the interview process, the participants indicated that they felt satisfaction not only with the actual artifact they produced, but they were satisfied that they “learned” or “remembered” more content from the assignment. Anna communicated her thought that the development process reinforced learning through repetition, “Because I had to fit my history points into the story, revising my story over and over was, like helping me memorize the facts, but it didn’t feel like memorizing.”

Looking Ahead

The idea behind asking the participants to look ahead was so they could discuss their feelings about the assignment without necessarily considering their direct experiences. This would allow the students to think more hypothetically about the game artifact creation process in general rather than focus on their own particular concerns and considerations. The researcher attempted to obtain information from the participants by framing this part of the interviews around the ideas of what the participants might recommend to other students participating in this sort of assignment, and what the participants would think or feel if they themselves were required to participate in a similar assignment at some point in the future.
Planning was a common element identified by the participants as an activity they would recommend to other students. Since there are quite a few different types of tasks involved (map building, determination of choices for branching, writing the narrative segments as a fictional framework around factual research), the participants felt that considering these tasks in advance and determining time and effort to apply would be a good course of action.

Rather interestingly, Zeta (who previously noted that planning was somewhat of a barrier to her enjoyment of the assignment, and that she preferred to “just go straight through it”) felt that planning the map would be a good idea. “I would focus a lot more on the map. I would say the map doesn't have to look perfect, but do plan a little bit more ahead than I did so that it's just kind of easier to get it to flow.”

Javier’s view was that overall planning considering many of the assignment elements would be helpful. “Definitely do the research and plan it out before you just start writing. It would be a good idea to set time for the different parts of the project, like set time for research, or set time for planning the game map, or figuring out people to be in the game.” Javier’s sentiment regarding planning before writing was reflected by many of the students in the class, as they typically jumped right into the Inklewriter environment to compose the game, but they would then find themselves backed into narrative dead-ends, ultimately having to revise large portions of their work.

Procrastination was a consideration for several of the participants, as they learned how quickly deadlines approached, and how difficult it was to get the necessary work completed when working in a new and unfamiliar environment, considerably unlike that of a research paper or report. Anna was straight to the point, commenting, “I would say do not procrastinate.” Caroline also stated unambiguously, “Do not procrastinate.”
Caroline: The future class, future students want to not procrastinate, get it done early if possible with their schedules, depending on sports, especially if they have sports they really want to focus on getting it done as soon as it is assigned.

Caroline’s advice related to sports is based on personal experience, as she had commitments for after-school athletic practices that often occupied time she would have otherwise spent on the game assignment.

Advising future students to embrace creativity was a common discussion point among the participants. Gisela’s perspective was about idea generation for the game, “It's like you really have to start making stuff up and getting like really creative with it, or otherwise you know it doesn't come out like you want it to. So, I really thought that being creative about it really helped me because it was all my stuff, you know?”

Anna thought of creativity as a way of removing (or preventing) self-imposed barriers on what could be accomplished. She identified the creative process as being unstructured and involving a potentially significant time investment, “when you're developing ideas don't put boundaries on yourself. Don't be afraid to just sit there hours at a time and just brainstorm.”

Anna: Okay, well like some of my ideas I thought were absolutely crazy. But you know you just write them down and then you can come back and rethink about it. Or let's say I already have a whole front and back page full of ideas for just level three... if you have another idea just go ahead and write it down, I don't care how many ideas you already have, because when you actually get to the actual plot you'll realize that some of these ideas don't even fit in anymore. Which, so, for me it would save me a lot of time if I had just not limited myself to thinking I have enough facts and said I'm done. Where ideas have come into my head and I just wouldn't write them down. Where I feel like if I had [written my ideas down], it would have taken me less time to piece it all together.

All the participants seemed to agree that an attitude of enjoyment is an important component to getting through the assignment. The researcher notes that there is a difference between enjoyment during the assignment and framing a future attitude of enjoyment in order to facilitate greater success in the future. That is the point made here.
The participants’ perceptions are that enjoyment contributes to engagement and potentially to success (without defining success metrics). Gisela commented, “Okay this sounds like really cheesy but you kind of have to have fun with it.” As a follow-up, she admitted that the assignment could be completed with little enjoyment, but she didn’t personally like that approach. She went on further, “It's not all going to be the facts, it's really just about like having fun with it and letting yourself feel a little looser I guess.” Zeta advised potential future students, “If you go into it thinking you’ll like the assignment, you’ll get a better grade.”

Predisposition Regarding Regular Assignment

In addressing the question of how experiences influence and perceptions reflect engagement during the assignment, it is necessary to consider how students may think of their experiences when it comes to the common assignment format of performing research and presenting the information through reports or presentations. There could be a comparative factor in which positive or negative feelings regarding the more common assignments may result in a relative change in perception of the IF game assignment. However, as the comparisons were made after particular segments of the assignment were completed and during the interviews, the perceptions took on a more deliberately thoughtful tone, and the students were cognitively rather than emotionally engaged with their perceptions and recollections.

Anna made the statement that even though an assignment like writing a paper might seem more restrictive, there are plenty of opportunities to exercise creativity in the work. None of the participants would say that they preferred their usual assignment formats, though there were elements of those assignments that were comforting, such as being less “wide open” in scope. In one case, Gisela compared writing a research paper with writing a fictional paper—both types of traditional assignment formatting—but one involving research as opposed to an open-ended story-writing exercise. She observed, “If we're getting choices between writing a fictional paper
and a research paper, I'm going to choose the research paper,” again recalling her self-identification as a “school nerd person” who truly enjoys writing research papers on factual topics.

On the other side of the issue, Javier expressed his opinion without ambiguity. “It's way better than writing a paper because I don't like writing papers.” While having expressed his personal preference, Javier did not elaborate further on his reasoning. Anna had similar thoughts regarding written assignments, and she responded in this way, “Writing a paper, like, it’s very restrictive kind of you don't have a lot of ways to be really expressive. So I mean if I had to, I would do it. I would write an essay if I had to in the car, but you know... this was more enjoyable.”

Enjoyment of assignment was a theme tied primarily to emotional engagement. Students not only shared how they enjoyed the activity of building game artifacts, but they provided insight as to why particular tasks were meaningful for them. The collaborative activities, conversations with their classmates during class in which they were able to share their ideas in draft form, obtaining informal critiques, and playtesting each other’s game were relatively new ways for them to fulfill assignment requirements. The idea that the students were expected to develop creative frameworks and content for the assignment was pleasurable for most of the students, and some even commented that they would have liked more time to spend on brainstorming ideas and experiment with multiple game design platforms.

The theme of characteristics of the assignment had the most effect on student experiences as they performed necessary work, and this was related to their behaviors and perceptions as well. Within this theme, students considered how the documentation they were provided, the grades they received, how building a game compared to writing a paper, and so on all

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contributed to the overall assignment experience. Students generally felt that the support materials provided by the teacher were appropriate as reference for the assigned tasks, and during the interviews they expressed that the materials provided an additional measure of comfort as they considered the work needing to be accomplished. The researcher observed that students readily approached the various aspects of development by utilizing the support materials as reference documentation, frequently looking through the pages and discussing various sections among themselves.

The effort and result theme came from students’ assessment of the work they had to invest in the assignment in comparison to the result they obtained (both in terms of grades and level of satisfaction). Interestingly, the behavioral engagement students exhibited as they expended their efforts working on their artifacts resulted in some cognitive engagement as they considered how to best apply their newly acquired Inklewriter knowledge. While none of the interview participants expressed dissatisfaction regarding their created game artifacts, all the students interviewed were able to identify particular tasks within the assignment that they would have done differently based on their experiences. Planning the narrative and choice points was a key part of this theme, as many of the students realized that composing their stories as they were implementing their content within Inklewriter was fairly challenging. The researcher observed in several instances that when students worked from initial paper-based design documents, they were able to more quickly execute segments of their programs utilizing Inklewriter. These students, in turn, would often advise and encourage their classmates to do the same.

Looking ahead categorizes the students’ thoughts regarding doing similar assignments in the future, and predispositions regarding regular assignment grouped the interview data and researcher observations together according to students’ comparative considerations of traditional
assignments. These two essential themes serve as counterpoints to each other, and both themes reflect the cognitive engagement exhibited by students as they worked on their artifacts and then as they looked back at the work they accomplished. During the interviews, the researcher noted that several of the looking ahead elements including the desirability of collaboration to brainstorm ideas and spending more time to edit and polish the game were issues that came up in discussion around the theme of predispositions regarding regular assignment. For example, the level of collaboration in this assignment was much greater than typically experienced in writing papers, and the editing process is not often as iterative when composing presentations. Several students expressed the sentiment of seeing game assignments in the future as way to address less engaging tasks that are parts of traditional assignments such as writing papers and composing reports.

**Classroom Observation Data on Student Engagement**

In observing the students’ actions and activities during the classroom sessions, the researcher was able to develop a picture of engagement that could be compared or contrasted with the information provided during the interviews, further addressing Research Question 2. The Engagement Observation Protocol (Appendix C) was developed by the researcher to systematically observe and verify certain actions or activities that could be associated with engagement exhibited by the students. The first six items of the protocol were specific to behavioral engagement, with items 7 and 8 related to emotional engagement, and items 9 and 10 associated with cognitive engagement. For each question, the observation scoring was based on one of two possible answers:

1. little evidence of this behavior
2. much evidence of this behavior
The “Engagement Score” percentage was simply a score attributed to each observed student across the six observational items for behavior as having been categorized as “much evidence of this behavior,” which was listed as 2 on the scale. Therefore, if a student was scored as having exhibited much evidence of this behavior for five out of the six questions, the Engagement Score was calculated simply as 5/6 = 83 percent. The aggregate score for the group of students is calculated as the average score for all 14 observed students, resulting in 85 percent.

The table below shows the scoring for the six questions related to behavioral engagement.

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Engagement Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>83%</td>
</tr>
<tr>
<td>S2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>67%</td>
</tr>
<tr>
<td>S3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>67%</td>
</tr>
<tr>
<td>S4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>83%</td>
</tr>
<tr>
<td>S5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>83%</td>
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<tr>
<td>S7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>83%</td>
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<tr>
<td>S8</td>
<td>2</td>
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<td>2</td>
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<td>100%</td>
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<tr>
<td>S9</td>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>2</td>
<td>100%</td>
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<tr>
<td>S10</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100%</td>
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<tr>
<td>S11</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>83%</td>
</tr>
<tr>
<td>S12</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>50%</td>
</tr>
<tr>
<td>S13</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S14</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>83%</td>
</tr>
</tbody>
</table>

Q prefixes in Table 5-1 denote the number of the corresponding question in the Engagement Observation Protocol, while the S prefixes denote the student being observed.

The six observational items designed to present a view of student behavior were as follows:

1. This student often spends time outside the classroom working on the assignment.
2. This student researches or plays other IF games beyond assigned work.
3. This student works hard developing branching situations in his or her game.
4. This student is not hesitant at utilizing Inklewriter documentation.
5. This student repeatedly tests the playability of his or her IF artifact for technical functionality as well as game-play enjoyment.

6. This student seeks methods of improving or increasing the narrative pathways of the game artifact.

While there is no direct comparison between this assignment and the typical assignments completed by the students, we do see that 11 of the 14 students exhibited much evidence of behavior for at least five of the six observational items listed. However, as this study is not meant to offer a quantitative view of participant experience, the researcher offers this in addition to and as corroboration for the behavioral phenomenological data obtained from the participant interviews.

Participant comments aligned with the evidence that the above behaviors were exhibited. Regarding the first item, the participants commented on the time spent outside of class, much as Anna stated, “I spent the most, the biggest percentage definitely outside of class.” This was the common sentiment, and it was clear from the new work brought into the classroom that the students were making progress when outside of class.

Similarly, for the second item, conversation in class touched upon what the students had discovered playing the sample IF games provided in the assignment documentation, and several students looked up additional examples available online to share with their classmates. Sybil noted that several old Infocom games were available for free online play. Javier found a number of IF games available for download in the Google Play store for Android devices, while another student not in the participant group found IF games for iOS.

Branching situations as observed for the third item were a great area of focus for nearly all the students, and all the students in the participant group created more branching pathways that were required in the assignment rubric. Creating the choice points for the branches was a topic of great consideration as well as trial and error effort.
With the Inklewriter documentation, much thought and discussion was devoted to the content contained. During class time, the students typically did not request assistance from the researcher or the teacher without first reviewing the documentation (Appendix A). Often during class sessions, students would have initial questions related to the work they tried to accomplish at home, yet they were unable to find particular information in the documentation (again, suggesting use of the materials as reference). Caroline expressed her thoughts regarding the usefulness of the provided documentation.

Caroline: I can't exactly remember all of the information that was in the materials that were handed out in the class, but it was very helpful throughout the project. I'd look at that frequently to make sure I was on track and doing the right thing. That was probably the only way I got the project done, by reading that, looking back at it, taking a few signed notes in the pamphlet that was presented in your presentation in class. That's probably what got me through.

The fifth and sixth items regarding functional testing and narrative pathway development and improvement can be considered together, as student activity around both items were observed to be closely related during classroom development time. The students’ process in class tended to revolve around a development-playtest cycle. They would compose their narrative foundations and add branching points, often sketching the anticipated maps out on paper or using index cards that could be reorganized. After that, they would enter the new content and structure into Inklewriter. Then they would immediately test the functionality of the segment of the game they had just implemented, troubleshooting for any difficulties. Once they were satisfied with the functionality of the game to that point, they would continue by looking for opportunities to improve the narrative flexibility by adding or altering branching point alternatives. This iterative process became a regularly behavior during class periods, and the students became very adept at assisting each other, from experience and through referencing the documentation.
The following two questions from the Engagement Observation Protocol provided context for the researcher to identify characteristics of emotional engagement, either positive or negative.

7. This student exhibits enthusiasm and shares verbal encouragement among the members (emotional engagement).

8. This student exhibits little or no signs of distraction or boredom and remains on task (emotional engagement).

Again, observational scoring was based on the two possible answers of 1) little evidence of this behavior, or 2) much evidence of this behavior.

Table 5-2. Emotional Engagement Observations

<table>
<thead>
<tr>
<th></th>
<th>Q7</th>
<th>Q8</th>
<th>Engagement Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S2</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S3</td>
<td>2</td>
<td>1</td>
<td>50%</td>
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<tr>
<td>S4</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S5</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>S6</td>
<td>2</td>
<td>2</td>
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<tr>
<td>S7</td>
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<td>S8</td>
<td>2</td>
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<tr>
<td>S9</td>
<td>1</td>
<td>2</td>
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<tr>
<td>S10</td>
<td>2</td>
<td>2</td>
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<tr>
<td>S11</td>
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<tr>
<td>S12</td>
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<td>2</td>
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<tr>
<td>S13</td>
<td>2</td>
<td>2</td>
<td>100%</td>
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<tr>
<td>S14</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
</tbody>
</table>

Q prefixes in Table 5-2 denote the number of the corresponding question in the Engagement Observation Protocol, while the S prefixes denote the student being observed.

Of the 14 students observed as part of the protocol, 11 students were considered by the researcher to exhibit much evidence of both of the emotional behavior indicators. The aggregate score for the group of students was taken as the average score for all 14 observed students, resulting in 89 percent. Regarding enthusiasm and verbal encouragement, these were common behaviors during all of the classroom sessions. The actively collaborative students were quick to praise each other’s efforts using phrases such as “that’s cool how you got the navigation to loop
back,” “having the box transport you to the embassy is a great idea,” or “I like that your character was a soldier waking up in the middle of the war.” There was no apparent lack of enthusiasm, as the students were very energetic during the class periods, and all activity was focused on the assignment. Of the participants, Caroline was fairly quiet and mostly withdrawn. She had self-identified during her interview that she was not inclined to share her work before completion, so this behavior was consistent.

The enthusiasm and widespread verbal encouragement during class sessions left little time for activities to distract from the work of the assignment. Again, the majority of students, 13 out of 14, were positively engaged. Of the one students considered to exhibit little evidence of remaining on task appeared was involved in assignments for other courses during several of the class sessions. While he was not part of the participant group in the study, the researcher spoke with him and determined that he spent so much time at home working on his game artifact that he was unable to complete a few of his other class assignments. He used the time in the history course to catch up, as his game artifact was well developed.

For the characteristic of discussing and planning game strategies and narrative paths for the game, 11 of the 14 students exhibited much evidence of this behavior, which corroborated the information provided in the participant interviews. The aggregate score for the group of students was taken as the average score for all 14 observed students, resulting in 93 percent. Conversations overheard by the researcher during class sessions were quite often about developing plot elements and strategies for identifying the correct or more favorable pathways to select in moving through the game. This was also a theme of working with interactive narrative that was emergent during the participants interviews.
The following two questions from the Engagement Observation Protocol were used to obtain some observational triangulation of cognitive engagement. The researcher applied these questions to the observations of the 14 selected students in class, and the answers of 1) little evidence of this behavior, or 2) much evidence of this behavior were applied. The results are depicted in Table 5-3.

9. This student discusses and plans game strategies and narrative paths for the game artifact well (cognitive engagement).

10. This student exhibits curiosity regarding ways to integrate assignment content on the Middle East into the fictional narrative framework (cognitive engagement).

| Table 5-3. Cognitive Engagement Observations |
|-----------------|---|---|----------------|
|                | Q9 | Q10 | Engagement Score |
| S1              | 2  | 2   | 100%             |
| S2              | 2  | 2   | 100%             |
| S3              | 2  | 2   | 100%             |
| S4              | 2  | 2   | 100%             |
| S5              | 2  | 1   | 50%              |
| S6              | 2  | 2   | 100%             |
| S7              | 1  | 2   | 50%              |
| S8              | 2  | 2   | 100%             |
| S9              | 2  | 2   | 100%             |
| S10             | 2  | 2   | 100%             |
| S11             | 2  | 2   | 100%             |
| S12             | 2  | 2   | 100%             |
| S13             | 2  | 2   | 100%             |
| S14             | 2  | 2   | 83%              |

Q prefixes in Table 5-3 denote the number of the corresponding question in the Engagement Observation Protocol, while the S prefixes denote the student being observed.

The Teacher’s Perspective

As an additional observation of engagement in consideration of Research Question 2, the teacher monitored student activity and made some assessment based on observations as well as rubric scoring data. When asked about grades for this assignment as compared to more traditional assignments, the teacher commented that there were some circumstances to consider
before making a one-to-one comparison. The teacher’s first concern was that since the study involved the last assignment of the year, some of the students may have “checked out” or have become less than optimally engaged. Overall, she felt that the work completed accurately represented the time spent on the assignment, stating, “I thought the range was pretty accurate to the amount of time the students put into it. It was one of those assignments that required them to work ahead and think critically about over time, rather than pulling an all-nighter- and getting it done.”

In terms of grades achieved by the students, she observed that some of her stronger students may have had initial difficulties because of the different nature of the assignment compared to more traditional assignments.

Teacher: I found that my students that struggle with traditional tests did better with this assignment. Many of these are the ones that excel in communication and creativity. Specifically one student who usually makes a C or below on my tests/assessments got a B on this assignment. He was off to a great start, then I think procrastinated and was ”done” at the end of the year, otherwise I think he could have pulled off an A easily. Some of my ”perfectionist” students struggled with this assignment initially... they would have preferred a traditional test as they weren’t sure how to study for this. It definitely stretched their thinking and how they applied it. They wanted the ”expected” test/assessment or paper and this required a bit more from them. They still did well on this test but per some parents’ responses it took them more time and they stressed over it a bit more.

The rubric point distribution scale was as follows:

- 16 students got 100 points
- 5 students fell in 99-90 points
- 4 students fell in 89-80 points
- 3 students fell in 79-70 points
- 4 students fell in 69-60 points
- 4 below 59 points

Of the six students that participated in the interviews and essential theme development, all expressed satisfaction with the grades they received.
From the teacher’s perspective, the assignment format and game artifact did not have any impact on attendance. The teacher observed, “Attendance is great at our school anyway so I didn't notice much difference. Some were very engaged in the class work, and others weren't sure how to even begin and needed a bit more assistance and encouragement to get started. Once started most of them were pretty independent.”

Chapter Summary

The reviewed literature demonstrated a connection between the narrative form of IF and player engagement, and results of the study appear to confirm previous work in the field. As the constructionist framework placed artifact development directly in the hands of the participant, this approach created a classroom environment rich in activity that was ideal for a phenomenological study. Data from researcher observations and reflection as well as participant interviews provided new insights and an improved understanding of the use of IF in the middle school classroom environment.

In this chapter, the themes derived from participant interviews were examined and categorized appropriately in the context of the two study research questions. The participant experiences and behaviors were observed within the classroom environment with all their classmates, and during the interview process, the participants were able to discuss in-depth their own perceptions of the assignment and their behavioral, emotional, and cognitive levels of engagement. All six participants reported enjoyment of the assignment and enthusiasm during the construction of their game artifacts, although different elements of the activity had individual appeal.

Javier and Sybil brought outside interests into their work, with Javier enjoying the technical elements of the Inklewriter software, and Sybil found the artistic elements of integrating illustrations to be interesting. Gisela and Zeta both enjoy the writing process, so the
parts of the assignment that involved creating the storylines through narrative were appealing to them. Anna and Caroline had initial expectations of creating modern video games and were somewhat initially disappointed yet ultimately relieved to understand and appreciate the true scope of IF games. Altogether, the participants had enough of a positive experience that they would recommend this type of assignment for other students, and they would be willing to participate in similar assignments in the future.

The Engagement Observation Protocol provided data on the researcher’s observations of student behavioral, cognitive, and emotional engagement. The data indicated increased engagement across all three domains, validating the students’ own accounts as provided during the interview sessions, and the teacher’s comments regarding both her perceptions and the grade results for the artifacts provided additional corroboration.

The students did, however, express some concerns regarding the challenges to IF game development and provided several cautionary notes, primarily around planning on the front end, the danger of procrastination, and the difficulties in understanding branching logic. These are areas to consider, but by no means impossible to overcome, and several interview participants spoke directly to these concerns as being relatively minor obstacles to be overcome by process diligence from the beginning of the assignment.
CHAPTER 6
DISCUSSION OF FINDINGS

Overview

This phenomenological study was designed to investigate how middle school students experience and perceive game construction as a learning activity in a History class and their levels of behavioral engagement, emotional engagement, and cognitive engagement as they developed an Interactive Fiction (IF) computer game artifact focusing on Middle East history. The researcher used phenomenological inquiry facilitated by observation of classroom sessions (recorded in a field journal) and in-depth interviews in order to analyze the lived experiences of six middle school participants, one boy and five girls, from a private school located in Central Florida. The memoing technique was used extensively throughout the study to record the researcher’s thoughts during the process, during the creation of the assignment with the teacher, the classroom sessions in which students worked on their artifacts, and the interview sessions.

One of the researcher’s goals was to identify and define implications for practice regarding the effects on student engagement through the integration of IF game assignments into curriculum. In the following discussion, the study findings are reviewed and analyzed from the focused perspective of the students as they constructed their own learning through the development of their IF game artifacts as well as the perspective of the researcher gathering and categorizing observations of the students and instructor as participants. Additionally, this chapter considers the connection of the findings to existing literature and touches on some considerations for future study in this area.

Connection to Existing Literature

Chapter 2 provided a context for this study in relation to the existing literature regarding IF and student engagement. The researcher observations, memoed reflections, and essential
themes that emerged during data analysis can be grouped according to the research questions and associated with the appropriate literature as a method to interpret the findings and derive meaning. First, however, it would be instructive to consider students’ perceptions of the game design experience, and how their experiences relate back to the constructionist framework.

Making computer games is a complex process during which students must utilize a wide range of skills (Robertson & Howells, 2008), in developing game artifacts, but also in wrapping those games around the actual historical subject matter that is the focus of the course. The essential themes discussed in the previous chapter provide a roadmap for the way in which students approached the process, and this roadmap should inform teachers that are giving serious consideration to implementing similar assignments.

At the introduction of the assignment, the students developed a set of assumptions and preconceptions regarding the meaning of “computer game” and what that meant they would be developing, the amount of work likely to be involved and the associated level of difficulty. This caused some anxiety among the students, so teachers should consider how they might manage expectations from the beginning. Once the students understood the scope of IF design as being much less complex than that of more visually-oriented computer games, they become more confident in their ability to approach and complete the assignment. Several students expressed relief that they would be able to apply more effort in integrating the subject matter of their History module into their games as an indication of greater engagement, as observed by Lim et al. (2006) when compared to more visually sophisticated games.

The characteristics of the assignment gave the students much to think about including the sufficiency of the documentation in answering technical development questions, a comparison of workload between building a game artifact and writing a paper (which would be more difficult or
take more time?), and how difficult it would be to combine fact and fiction. Providing more thorough or detailed documentation would address many of these issues, though as Mehm and colleagues (2009) demonstrated in a study utilizing natural language programming, the accessible nature of the Inklewriter software (as compared to visually-oriented game programming environments) eased the students’ development efforts as the researcher observed and as the interview participants confirmed.

Students had a number of questions regarding how to go about designing their games, from the first steps of conceptualizing the combination of historical fact in a fictional framework to questions about creating choice points within the games that lead players to the different endings as required for the assignment. As demonstrated in a study conducted by Douglas and Hargadon (2001), this level of flexibility to control the game narrative was a main component of enjoyment as well as an element of concern. While examples would be helpful here, possibly of greater value to the students would be a more detailed in-class discussion of ways to manipulate stories within the Inklewriter tool. Students had many questions regarding the branching maps, and many of them felt ill-equipped in the beginning to design their games. Similar to the findings of Song and colleagues (2004), students experienced technical challenges working with the software, and this also needs to be considered as a possible obstacle to learning.

To a large extent, students themselves addressed the challenges through collaboration in the classroom, in which they worked in pairs, small groups, and ad hoc teams. Teachers may want to formalize the collaboration process by assigning small teams from the beginning or set some structured constraints as to how and when students should work together in class periods. Also, teachers may want to come up with a way to encourage or facilitate collaboration outside of class. Finally, students both exhibited and discussed during the interviews their enjoyment of
the work. This was, of course, a desirable outcome of the whole assignment process, but it is not necessarily guaranteed.

For teachers interested in ensuring and promoting enjoyment during the assignment, it is important to understand the predispositions students may have toward computer game development work as well as the level of anxiety students might experience when they realize the assignment requires somewhat unique thinking and activity as compared to their more typical assignments. Based on observations of the students working on their games as well as review of the interviews, the researcher concludes that enjoyment is not likely or easily imposed. The framing of an assignment that integrates the development of a narrative storyline into game artifact is a contributing factor increasing student interest (Lee & Chen, 2009). Perhaps the best approach is for teachers to ensure that obstacles to enjoyment, whether conceptual or technical, are removed from the overall experience. This is something teachers will better be able to manage through suitable planning and preparation beforehand.

**Constructing the Game Artifact**

Research Question 1 asks, “What are the experiences, behaviors, and perceptions of students during the development of an IF game artifact as an assignment in the middle-school History classroom?” The game construction activities in the classroom provided students with a broad range of experience (across planning, design, implementation, and revision stages), and the students readily discussed these experiences as well as their perceptions of the assignment during the interview process.

From the researcher’s perspective, the level of preparation most of the students exhibited when coming into the artifact-focused class sessions was strong. Clearly, the students had worked on the assignment outside of class, as they typically brought in materials (notes, map sketches, etc.) that had been prepared at home. In several instances, the researcher saw computer
documents such as storyline outlines that were timestamped during evening hours. Into the second and third week of the assignment, it became clear that the students were spending more time at home in preparation for class, and they were using their previous classroom experiences to inform their subsequent actions.

As Connell and Wellborn (1991) found in their study, the students consistently participated in activities relevant to positive learning outcomes including collaboration, extended work effort applied outside of the classroom, and self-directed utilization of course materials and external resources. Also, they conducted themselves in a manner that did not disrupt the learning process. As evidenced by the level of on-topic conversation and collaboration in class (recorded in the researcher’s field notes), there was ample observational indication that the students’ experiences in the classroom were informing and guiding their activities at home throughout the assignment. Several of the participants expressed the perception that Zeta shared in her interview, “I realized that I felt a lot better if I figured out as much of my map as I could before class.”

During the timeframe of the study, the students experienced and were aware of their own positive as well as negative reactions to various areas of the assignment, experiencing enthusiasm and frustration over the technical aspects of the Inklewriter software (such as building maps, making branching choices, and importing pictures) and coming up with ideas for the fictional framework for their game artifacts while working collaboratively with their classmates. The interviews and the observation data provided evidence that the assignment was perceived as being positive by the participants themselves as they recollected and recounted their experiences during the assignment.
The idea that the participants perceived the assignment as fun was an element of the continued enthusiasm they experienced throughout the activity. Other than some expression of initial disappointment in finding that the computer game was to be text-based rather than in the form of a modern graphics intensive video game, none of the participants made any comment regarding experiencing disappointment during the assignment at any point. Rather, the commentary was positive about the various activities, and remained positive as the participants looked at their experiences in hindsight. In consideration of their final game artifacts, every participant spoke in positive terms as to how they felt about what they created. Finn (1989) draws the connection between experiences and students having a sense of accomplishment in their course-related activities, and this is what the participants expressed. Zeta provided a good summary of her positive experience when she described her pleasure at the outcome of the game artifact, mentioning several areas of the game development process that gave her great satisfaction.

While there was no objective comparison between this assignment and other assignments involving more common activities, the participants reported the perception of having greater retention of the content because of the constructionist nature of the tasks involved. The participants attributed this perception primarily to the experience of integrating historical content into their fictional game setting and the amount of time they spent working on the story framework and choice points in the game. Several of the participants stated directly that they would like to participate in other game development assignments in the future because of the perception that the assignment was effective regarding content retention. This is consistent with the idea that when an instructor fosters more active and collaborative learning environments,
students are better able to learn experientially and through a more constructionist “learning-by-making” paradigm (Dickey, 2005; Umbach & Wawrzynski, 2005).

Although academic performance was not considered in an objective or quantitative fashion for the purposes of this study, during the course of the interviews the participants did evaluate and comment on their perceptions of their own performance. The participants were not asked to discuss or compare their grades with other assignments, but all six participants did express strong satisfaction at the grades they received. Caroline, the self-admittedly very competitive student, commented that she would have liked to “have gotten the top grade possible because that’s how I am.” But she was satisfied as were the rest.

By the end of the assignment, the students had played each other’s games several times during class periods while their games were in various stages of completion. The students provided each other with fairly extensive feedback regarding storyline, branching choices, and the integration of historical facts appropriate to the assigned content. The researcher observed that the students played the games enthusiastically, and students were often openly complementary of their classmates’ efforts. Since Inklewriter stores games in an Internet-accessible repository, students were able to share games outside of class as well. However, the researcher is unaware if students shared their games outside of class.

Considering Student Engagement

Research Question 2 focused on middle-schoolers’ experiences with IF game construction as it influences their emotional, cognitive, and behavioral engagement, and those domains are discussed below.

Behavioral Engagement

When we consider behavioral engagement, we can examine time on task regarding academic activities or assignments. In both observing students as well as having participant
responses regarding their time on task, we see an emergent picture of behavioral engagement (Fredricks et al., 2004). All of the participants reported spending time on task outside of class to a greater extent than typically applied to standard assignments such as written reports or presentations, with Anna, Caroline, and Sybil all stating that they spent more time at home working on various aspects of the game, than the time they spent in class—which was all the allotted class time. Sybil summarized, “At home most of... that's where I did most of my work. I did about, I'd say three fourths of my work at home.” The others, Javier, Gisela, and Zeta expressed that they worked extensively on the assignment outside of class, though they did not compare the amount of time outside with that spent during class time.

The observation of class attendance or the absence of disruptive class behavior as part of overall class participation can also be associated with behavioral engagement (Archambault et al., 2009). Considering class attendance metric, the teacher observed that students appeared to attend no more or no less than during the rest of the school year, so this measure is inconclusive, or that it may indicate that at least students were no less behaviorally engaged. Class behavior indicated no unusual disruptions, and this is significant considering the amount of collaboration and movement that took place within the class environment.

The Engagement Observation Protocol (Appendix C) was used to record and quantify some activities that could be associated with engagement (although the study is not meant to provide a quantitative analysis of engagement). The observations regarding behavioral engagement corroborate the participant statements. One of the behaviors noted by the researcher was the willingness of the students to engage in repetitious behavior when it involved use of the Inklewriter software. While this can be considered part of the revisions editing process for the artifact, the iterative nature (add text and branching choices, test in game-play mode, find
functional or logical errors, then go back to the beginning and try again), did not discourage the students, and, in fact, there were some comments made during class sessions that the process “wasn’t as boring as rewriting papers.” This might be an indication of the attractiveness of novelty of different types of assignments, but it might also touch upon the idea that technology mediated activities can hold student interest by virtue of the technology itself. This phenomenon could be worth further exploration in relation to the particular Interactive Fiction tools being utilized.

**Emotional Engagement**

Emotional engagement is associated with the extent of positive or negative reactions to various areas of the academic experience or the feeling of accomplishment in performing course-related activities (Finn, 1989).

Anna described the assignment specifically as being “fun,” because of the activity of building the game artifact as well as in comparison to working on a typical assignment for the class. She explained that the fun activities helped motivate her to stay on task, and they prevented her from getting bored or tired of working on the assignment. Gisela and Zeta also described the assignment as being fun and enjoyable as an activity, though they did not make that comparison directly to their typical coursework, though Zeta commented about the assignment comparatively that she, “found it much more interesting, and the others more boring.” There are examples in the literature in which students participating in newer or less frequently used technologies describe their experiences as fun, and in these cases their perceptions are indicators of emotional engagement by researchers (Beeland, 2002; Cole, 2009).

The researcher posed the scenario of participating in another IF game assignment as a proxy indicator of the actual emotional engagement with the assignment that was the subject of the study. Under this hypothetical context, the participants were free to reveal their true level of
positive or negative connection with the assignment by making statements whether they would be willing to participate in a similar assignment in the future. The comments provided by the students during the interview reinforced the researcher’s conclusion that the participants experienced positive emotional engagement as a result of this assignment.

The participants used multiple terms and descriptive phrases indicating positive engagement associated with several areas of commonality that were coded and grouped thematically during the interviews, including topics such as:

- Enjoying the different way to look at the research material through a fictional format, and the enjoyment associated with writing a story as a learning activity in history class (Zeta)
- Having the freedom and flexibility to take the story in such a wide range of different directions, and doing so multiple times because of the branching nature of IF narrative (Gisela)
- Feeling emotional engagement with the story, because the format of the assignment allowed and even encouraged the students to think of themselves as characters in the game, directly affected by the events of the narrative (Caroline)
- Enjoyment of working with the Inklewriter interface, because that was more fun than working in the more plain “white page” interface of a technology tool such as Microsoft Word (Javier)
- Being so excited by the prospect of working on the game assignment, that work from other classes was completed as quickly as possible to leave more time for game development (Sybil)
- Constantly thinking of story ideas for the pleasure and excitement of doing so, to the point it consumed free time, even during recreational travel while away from school (Anna)

Based on the interviews, emotional engagement was strongly exhibited in the participants’ self-reporting. However, positive emotional engagement also was observed by the researcher among the majority of students during classroom activities. The general atmosphere within the classroom during the sessions was active and energetic in a positive sense. There was constant conversation focused primarily on the assignment and the progress that was being made
on the artifacts. It would seem that even though IF as a game format is over three decades old, this has not been a cause for students to be disappointed that the assignment was not based on the development of more modern game formats. This may be an indication that the game construction activity itself is more important than the type of game artifact produced, at least to a certain degree, as long as expectations are managed regarding the nature of IF games (not widely recognized these days).

**Cognitive Engagement**

Throughout the class sessions, the majority of students displayed the willingness to expend a significant amount of effort in their game development, mastering the Inklewriter technology, the concept of branching narratives, the integration of factual historical information within the context of fictional settings, and so on. This type of effort is a characteristic of cognitive engagement (Fredricks et al., 2004). Cognitive engagement considers the processing of learning content, self-regulation strategies applied to content mastery, and the application of learning strategies. Additionally, cognitive engagement is demonstrated by the self-regulation strategies that students apply in the context of their learning tasks, such as task planning, consistent effort to learn new skills over time, practice of new skills acquired and application of those skills in new situations, and setting aside regular time for work on the project (Archambault et al., 2009; Fredricks et al., 2004). Throughout the assignment, the students demonstrated various self-regulation strategies, and additionally, they were thoughtful about their efforts which was captured during the participant interviews.

Task planning was a key indicator, and it was displayed by many students as they developed outlines of their game artifacts. The planning included determining how many branching opportunities they would offer players, what the form of the game pathways would be (and how they would be visualized in their game maps), and what historical facts would be
wrapped into their game narratives. Students used a number of techniques from index cards to drawing applications on smart devices to visually depict how they wanted the components of their games to fit and operate together. The students also spoke of time they consistently and regularly spent on game artifact development when they were not in class. Javier spoke of getting help from his father to reserve time on a calendar specifically to work on the assignment, and how this discipline was helpful for him.

Another demonstration of cognitive engagement was in the analysis made of the finished game artifacts by each of the study participants. These participants’ comments exhibited very thoughtful review of their invested labor, the results they obtained in the various aspects of IF game design, and what they would have done to improve their work. The use of pictures within Inklewriter was a theme emphasized by both Javier and Sybil, and they both expended extra effort in learning how to import images, what image formats were compatible with Inklewriter, and most significantly how different images would improve or detract from the game experience for the player. Gisela was most satisfied by the level of factual information integrated into her game artifact, and how well that was able to represent the historical events in which she was most interested.

The participants also expressed what they felt they could have done better in the development of their game artifact. While this exhibits some dissatisfaction in the results of their work, it is a demonstration of greater cognitive engagement in the process. Caroline commented that she would have liked to have more time available in order to have been able to develop ending scenarios with greater detail. Similarly, Gisela thought that her game left too many narrative loose ends, and that her desire would have been to wrap those up in a more satisfying manner.
In terms of integrating the Middle East course materials into the game framework, this very much was a topic of necessity; a basic requirement of the assignment. The students spent much of their collaborative time in the classroom in discussions about clever fictional settings. Some were flavored with elements of science fiction, such as fantastic devices that transported the main character from the present day back to the time of the Six Day War, while other ideas were based on espionage stories with spies on top secret missions and codes that were impossible to break. Even though some of the students admitted that the topic of the Middle East was not one they would have chosen for the game they were required to build, they did not avoid doing the work of building their researched materials into their games. Again, this speaks to the students’ interest in the development of the artifact and the use of the technology to outweigh any distaste they might have regarding a particular topic of study. Whether this would remain true should developing IF game artifacts become a more commonplace type of assignment is a question left to be answered with further study.

**Implications for Practice**

The researcher is an active IF game developer, and his current practice is to provide consultation to teachers, curriculum designers, professional development trainers, education administrators, and other entities and organizations that produce materials for instructional purposes. He has been considering greater integration of IF into his instructional materials, but before making the commitment for greater integration, he has been seeking theoretical rationale and empirical evidence regarding the role of IF game construction activities in the instructional process. This study provides a basis and rationale for education practitioners to work with IF in the classroom.

While the focus was on 8th-grade students in a classroom environment, the assignment created for this study could be executed for home-school students or individual learners,
provided the teacher or adult guiding the activity possesses basic computer skills competency: ability to navigate to particular web locations, access cloud-based web applications, and answer simple computer questions related to software accessibility. The researcher observed that the teacher possessed all of these skills, and there was nothing to indicate that these skills were location or equipment dependent. This indicated that the teacher could have fulfilled the roles of the position in the classroom setting or in a different setting and environment altogether. (Benefits to the students related to collaboration would be lost in the single-student model without some adjustment to the assignment format.)

The type of student to participate in a game-building exercise is important as well, and some basic criteria should be specified to improve the likelihood of a successful experience. Establishing a student profile for successful Inklewriter authoring will be important for teachers developing similar course activities. The 8th-grade students that participated in the assignment were at a technology skill level for using computers, tablets, and web-based software that allowed them to perform the required tasks with an appropriate level of confidence. Further, the students were able to master the new skills necessary for successful completion of the assignment with minimal teacher interaction.

While the students were comfortable learning in more self-directed fashion or in collaboration among themselves, the role of the teacher was changed as well. As the students worked more on their own, pacing their efforts to meet assignment milestones without prompting, the teacher functioned more as a guide during the class sessions. The researcher observed that the students exhibited flexibility as different students worked on different tasks at any given point in time (Mayer, 2001). Any teacher implementing this type of assignment into curriculum should make adjustments to his or her anticipated role. The teacher should be
prepared to provide more fluid guidance during the game development process rather than more traditional lecture material.

Use of the Inklewriter tool is not one of the learning objectives for the history course, and therefore, it is better if the students are at a level of computer skills maturity in which they are able to learn to make use of the tool without requiring significant teacher support or classroom time devoted to computer hardware or software issues (which might be the case with students in grade levels earlier than the 8th grade). The researcher observed students making use of documentation in a self-directed fashion, and students worked collaboratively as well in answering questions as they worked on their artifacts. Comments that students made to one another during class sessions indicate that their own perceptions were that the complexity of the software was not too great given the time frame of the assignment (and this was one of the considerations of selecting Inklewriter over other IF authoring tools such as Inform 7).

**Illustrating Historical Cause and Effect**

One of the issues of concern to the students is based on the consideration of how to combine module content with the construction of a game storyline or plot. During the process of developing class assignments, teachers should think about the challenges students will face as they attempt to build a fictional storyline around their factual course content. This was an area where several students struggled, and the commonly expressed desire by students was that they desired a more concrete set of steps to execute the assignment. Creating what is essentially a series of “What if?” questions with the goal of authoring multiple plausible outcomes requires a high order of critical thinking skills. In this study, the teacher was pleased at the need to exercise critical thinking, but retrospectively she felt that some additional pre-work may have been helpful to students. Teachers developing this assignment should consider creating a set of “cause
and effect” examples that demonstrate or provide simple examples of how particular decisions may have certain historical consequences.

**Allowing Students Multiple Opportunities to Play IF**

Throughout the duration of the study, students exhibited enthusiasm for playing Interactive Fiction games, whether they were the example game segments meant to demonstrate the requirements of the artifacts to be constructed or the actual student games created and which the students played among themselves as well as demonstrated to the class after completion. The students commented several times (during class time as well as in their interviews) that playing the game example segments helped them understand what they were supposed to accomplish in the assignment and what structure or format they were expected to create using Inklewriter. The game play helped reduce student anxiety; the researcher noted that the students appeared to be much less anxious after having placed the example game segments.

For teachers implementing this assignment into their curriculum, it would make sense to provide example games with some guideline commentary to students prior to the assignment itself, possibly incentivizing the game play as an extra credit opportunity. At a minimum, there should be a class period devoted to game play (possibly within a computer lab), in which the first 15 minutes are explanation (and projection on a classroom screen) and the remainder of the class spent on collaborative free play. After the assignment is given to the students, there should be a portion of a class period for question and answer regarding the example game segments. Allowing the students to freely play each other’s games in progress during the assignment timeline and reviewing completed games at the end should increase the students’ perception of satisfaction in the process, as the students both appeared and expressed that this was the case. Additionally, students indicated in comments during class time as well as during the interviews that being able to play the games was one of the aspects they found to be most satisfying. After
the assignment has been completed, teachers may want to informally survey their students to determine what were successful or unsuccessful components of the assignment. Determining this information is a straightforward way in which to understand where improvements to the assignment may be made.

**Providing Additional Support and Resources to Learn IF Development Software**

The students appeared to make good use of the provided documentation and support resources for the development of IF game artifacts using the Inklewriter software. The researcher observed students consistently referring to the paper documentation to answer technical software questions before the students asked the teacher or researcher for assistance. In some cases, questions arose that were not addressed in the documentation nor could be answered by the teacher or researcher. In these cases, the students researched web-based support forums for Inklewriter, and they used trial and error methods of troubleshooting to determine suitable solutions. When the solutions were found, they students shared what they had discovered with their classmates. This information was not formally or systematically captured, however. A good practice for teachers would be to record any solutions and to maintain a repository that can be shared across classes and retained for future use and enhancement.

Additionally, the website Teachinghistory (http://teachinghistory.org/digital-classroom/tech-for-teachers/25772) provides tutorials and other support material for utilizing Inklewriter in the classroom. This resource could be made available to students as they work on their own IF game artifacts.

**Assignment Flexibility to Adjust for Technical Challenges**

Technology problems are always possible regardless of the level of preparation made beforehand (Smaldino et al., 2005). While the class assignment tasks had a particular order for sequential execution, there was enough flexibility in the model that allowed some tasks to be
addressed at the same time as, or instead of, other tasks. This was important considering there were several possible technology failure points that could have resulted in an interrupted assignment workflow.

The first area of potential technology failure was in the presentation system used in the classroom. In this area, failure of the projector or the source signal computer could have resulted in course interruption while waiting for system repair. Instead, because of the way the assignment was designed and resources were provided, students would have been able to view the presentation on their own computing devices (laptops, tablets, and smartphones) brought to class.

The second area of potential technology failure was in the computing devices brought by the students to the class. If any of the personal devices failed, the students would have been unable to move forward or complete their work. The two alternative solutions involved 1) having multiple spare computing devices in the classroom (the teacher had between 3-6 extra laptops and tables for sharing), and 2) having the option for students to perform much of their game development work on paper rather than having to use computers or smart devices.

The third area in which possible technology failure could have had a negative effect on the experience was in the use of the Inklewriter tool itself, and the necessity for web connectivity to ensure access to Inklewriter online. If there had been failure of either the Inklewriter system or of the Internet connection, students would have had the option to continue paper-based development of their game artifacts.

When creating IF game-building assignments, teachers should consider where the possible points of failure are, especially regarding technology. Alternative activities that continue move game development forward should be possible so as not to lead to frustration during the assignment work being conducted in class.
Students Reluctant to Participate

Over the duration of the study, there were students who demonstrated very little interest in developing IF games as an assignment activity. In discussions with the teacher, the researcher identified two main categories of reluctant students. A few students were typically engaged in coursework (for any assignment) only so far as to complete the minimal amount necessary in order to obtain a passing grade. The teacher’s observation over time was that the type of activity did not appear to change these students’ attitude toward their assignments. Also, there were a few students that did not seem to be interested in this particular assignment, and they indicated to the researcher they would have preferred one of their “usual” assignments (such as a research paper or oral presentation).

Finding ways to motivate these students for greater participation is a challenge not unique to assignment associated with this study. However, there are a few strategies that may be applied to improve interest in creating IF game artifacts. Introducing students to Interactive Fiction and the Inklewriter tool before an actual assignment might be beneficial. By allowing students to learn about IF games without simultaneously having to deal with course content (tied directly to grades), students might be more open to exploring the IF genre as “computer games” rather than “class assignments.” In this case, it would be useful to provide a number of IF games to the students and encourage them to play the games with each other, perhaps even providing free time to do so.

Another alternative might be to frame the assignment as a small group project, so that students that prefer the research and reporting activities would be able to contribute according to their particular interests. It would make sense to partner these students with other students that are more interested in the game design aspects of the activity, and the assignment could be designed in such a way that all students would have the opportunity to become familiar with the
content associated with module learning objectives. In any event, designing the assignment so that students are able to focus on activities that interest them is a possible method of improving participation.

**Implications for Further Research**

The time devoted to the study demonstrates that IF game construction may serve as a useful activity in the learning and teaching of history. Although the study results may only be transferred to middle school students in similar educational contexts, further studies that subsequently expand the participant demographics will provide additional data that will be very helpful in validating the broader areas of his professional practice.

Currently the researcher is engaged in several game design activities connected to curriculum development for potentially large adult populations. Further study will be conducted to demonstrate the transferability of these results to significantly older adult populations that currently lack a strong feeling of engagement with their established curriculum. Additionally, the researcher is working with a group of educators in the planning of the Revolutionary Learning Conference to take place in Manhattan, NY, in August of 2016. The researcher will be presenting his current findings regarding IF game assignments, and he will be running workshops in order to provide attendees with some basic IF game design skills. This study will be an important segment of the presentation, but the researcher strongly desires to present more information with broader conclusions regarding the efficacy of creating IF game components. Finally, the school that participated in this study has asked the researcher to return and assist in the implementation of a similar assignment. The researcher will be working with the same teacher that participated in the study, and they will explore methods of encouraging participation among reluctant students as defined above.
This phenomenological study provided a view into the lived experiences of students constructing an IF game artifact as a way to understand historical content around an assignment regarding Middle East history. Although there has been research conducted in the application of computer game activities as assignments, and on using game construction activities for learning (Kafai, 2006), there have been no studies on the hands-on construction of an IF game artifact, nor have there been any relevant studies on the perception of behavioral engagement, emotional engagement, and cognitive engagement experienced during the computer game development process. As a focused study on the participants’ lived experience, other elements of the assigned activity were not considered. The contributions of this study are all about the student experience and level of engagement as perceived by the participants, and to a certain extent observed by the researcher.

In this case, as the researcher was focused on student experiences and perspectives, future studies may seek to examine these issues from the teacher’s perspective. In subsequent conversations with the teacher after the conclusion of the school year, she expressed her feeling that the assignment and development of the IF game artifact was worthwhile and the learning objectives were achieved by the students. Further she has asked the researcher to assist in integrating a similar assignment into her course materials for the current school year, making adjustments based on what was learned during the study. The game artifact assignment itself was developed and implemented as a capstone activity, and for the 8th grade students, this assignment could possibly be interpreted as a “fun” reward at the end of the school year rather than a rigorous assignment upon which additional work would be based. There was great novelty to the use of the Inklewriter tool, and the novelty itself could conceivably cover frustration or boredom if the tool were utilized on a more consistent basis in the course. Finally, the study was limited to
a single grade within Middle School without any indication if older or younger students would respond similarly. While the complexity of the concept of branching narrative along with the challenges of gaining minimal proficiency with a new software tool might be overly challenging for younger students, older student groups could be considered.

The findings of this study provide a foundation upon which further studies regarding IF artifact development could be built and expand the knowledge base. This researcher recommends the following four areas for further exploration and study: 1) conducting a phenomenological study from the teacher’s perspective, 2) conducting a more objective quantitative study on the actual effect of this assignment on learning outcomes and grades achieved, 3) implementing the study on multiple content modules rather than a single assignment, and 4) expand the research to broader demographics, including students, teachers, and types of schools.

Focus on Teacher Perspectives

Even though the participating students reported positive levels of engagement which would suggest possible value in building similar assignments in the future, there was no component of this study designed to determine the level of engagement, commitment, or enthusiasm of the teacher during the course of the assignment. Would teachers find this type of assignment worth the effort to design and integrate into existing curriculum? Would teachers find that students achieved the desired outcomes for the learning modules? Would grades reflect any improvement commensurate to the effort required in developing IF game assignments? A possible study protocol might focus on the perspectives of a group of 8th grade history teachers across a number of middle schools, controlling for variables such as class size, technology accessibility, and student demographic type.
Study Effects of IF Assignments on Learning Outcomes

While a phenomenological study determining the experiences and perspectives of students participating in an assignment to build IF artifacts can reveal much about engagement and student perceptions of the learning activity, understanding the effectiveness of such an assignment in terms of measured and quantifiable learning outcomes would provide an objective foundation that educators could use in deciding whether or not to implement this type of assignment. It is common knowledge that due to the existing assessment and accountability pressures, for many school administrators and school teachers the bottom line of any educational innovation is student achievement, specifically achievement that is conceptualized as improvement in standardized test scores. Thus, being able to conduct a quantitative study across significantly larger numbers of students and focusing on the impact of the IF game construction activity on quantifiable learning outcomes could be beneficial. The work of this researcher’s study could serve as the impetus and core curriculum materials that could be used across multiple classes and even multiple schools, perhaps in a district-wide context.

Apply IF Assignment Framework to Multiple Content Modules

This study appealed to the participants to some degree because of the novelty of IF game development. The participants admitted this in the context of describing the process of building the game artifact as a welcome change from writing reports and giving presentations. The question that comes to mind, then, is what perceptions would be if students were required to develop several IF game artifacts for a variety of assignments over the course of a single school year? A possible study design would be to apply the assignment developed in this study to several content modules to be implemented over the course of a quarter. In this way, students would be expected to develop IF game artifacts at a frequency more comparable to that of assignments such as reports and presentations. Consideration should be given to the fact that IF
game development can be more complex than typical class assignments, and it is potentially very
time-consuming.

**Expand Study to Include More Diverse Student Demographics**

A fourth and final recommendation would be to expand the target population of the study
to include much broader and diverse student demographics across a variety of institution types
including public and charter schools, as well as expansion out of the Central Florida region.
Determining the lived experiences and perceptions of a more diverse student population might
give an indication to the potential effectiveness of IF assignments at institutions that work with
disadvantaged students, at-risk students, students without ready access to technology and Internet
connectivity at home, and students for whom English is a second language.

**Personal Reflections and Conclusions**

During course of this study, the researcher has seen that the task of building IF computer
games as part of assigned work can interest and engage 8th grade students in ways beyond the
level of engagement experienced during more typical assignments. The elements of IF game
design that appeal to students include the creative opportunities of creative open-ended fictional
narratives, working with software tools that provide challenging opportunities beyond those that
are encountered while using standard software such as Microsoft Word, the ability to work with
classmates in a collaborative fashion in ways that facilitate story composition, and the perception
that information obtained from research will be more easily or readily retained without having to
engage in more traditional assignment activities.

Part of the positive experience is likely to be related to the impression among students
that computer games are “fun,” as they have been a consistent part of students’ social lives
before being introduced to the classroom. Since students associate computer games with
entertainment and recreation, they are ready to take on the task of creating games for
coursework. The activity is seen as a way of integrating play into their schoolwork, and most, if not all students are ready to take advantage of that opportunity.

Leveraging this interest in computer games makes sense in the education environment as long as there are some demonstrable positive academic benefits. This study represents the first stage of those potential benefits; before determining whether or not computer game assignments may improve actual learning outcomes, it is worth determining whether or not computer game assignments would even be accepted and completed by a significant number of students. The researcher feels that this study has demonstrated that to be the case.

Unfortunately, the assignment did not seem to appeal to all of the students observed during the course of this study, and even though the artifact to be developed was a computer game, these disinterested students showed no significant increase in their levels of engagement. As evidenced in Chapter 2 of this study, many researchers will state that games are good for engaging students who are typically disengaged in the traditional classroom. This was not necessarily the case for all students in this study. The researcher’s field journal notes show that some students who were initially less participatory became more engaged as the class progressed, so there is some element of increased engagement.

For the students that did not show interest in the building the IF game artifact, there are considerations regarding both motivation as well as the ability to work with the technology on a primarily text-based assignment. As already discussed, the teacher identified a small number of students as being less interested in assignments no matter what type of activities are involved. Improving motivation levels among these students is not a variable dependent on the type of assignment itself. There may be game genres that would be more appealing to these reluctant students, and to make that determination, it may be informative to survey them prior to making
the assignment, then providing IF templates that exemplify integrating history content into those
templates that interest the students most. Finding ways to tailor various aspects of the assignment
to students’ individual interests may improve levels of enthusiasm, but that would need to be
tested through further study.

Other students may have difficulty with text-heavy assignments, and the technology skill
required to manipulate the web-based software to input and edit text could represent a significant
hurdle. Rather than requiring students to type all of their text materials, an alternative might be to
use text-to-speech input (through smart devices, for example), then paste the converted text into
Inklewriter. It might also be fruitful to explore alternatives to Inklewriter such as Twine, which is
similar to Inklewriter though with a somewhat different interface. It may be that the software’s
user interface is challenging or confusing to some students.

It seems that the benefits identified in this study are more strongly related to content
retention and increased levels of engagement for students that already exhibit moderate interest
in the assignment. This is not insignificant. As the participants all indicated, the IF artifact
assignment was appealing enough to them that they would welcome additional assignments of
the same type. Had the feeling been more neutral, engagement could drop off as the activity
becomes more commonplace. To some degree, this seems to be the feeling expressed by a few
students regarding the more traditional assignments such as writing papers.

As a final reflection, the researcher’s original intent for the study was to develop an IF
game based on some historical content that would be provided to students as a completed
artifact. The concept for this approach would have been to demonstrate some level of
engagement through the students’ play with the IF game rather than to examine engagement with
the process of game development around course content. This approach was attractive to the
researcher in large part due to his passion for IF game development; ultimately a more inward-facing consideration.

During the process of topic and study refinement, the researcher was surprised as he developed a strong interest in teaching students how to construct IF games rather than simply play them. The researcher sees this final approach as being much more focused on the learner experience with the potential for greater impact on learning outcomes. By the conclusion of the study, the researcher derived a much higher level of personal satisfaction through sharing his knowledge of IF game design with the students.

Nearly three decades ago at the height of popularity for the IF game format, research was conducted demonstrating that IF gameplay would engage even the reluctant reader (Lancy & Hayes, 1988). By taking IF a step further into Papert’s realm of constructionism, this researcher has identified an opportunity to use an older, less technically-demanding form of computer game effectively in the modern classroom environment to equip students to construct their own engaging learning experiences.

Several factors have changed since the heyday of IF as a form of computer entertainment: personal computers are available and practical to obtain, the Internet allows the hosting and distribution of freely available IF authoring systems, and ubiquitous mobile devices provide accessibility to IF products through an anytime-anyplace model. All these changes readily facilitate the student development of IF rather than simply provide the ability to play IF games should they be made available in the classroom. This study has demonstrated the feasibility of creating assignments in which middle school students develop their own IF artifacts, without the process being too complex or burdensome for teachers to implement in their practice. Implementing older IF interactive narrative techniques through the widely accessible modern
technology infrastructure may be a reliable method of enhancing student engagement and, ultimately, positive learning outcomes.
APPENDIX A
A BEGINNER’S GUIDE TO INKLEWRITER

The following document was provided to the student participants as instructions for using the Inklewriter Interactive Fiction authoring software.
Introduction

Inklewriter is a web-based software that is used to create Interactive Fiction in the Choose Your Own Adventure (CYOA) format. Interactive Fiction (IF) is a type of computer game that lets the player read a story and make choices that can change the direction and outcome of the story.

Because IF games are mainly text-based, IF games were among the first kind ever written for computers. CYOA games are a type of IF that give the player specific choices at the end of each section. The player chooses what he or she would like to do, and the game moves forward based on the player’s selections through the game.

There can be many different outcomes in an IF game, or the story can lead the player to a single ending. It is up to the game creator to decide what the player is able to do. To direct the player’s path through the game, the game creator must develop a “map” of the story. That is an outline of the story narrative along with the decisions a player is allowed to make and the places in the story that those decisions may be made. You will learn about that later.

To get to Inklewriter, all you need is a computer with access to the Internet with a regular web browser. You will go to the URL http://www.inklestudios.com/inklewriter/ and your screen should look something like this:

Click on the Start Writing button. When you do that, another tab will open up in your browser, and you will see this on your screen:
Your account has already been created, so you will immediately click the “sign in” button. This is what you will see next:

Use the account information that Mrs. Baker provided, and fill in the Email and Password fields.
Once you sign into your Inklewriter account, you will see the screen below.

This is your “blank sheet of paper” for creating your IF game. You will learn how to create a basic game using Inklewriter, but first we will talk about planning your game. It is very important to have an outline of how you want your game to “flow” and the choices you want the player to be able to make.

**How to Design a CYOA Interactive Fiction Game**

The key concept behind creating a CYOA Interactive Fiction game is that you must give players the opportunities to make choices during the game. These choices should in some way change the actual flow of the game. In a regular story (such as in a book you might read), the story flows in one direction from start to finish, like this:
There are no choices to be made, because the storyteller or writer has already decided what will happen and in what order everything takes place. In an Interactive Fiction game, however, in certain places in the story the player gets to choose the direction.

The above diagram is an example of a story that branches after the beginning into two different paths. The player is able to select one of two options, and the result be a different ending. It is possible to have many options in the middle portion of your IF game, and this may result in more possible endings. Below is an example.

We see that after the beginning branches into two paths, those two paths branch into two more paths before getting to the four possible endings. You can imagine how big this map could become if you added several more levels that branch in between!
Your navigation map can be as simple or as complex as you like. And it is even possible to have the branches of the game come back together instead of always separating. On a map, that might look something like this:

You can see in the above diagram that there are multiple paths that will take the player to the different endings. Although this is the most challenging game to create, it is often the most satisfying to play because of all the choices a player may make.

Planning the Story

When planning your story for the game, you will need to do the following things:

- Gather your materials, just as you would for a report. You will find good sources, and you will have a bibliography at the end of the game.
- Since your game will be in the form of a story, you will want to identify key historical figures with whom your game player might have “conversations,” such as the Prime Minister of Israel or a fighter pilot.
- You may want to think about a key historical event that might be described in your game, such as the Six-Day War.
- You will want to decide the location in which the events of your game takes place. That location may be inside a building like a library, a government building, a city, a battlefield, or even a combination of places.
- You will want to identify objects that might have significance to the story you want to tell. For example, there may be a book that contains information you want your game player to know, or there may be a treaty that was signed between two countries.
- You should create a navigation map on paper first, outlining the story and the action choices where the story branches. Index cards might be a good tool for you to use.
As you write your game, the places where the story branches into different paths are where the player chooses different actions to take. For example:

You are in a field of rolling hills on a sunny day. Not too far in front of you, you see a jet fighter that has crash landed. The canopy of the jet is open, and the pilot was able to get out of the plane safely. He is sitting on the ground next to the jet.

You ask the pilot what happened.
You turn around and run to find help.

The paragraph of text “sets the stage” for this part of the game story. This particular story might be about describing the Six-Day War from the perspective of an Israeli fighter pilot. After encountering the pilot, the player has two choices to make:

- You ask the pilot what happened.
- You turn around and run to find help.

For each choice, you must decide what happens next. Let’s look at how to do this in Inklewriter.

On the “blank” Inklewriter page you would type a title for your game (“A Pilot’s Tale” in this example), your name, and the paragraph of introductory text. Then you would click on the “Add option” button to type in your action choices:

- You ask the pilot what happened.
- You turn around and run to find help.
To enter text that should be connected to the particular action, you click on the arrow button on the right side of that action. That will bring up another text box for you to enter the next section of your game story.

To continue the story after the choice of “You ask the pilot what happened,” you should think of the next part of the story and compose the text in a way that makes sense. For example, this could be the next section (as shown above):

The pilot looks up at you and says, “We saw that Egyptian forces were being built up on our border along the Sinai Peninsula. Our air force was given the command on June 5th to launch a pre-emptive airstrike.” He pauses for a moment, and you notice that his lips are chapped.

You offer the pilot your canteen.

You ask what happened to the Egyptians.
As you build out the different areas of your game, you may want to check the progress of your navigation by clicking on the “map” link at the top of screen. This will bring up a visual representation of the flow of your game such as the one below. The map that Inklewriter displays as you create your game should closely resemble the outline you first made when developing your game idea.

Communication, Navigation, and Manipulation

There are three basic choice types for players to select in Inklewriter:

- **Communication** – These are choices that involve conversations between the player and characters in the game. For example:

  *Ask the doctor about the medicine.*

  *Tell the police officer you saw a robbery.*

- **Navigation** – These are choices that result in the player moving from one physical location to another. For example:

  *Go through the door to the garden.*

  *Climb up the stairs.*

- **Manipulation** – These are choices that allow the player to use objects in some way, such as read them, examine them for information, and so on. For example:
Open the book and read the first page.

Fill the glass on the table with water.

As you create your game, you will be able to mix all three of these types of choices for the player. This will make the game much more interesting to play.

We have only touched upon some of the most basic functionality within Inklewriter so that your first experience using the system is straightforward. There are a number of resources for Inklewriter available, and within the Inklewriter authoring system there is a “tutorial” link in the top menu bar that provides a lot of helpful information.

If you have specific questions about creating your IF game, you may contact me directly at hapaziz@gmail.com.
Model 1
6 levels
31 Segments
62 Choices
32 Endings
Model 2
6 levels
20 Segments
30 Choices
5 Endings
Model 3
6 levels
19 Segments
32 Choices
3 Endings
Model 4
6 levels
15 Segments
26 Choices
2 Endings
Model 4a
5 levels
13 Segments
20 Choices
3 Endings
APPENDIX B
LETTERS OF PARENTAL CONSENT AND STUDENT ASSENT

The form letters approved by the IRB are provided on the following pages
Letter of Parental Consent

Dear Parent/Guardian,

I am a graduate student in the College of Education at the University of Florida conducting a research study under the supervision of Dr. Pavlo Antonenko titled, “Understanding student engagement and experiences during the construction of Interactive Fiction in a middle school History course.” The purpose of this study is to determine perceptions, levels of engagement, and experiences of students as they create Interactive Fiction games as part of a history assignment. The study results may help teachers determine if it might be useful to use game-creation exercises in lessons to help students with the material. I am seeking your permission for your child to volunteer for this research.

Participating students will be instructed on the game development software and will be observed during game creation. The duration of the study will be four to five weeks including curriculum development with the instructor. Students will work on the study assignment for about three weeks in the classroom. After completion of the games, the students will be asked to answer seven questions in an interview format about their activities. They will not be required to answer any question they do not wish to answer. Students will be taught the basics of Interactive Fiction game creation during class, and I will remain available to answer questions regarding use of the game development tool.

Interviews at the end of this process will be audio recorded. The recordings will only be accessible by the researcher. At the end of the study, the recordings will be deleted, and all student identities will be kept confidential. Participation or non-participation in this study will not affect the students’ grades or placement in any programs. You and your child have the right to withdraw from participation at any time without consequence. There are no known risks or immediate benefits to the participants, and no compensation is offered. Study results will be available in December upon request.

If you have questions about this study, please contact me at 407-697-9187 or my faculty supervisor, Dr. Antonenko, at 352-273-4176. Questions or concerns about student rights as a research participant may be directed to the IRB02 office, University of Florida, Box 112250, Gainesville, FL 32611, (352) 392-0433.

Fuad Aziz

I have read the procedure described above. I voluntarily give my consent for my child, ____________________________________________, to participate in Fuad Aziz’s study of student experiences during a game creation assignment. I have received a copy of this description.

_________________________________________________________  __________________________
Parent/Guardian                                                Date

_________________________________________________________  __________________________
2nd Parent/Witness                                           Date
Letter of Student Assent

Hello, [student’s name],

My name is Fuad “Hap” Aziz, and I am a student at the University of Florida. I am trying to learn about how students think and feel about creating a computer game as an assignment in history class, and I am conducting a study called, “Understanding student engagement and experiences during the construction of Interactive Fiction in a middle school History course.” I will be working with several students in your class at International Community School. If you decide to participate, you will be asked to work on a computer game (you will be taught how), and you will be interviewed about your experience. You will work on the game in a small group including two or three other students, and the whole activity will cover about three weeks of your time in the classroom.

There are no known risks to participation. You do not have to be in this study if you don’t want to, and you may quit the study at any time. Other than me, no one will know how you responded to the interview, including your teacher or your classmates. If you don’t like a question, you don’t have to answer it and, if you ask, your answers will not be used in the study. I also want you to know that whatever you decide, this will not affect your grades in class. Your [parent / guardian] said it would be okay for you to participate. Would you be willing to participate in this study?

Fuad Aziz

I would like to participate in this study.

__________________________________________  ____________________
Student  Date
APPENDIX C
ENGAGEMENT OBSERVATION PROTOCOL

This protocol will be completed by the researcher for each student working on the IF artifact assignment in the class. A calculation of the percent agreement between teacher and researcher for the observation items will be reported as a strategy to enhance the overall trustworthiness of the results in the study’s Discussion of Findings section.

The items will be scored on the following scale:

1. little evidence of this behavior
2. much evidence of this behavior

Items 7 and 8 are observations regarding emotional engagement, while items 9 and 10 are observations regarding cognitive engagement. These are included in order to provide additional validation of the data gathered through the interview process outlined in the study.

1. This student often spends time outside the classroom working on the assignment.
2. This student researches or plays other IF games beyond assigned work.
3. This student works hard developing branching situations in his or her game.
4. This student is not hesitant at utilizing Inklewriter documentation.
5. This student repeatedly tests the playability of his or her IF artifact for technical functionality as well as game-play enjoyment.
6. This student seeks methods of improving or increasing the narrative pathways of the game artifact.
7. This student exhibits enthusiasm and shares verbal encouragement among the members (emotional engagement).
8. This student exhibits little or no signs of distraction or boredom and remains on task (emotional engagement).
9. This student discusses and plans game strategies and narrative paths for the game artifact well (cognitive engagement).
10. This student exhibits curiosity regarding ways to integrate assignment content on the Middle East into the fictional narrative framework (cognitive engagement).
APPENDIX D
AUDIT TRAIL

Establishing the confirmability of conducted research is of significant importance, and this must be considered and integrated into the research process. The application of a research audit trail is a recommended practice (Carcary, 2009), and the researcher describes this study’s audit trail here.

**Intellectual Research Audit Trail**

Prior to initiating the study and taking any action to gather or analyze data, the researcher took some time to consider the evolution of this thinking regarding the construction of the study, from the development of the conceptual framework, to the creation, revision, and final study parameters to be implemented in the field.

Initially, the researcher sought to approach the topic of the use and effectiveness of computer games in curriculum as an exploration based on Diffusion of Innovations Theory. The researcher had intended to develop an Interactive Fiction game specifically for the study, provide it to students, and then study teacher reactions and likelihood of adoption of the IF game format. After consideration, the complexity and time required to develop a complete IF game as well as the researcher’s shifting interest in student perceptions as a driver for teacher motivation became reason to redevelop the conceptual framework. Papert’s constructionism was an appealing model for a study meant to measure students’ interest and enthusiasm, and with further consideration, the researcher came to find Fredrick’s student engagement framework (behavioral, emotional, and cognitive engagement) as an ideal way in which to assess a constructionist activity.

After determining a conceptual framework for the study, the researcher considered several alternatives for the physical study:

- Inform 7 versus Inklewriter for IF development: Initially the researcher considered conducting the study using the Inform 7 tool, as the researcher had greater familiarity...
with it, and the artifacts would have been constructed in the more traditional IF format rather than the choose-your-own-adventure IF format. However, realizing that the students involved would have no IF development experience and probably very little (if any) computer programming experience (later confirmed), the researcher settled on Inklewriter as a more accessible tool appropriate for the students.

- Individual versus group artifact development: The researcher deliberated between having students work on teams, thinking that the work would be more easily divided among team members. However, the introduction of the variables of participation levels and tasks performed would have made the study results much more difficult to interpret. The researcher decided to have each student develop their own artifact from start to finish, and in that way, interviews could be conducted with individual students rather than groups of students that worked on single artifacts.

- Working with multiple teachers versus a single teacher: Originally, the researcher envisioned a study spanning several teachers, classes, and possibly schools. Again the question of additional variables as well as simple manageability (how difficult would researcher travel to each class location be during the course of the study?) resulted in focusing on a single teacher.

- Data collection through survey instruments versus interviews: When the researcher decided to have individual students work on their own artifacts, the realization was that there would be at least 25-30 students in total having participated in the assignment (final number was actually 36 students). This made the prospect of conducting individual interviews for data collection a potential obstacle. The researcher determined an alternative selection process to limit the interviews to six to eight students instead. This way, a phenomenological study focusing on engagement could be more practically implemented.

**Physical Research Audit Trail**

The physical audit trail reflects the actions taken by the researcher in implementing this study, in alignment with the intellectual audit trail as described above.

Identification of research problem: After completion of the Qualifying Exams, the researcher conferred with classmates, professional colleagues, and program faculty to refine the topic of the use of computer games in the education environment. It became apparent to the researcher that the difficulty of implementing computer games was a topic worth examining, and after extended consideration, the topic was narrowed to research focused on student perceptions and engagement.
The research proposal: The researcher developed a proposal based on the research questions, and the proposal was submitted to the researcher’s dissertation committee for approval. The proposal included the description of the study to be conducted as well as the description, curriculum to be used in the classroom, the objectives of the study and the interview questions.

The literature review: An in-depth review of the literature on computer games, narrative, student engagement, and IF was conducted, with a focus on the use and efficacy of using computer games in the classroom environment. Although there was significant literature on the topic of computer games in education, there was little written on the topic of narrative-focused games such as those in the IF genre, and the researcher found no studies directly addressing student development of IF games and the resultant effects on perceptions and engagement.

Design of the research framework: The researcher then developed a framework based on a constructionist foundation to examine engagement in the context of a phenomenological study. The study data was obtained from researcher observations in the classroom as well as participant interviews after completion of the game artifact assignment.

Selection of school, teacher, and students: The research selected the participating school after contacting several middle schools in the Central Florida area for ease of travel. The school administration identified the middle school teacher, and as the teacher was agreeable, it was determined that both the teacher’s 8th grade history classes would participate. These classes were scheduled back-to-back and followed the same curriculum plan and schedule.

Development of assignment curriculum: Working with the teacher, the researcher developed instructional materials to assist students in learning how to use the Inklewriter IF programming tool. Also, the teacher and the researcher developed the assignment criteria and
rubric to direct the students in the development of the game artifact.

Administering assignment and guiding students: After the support materials were developed, the researcher came to the classroom for one class period each week during the study to provide basic introductory instruction on Inklewriter, and then to provide ongoing support (primarily answering questions about IF development and about technical development challenges). Each class session lasted 45 minutes. The students also had one other class period during each week to work on their artifacts in class.

Selecting student participants and scheduling interviews: In both classes, there were 18 students in attendance, for a total of 36 students that were assigned the project. The teacher provided the researcher with a subset of 14 students likely to provide meaningful or expressive interview data, and the six students to first respond to the researcher’s request were scheduled for interviews as study participants.

Collecting and analyzing interview data: Interviews were conducted via Skype™ as the end of the school year schedule did not allow time for all participants to be interviewed in a face-to-face environment. For consistency, Skype™ was used in all interviews, and the interviews were recorded then transcribed into written format. Each interview lasted between 45 and 60 minutes, and the transcripts were subsequently verified by the informants. Once transcribed, the interviews were coded, and essential themes emerged during the code analysis process.

Presenting narrative account: Interview transcripts as well as researcher observations and field journal notes were used in developing the narrative of the study. The participant interviews provided a foundation for understanding the lived experiences during the assignment from a phenomenological perspective, while the researcher was able to validate participant perceptions through external observations of their exhibited behaviors during classroom activities. In support
of transferability, this researcher provided rich descriptions of the participants, context, and results so that other researchers may determine the extent to which the study findings can be applied to their own research context.

Distillation of Findings: Through extended reflection on the essential themes categorizing participant experiences, behaviors, and perceptions, the researcher explored the relationships between the categories as well as the relationship between the themes and the theoretical framework presented. The findings contribute to the body of research on the topic of incorporating constructionist IF game activities into the classroom environment as a method of fostering student engagement.
LIST OF REFERENCES


Richards, H. M., & Schwartz, L. J. (2002). Ethics of qualitative research: are there special issues for health services research? *Family Practice, 19*(2), 135-139.


BIOGRAPHICAL SKETCH

As an academic consultant working in the field of program, curriculum, and training development, this researcher regularly works with faculty at a variety of education institutions across the United States to assist in the development of engaging teaching and learning experiences and to continually improve student learning outcomes. The researcher specializes in incorporating narrative format interactivity into custom-developed curriculum. While learning outcome issues are related to several factors including student preparedness as well as the quality of curriculum, this researcher has been greatly interested in possible narrative and gamification methods related to Interactive Fiction as ways of facilitating greater student engagement in the teaching and learning environment.

The researcher obtained an undergraduate degree in Computer Science from Rollins College, which provided the requisite knowledge base to develop instructional software. Upon completing his master’s degree in Instructional Technology and Distance Education from Nova Southeastern University, the researcher was equipped with an understanding of online methodologies and technologies. The researcher’s academic background and professional experience has prepared him for work in narrative and interactivity in curriculum development.

The personal philosophy of learning espoused by this researcher was very much shaped by the essay “Does Easy Do It? Children, games, and learning” by Dr. Seymour Papert published in the June, 1998, issue of Game Developer magazine. In the essay, Dr. Papert made the assertion that people learn well through play, and the modern state of the instructional design world had fallen well behind the commercial computer game sector in terms of creating compelling learning experiences. There are lessons to be learned from the commercial computer game development sector; many of the characteristics of compelling game play could be applied in creating compelling instructional content.