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Minecrafting Archaeology: An Experimental Pedagogy for an Eighteenth-Century French Trading Post in Niles, Michigan

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MINECRAFTING ARCHAEOLOGY: AN EXPERIMENTAL PEDAGOGY FOR AN EIGHTEENTH-CENTURY FRENCH TRADING POST IN NILES, MICHIGAN

by

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The convergence of archaeology, digital technology, and public education has produced new and exciting ways for archaeologists to engage and inform the public. This thesis uses the video game *Minecraft* to recreate the process of archaeology in a digital format. The test case for this project was the Fort St. Joseph Archaeology Project and its excavation at Fort St. Joseph in Niles, Michigan. The target audience for this project is students in grades three to five. These grades were determined to be the most applicable because their content ranges from United States to Michigan history. A study of virtual archaeology determined that there was a significant contribution could be made by using archaeology and digital technology with the specific goal of public education and outreach. A review of the use of digital technology in public education concluded that the topic distance learning would provide the most useful information for this thesis. The construction of *Minecrafting Archaeology*, the name of the *Minecraft* world created for this thesis, was divided into two distinct phases. The first, or Alpha phase, was designed to test if the basic components necessary to recreate an archaeological excavation in *Minecraft* was possible. The second, or Beta phase, refined material created in the first phase, added instructional and educational content books and was peer-reviewed to ensure that the process of archaeology was being created and the language was appropriate for students in grades three to five. The final map will be published for free access on both the Fort St. Joseph website and Curse.com, a popular website which hosts *Minecraft* content.

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James B. Schwaderer

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INTRODUCTION

Life without knowledge is death in disguise! (Sooter - Shake That! n.d.)

Over time human curiosity regarding its material past has evolved from personal fascination to an academic discipline that spans the globe. A corresponding growth in the complexity of theory, methodology, and application have developed in conjunction with the maturation of archaeology as a profession (Preucel and Mrozowski 2010; Trigger 2006; Schnapp 1996). Virtual archaeology, which can be defined as the incorporation of digital technology into the archaeological process, is a recent development in the history of archaeology as a discipline. Digital technology can be defined as any technology that uses some form of computerization. Virtual archaeology has used digital technology in the analysis, recording, and reconstruction of artifacts and archaeological sites.

The development of digital technology had a significant impact on the classrooms, theories, and methods of public education (Harrison 2013; Thomas 2005). Early explorations included games like Word Rescue and Math Rescue that were reviewed in 1993 as being good for children young and old (Miller 1993:116–117). Educators who employ digital technology have built upon these early successes to create programs like Citywide, which uses interactive digital maps, and game-hosting websites like ABCya.com, to broaden the topics and forms of student engagement (see Byrne 2013; Izadi et al. 2002; Keengwe and Schnellert 2012; Muñoz-Cristóbal et al. 2015). This means that students are better able to access and interact with the provided material. The use of digital technology has also become a critical component of education standards that range throughout many different subjects, including social studies (MDE Goals and Strategies n.d.; 3-5_ELA_357701_7.pdf n.d.; SS COMBINED n.d.; SSGLCE_218368_7.pdf n.d.). Contributions from digital technology to public education are

numerous, including providing students access to a wider array of materials. Students are no longer bound by the traditional classroom setting and the connection between educator and student is becoming easier. Students can easily ask an educator a question and receive a response outside of normal class hours thereby streamlining the learning process.

The combination of virtual archaeology and digital education techniques provided the basis of this thesis. Its specific design is to test if the enterprise of archaeology can be incorporated into the video game *Minecraft* to serve as a teaching tool for children in grades three to five. I define the enterprise of archaeology as the unique balance between discovering physical materials and constructing narratives of the past. The ratio between discovery and analysis should be heavily shifted towards the latter rather than the former because it is the information gained about recovered materials that will create these critical narratives. The Fort St. Joseph Archaeological Project (hereafter "the Project") was chosen as a test case for the development of this application. The choice was made based upon detailed records necessary for virtual recreation and the longstanding commitment to public outreach visible through the project's ongoing lecture series, camper programs, and open house to name but a few examples (Berliner and Nassaney 2015). The topic of public outreach within archaeology has also been the focus of multiple scholarly works from the Project (see Berliner and Nassaney 2015; D'Elia 2013). Beyond the Project, there has been a growing trend to involve the public in the archaeological process which can be seen through programs like the Passport in Time run through the Forest Service (Clearinghouse n.d.).

This thesis will demonstrate that virtual techniques, and more specifically games like *Minecraft*, are powerful tools for archaeologists to use in public outreach, education, and engagement. Not only do digital outreach programs remove the requirement of physical site

access, which has been an almost universal hindrance to the public at large engaging with archaeology, they also link to previously mentioned curricular goals in public education. These include providing specific information about Michigan and United States history and reinforcing critical thinking skills. This allows a shift from just teaching archaeology to teaching through archaeology. *Minecrafting Archaeology* will be able to connect with the broader-reaching academic goals including critical thinking, problem-solving and familiarizing students with the use of digital technology (Bartoy 2012).

In chapter one, I provide a brief history of archaeology with a focus on the development of theories and methods that led to the birth of what is now known as virtual archaeology. Since virtual archaeology is inexorably linked to digital technology I primarily concentrate on advancements in archaeology that have used ideas or techniques now associated with virtual archaeologists. I define digital technology as any technology that uses computers in some form. The use of digital technology in archaeological contexts started in the early 1970s (see Burton et al. 1970; Whallon 1972). Early research primarily engaged with large data-set analysis. As computer technology evolved, the first projects in virtual recreation started. The turn of the twenty-first century coincided with the development of virtual analysis including 3D laser scanning and photogrammetry. These techniques dominate the publications of those practicing virtual archaeology. I also review projects where video games were used to facilitate archaeological analysis, primarily through digital recreation. I explore currently available historical and archaeological based games to elucidate how this project will be both different and more in-depth. The vast majority of current archaeology-based educational video games focus more on the discovery of objects and less on constructing narratives of the past. Lastly, I briefly explain why the efforts of public outreach in archaeology are growing and how they are

connected to the technology and techniques associated with virtual archaeology. The history of the test chase chosen for this thesis, Fort St. Joseph, a French colonial fur trade post, mission, and garrison, and its associated archaeology project is reviewed in connection with public outreach and education. Understanding how New France was formed and developed will situate Fort St. Joseph within the wider topics of the fur trade and its place in New France during the fort's occupation. Understanding the history of Fort St. Joseph is critical to providing context for the material recovered from the site. Lastly, by exploring the history of the project explains why this thesis is a logical extension of previous literature. Like the review of literature associated with virtual archaeology, understanding the breadth of the project will provide information for how this thesis will connect with it. While the product of this thesis could have been created at any archaeological site, linking it with the project situates it within a growing network of public education. The completed map will be published on the Fort St. Joseph web page for free. As well, the project contains the necessary detailed excavation reports that are required to properly create this *Minecraft* map.

Chapter two explores the intersection of public education and digital technology. The roots of digitally-enhanced learning can be traced to the late 1980s when computers slowly began to be incorporated into public schools (see Goodson and Mangan 1996). As digital technology became more readily available, educators began to investigate how it might enhance instruction techniques of the time. A brief background regarding the primary structure and terminology associated with education and digital technology refines the scope of material associated with this thesis. The two distinct areas of study include the incorporation of digital technology into the classroom and the benefits and impacts of e-learning and distance learning. This information will help situate *Minecrafting Archaeology* within literature that examines the

use of digital technology in public education. This chapter also examines the history of *Minecraft* and how it is used by the general public. The content that is being developed to supplement *Minecraft* goes far beyond the game's basic design. The vast majority of these additions, colloquially known as mods, are available for free, as this product will be upon completion. Exploring the history of *Minecraft* provides evidence that this thesis is situated within the developing educational content available for the game.

Chapter three is an in-depth explanation of the process and reasoning involved with the development of the *Minecraft* map Alpha phase. The term "map" is used because it is the colloquial name given to a specific and unique game universe and "Alpha" is the first stage in a game's development. The first phase was designed to determine if the disparate elements necessary for the project would function. A detailed description of the initial process of creating the physical framework for the recreation is critical to understanding the expansion in the second phase of development.

Chapter four examines the changes made during the Beta phase which is the term for the second and final phase of a game's development before public release. This portion of the project provides depth to its elements and incorporates the final details of the recreation. The specifics of the chosen unit from Fort St. Joseph, N29E8, were digitally recreated in the two scales of one block to ten centimeters and one block to five centimeters. I developed a system for disseminating information books related to artifacts and ecofacts. The location for the player to start and directions for using the game was also refined. Lastly, I updated the digital recreation of a French colonial house to provide the player with a digital approximation of what a building at Fort St. Joseph might have looked like. This reconstruction will allow the player to view some of the items and information gained in the excavation as it would have looked like during the

eighteenth century. As well this chapter examines the review and release of *Minecrafting Archaeology*. While this thesis is not constructed to explore the implementation of the Minecraft project, it is critical for the information it contains to be reviewed. The reviewers included those who are both familiar and unfamiliar with educational material and archaeology to provide an impartial perspective to the critique. Much of the information produced by the academic community is unavailable to the general public. The Project and this thesis stand apart from this trend, the former having a prominent social media presence and publishing documents specifically for the public (Loveland and Nassaney 2017). *Minecrafting Archaeology* will be made available free online in multiple locations for whoever wishes to access it.

The concluding section, chapter five, will expound upon the future of archaeological outreach, education, and digital technology with specific emphasis placed on video games. I will also discuss what I learned during the creation of this process and where its future lies. The world and techniques of education are evolving, if archaeology cannot adapt and grow, then it is in danger of becoming irrelevant and ignored. People are generally only interested in the past when they see themselves as stakeholders. One of the best ways for people to become stakeholders for history is through direct access and input. Since archaeology suffers from the critical requirement of direct site access, *Minecrafting Archaeology* will break this barrier by providing a digital link to Fort St. Joseph. While a more simplistic solution like a detailed website can provide information, I would argue that it cannot provide the dynamic experience that an educational game can. Therefore, gaining the interest of the public at large is vital to the continuation of archaeology as a discipline, and the protection of crucial heritage worldwide (Nassaney 2017).

CHAPTER ONE: A BRIEF HISTORY OF ARCHAEOLOGY

Archaeological theory and method have a long history, developing from individual fascination in past material culture to a precise academic discipline that is recognized worldwide. Since virtual archaeology is comparatively new to the discipline of archaeology, it is important to explore the developments and changes in archaeology that brought virtual archaeology into being. It is important to understand this past because it provides the necessary groundwork to contextualize the development of virtual archaeology. Theory, methodology, and technology are inexorably linked, one cannot proceed without the others. Understanding the evolution of archaeology as a discipline is critical to understanding the place virtual archaeology holds in the discipline as a whole. This chapter will briefly examine the history of archaeology through the post-processual movement which is when virtual archaeology begins to appear. It will then focus more specifically on the breadth and depth of virtual archaeology along with the use of video games in archaeology.

Archaeology through Post-Processualism

Interest in the physical remains of the past has been present in many civilizations since the first written records. Objects from early human societies, for instance, hand axes and structural ruins, were believed by ancient peoples to be evidence of mystical beings and the artifacts were thought to possess magical properties (Trigger 2006:42). Artifacts were recovered not through specific or specialized means but gathered as people found them. These objects were not necessarily associated with the human past but used as evidence of mythos and the supernatural. With the arrival of the Renaissance and the antiquarian movement, those interested in the past began to collect artifacts to reproduce artistic styles (Ibid.:78). Material culture began to be systematically disinterred from ancient sites. Past methods cannot be judged as they are a product of the beliefs of their time. These actions gave rise to the dangerous misconception that

archaeologists are little more than treasure hunters, which have persisted for over one hundred years, to create characters like Indiana Jones and Laura Croft. It is only through direct engagement and education that these stereotypes can be overcome.

During the mid to late 1800s, the first professional archaeologists arose and excavations were provided their first generalized methodologies (Barker 1993:36; Trigger 2006:131). Specific skills such as unit mapping, measurement, and comparative artifact analysis also developed at this time. These ideas and techniques are the early forms of what, in time, became virtual archaeology. For example, without the development of unit mapping, the use of LIDAR, light detection and ranging, to map whole sites could not have been created. The theories and methodologies developed during this foundational period laid the groundwork for those developed post-WWII.

The foundations of processualism were crafted during the functionalist period and refined to counter culture-history archaeology by promoting analysis focused more on evolutionary, positivist, and ecological elements (Trigger 2006:386). Culture-history archaeology was determined to establish cultures within a historic timeline tracing back to the prehistoric era. Evolutionary theory, which developed in the 19th century, argued that cultures throughout the world evolved from the savage to the complex in a specific order. This school is also known for possessing a top-down view of society and often chooses to examine the whole instead of the individual. The thoughts associated with processualism, which came at the same time as the development of computer archaeology, were well suited to each other. A desire to understand broad-reaching questions directly correlates with early testing of large data sets (Chenhall 1968).

A change was made by post-processual archaeologists, which was a shift from culture-history, to incorporate individually-oriented research designs that examine culture from a more

human scale (Trigger 2006:481). Post-processualism is a misnomer as it is not an improvement or continuation of processualism. It arose in contrast to the questions and ideas addressed by processual archaeologists. The one element that ties these two vastly different schools of thought together is the promotion of differing schools of theory which were unprecedented in the history of archaeology. Prior to this time, the primary schools of archaeological thought centered on an attempted universal explanation of the human experience. The shift to a multitude of theories in the wake of post-processualism is best reflected in the book *Contemporary Archaeology in Theory: The New Pragmatism* (Preucel and Mrozowski 2010). New perspectives included feminist, indigenous, and self-critical archaeologies. It is in this new era of expanding thought that virtual archaeology has found its home. Similar to the early years of computer archaeology, the focus on the individual as compared to large groups has worked well with modern virtual archaeology. Examples of this can be seen in the analysis of objects or using a digital site recreation to understand how people moved within it (Cargill 2009; Porter, Roussel, and Soressi 2016)

The Development of Virtual Archaeology

Virtual archaeology, while nigh-exclusively limited to the development of facilitating digital technology, can be traced to the mid-1960s. Archaeologists began experimenting with a device known as a stereoscope. It produced an optical illusion of a three-dimensional (3D) image through the use of incrementally angled photographs. The images were laid side by side so that the carefully distanced viewer allowed the eyes to perceive a 3D image (Whittlesey 1966). This early example demonstrates that while computer-based technology had not yet developed, the ideas and methodologies that will be later used in virtual archaeology were beginning to emerge.

From the 1960s to the 1990s archaeologists began to experiment with computers and how they could be used to facilitate the analysis of material culture (see Burton et al. 1970; Chenhall

1968; Cowgill 1967; International Business Machines Corporation 1971; Whallon 1972). The earliest known projects in the United States and other areas of the world began around 1960 (Cowgill 1967:17). These early projects arose out of a curiosity to see if computers could be used to facilitate analysis in archaeology. Since computer technology during the 1960s and 70s was limited by a comparative lack of complexity and ease of use, these first projects concentrated on statistical analysis and data storage (Ibid.:18). Archaeologists were able to access computers at this period due to the addition of the cathode ray tube, which is the display technology used in monitors (Burton et al. 1970). This relationship between computer technology and archaeology's use of it was further developed by archaeologists throughout the 1970s (see Burton et al. 1970; Whallon 1972; Chenhall 1968). This happened through the increasing ability of archaeologists to use technology in the analysis of large datasets. Archaeologists began to address questions with exponentially increased data sets and categories of comparison, all in a single study. It can also be argued that the prevailing theoretical paradigm of processualism fueled these projects as well because of their nature in looking at large scale questions that could span vast distances of space and time. This is not to say that these projects were in any way limited to processualists, merely that computer archaeology is well suited to processualism. The development of new technology and theories lead to new applications for virtual archaeologists.

The technological boom that began in the 1990s allowed digital technology to increase its sophistication and also approached affordability for use in the academic and personal sectors. The growth of technology directly led to the creation of the first forays into combining archaeology and the virtual world. A wide array of these early projects have been examined in the book *Virtual Archaeology: Re-Creating Ancient Worlds* (Forte and Siliotti 1997). The 3D digital reconstructions in this compendium are confined almost exclusively to major sites of the

ancient world such as Egyptian tombs, Greek architecture, and the reconstruction sites extended all around the globe (Ibid.). Unfortunately, the software and techniques that were used for these projects are not mentioned in enough detail to truly comprehend how these early reconstructions were accomplished. The purpose was to document the results of these projects and demonstrate the wide variety of locations that can be digitally recreated. Without understanding how these early projects were made, examining the development of digital recreation techniques and technology is difficult when major sources do not recount necessary information. Most reconstructions done today present few enhancements when compared to early projects which include graphic quality and ease of navigation by the user (see Rua and Alvito 2011; Woolford and Dunn 2013). This implies that virtual archaeologists may now be unable to keep pace with the advancements in digital technology. However, the trend of using digital technology, primarily for reconstructions to facilitate analysis at the expense of informational dissemination, can be traced to this era. While few arguments in regards to the significance or utility of the reconstructions can be gleaned from the aforementioned book, a clear shift in methodology that came as a result of developing computer software and display technology is immediately evident by the shift in methodology from the analysis of large datasets to the experimentation with virtual recreation.

Virtual Archaeology – Artifact Analysis

Virtual archaeology in the twenty-first century contains many different areas of study that, while seemingly disparate, are related based upon methodology and focal object. The greatest differentiation of methodologies is a scalar divide between the analysis of an individual artifact and a whole archaeological site. The work which concentrates on an individual artifact has numerous applications, but two major concentrations are the examination of stone tools and ancient human remains. Projects that do not involve the previous objects provide a window into

the questions being asked by virtual archaeologists across a wide spectrum of applications (see Ahmed, Carter, and Ferris 2014; Akca 2012; Fatuzzo et al. 2011; Gallo, Muzzupappa, and Bruno 2014; Harrower et al. 2014; Koutsoudis and Chamzas 2011; Koutsoudis, Vidmar, and Arnaoutoglou 2013). Throughout the aforementioned pieces, the questions being proposed focused primarily on explaining how new methods of analysis worked, and why it was an improvement in comparison to prior research. What follows is a breakdown of these categories to further elucidate the issues being engaged with by virtual archaeologists.

Analysis of stone tools using the methods derived from virtual archaeology began in the early 2000s. The articles written in this era tested to determine if digital tools, such as 3D laser scanners, could be used to digitally reassemble flakes from a core by imaging each item and stacking them in digital space (Riel-Salvatore et al. 2002). The increase in complexity of digital technology has been directly reflected in research questions and analysis. Instead of doing large dataset number calculations or experimenting with the applicability of technology, 21st-century virtual archaeology uses digital technology to analyze artifacts. Current avenues of research include changes in mass as cores are flaked, the morphological variability of cores and flakes, and post-depositional degradation (see Bretzke and Conard 2012; Clarkson and Hiscock 2011; Grosman et al. 2011). Like those articles mentioned in the previous section, the analysis of stone tools is also centered on the description of methodology. While developments concerning the examination of structures and places are varied in technological application, the techniques and devices that are used to examine lithic artifacts continue to be almost exclusively linked to 3D laser scanners, although recent articles developed a field rig for use in photogrammetry (Morales, Lorenzo, and Vergès 2013; Porter, Roussel, and Soressi 2016). Photogrammetry is the computer-assisted assembly of photographs to create a 3D photorealistic image of an object. This

demonstrates that the analysis of certain types of artifacts, in this case stone tools, can be best accomplished by a specific technology.

Those archaeologists who use virtual methods to examine ancient human remains focus primarily on using 3D laser scanners to measure and compare cranial elements in the hopes of understanding patterns of evolution and morphology (see Harvati, Hublin, and Gunz 2010; Katz and Friess 2014; Sholts et al. 2011; Terhune, Kimbel, and Lockwood 2007). This group of scholars, unlike those working with lithic artifacts, do mention the incorporation of photogrammetry as a technique, but the 3D laser scanner is still the primary analytic device. Outside the study of humans, 3D scanners are being used to create comparative faunal collections that can be shared worldwide as a data file and then physically recreated using a 3D printer (Niven et al. 2009). These articles do have a large section concentrating on methodology, but they also present a detailed analysis of the implications regarding their research that includes new and greater understanding of human evolution.

A review of the previously mentioned articles associated with the virtual analysis of objects reveals a great deal about the associated questions and methodologies. This group of work concentrates primarily on understanding the formation and reassembly of artifacts. The work done at an intra and inter-site level will reveal an entirely different perspective.

Virtual Archaeology – Location Analysis and Preservation

The second major group of archaeologists who use virtual technology and techniques concentrate their study on the physical location of excavation or preservation. Those who chose to study a location can be further subdivided based on the specific area of study. For example, virtual application in caves primarily examines and develops methodologies to increase the precision of mapping in such difficult terrain (see Häusler 2004; Leonov et al. 2014; Lerma et al. 2010; Núñez, Buill, and Edo 2013; Tyree et al. 2014). The implications of this work include

greater precision of recording and analysis of how such caves may have been used. However, the primary components of articles related to location focus on the development of digital technology and its associated procedural components.

Virtual archaeologists who focus on conservation employ techniques for the mitigation of threatened cultural resources; some of these projects such as the LIDAR recording of desert landscape features can be at a massive scale, whether this be a large single site or multiple sites (see Al-kheder, Al-shawabkeh, and Haala 2009; Barton 2009; Knabb et al. 2014). Political movements and changing environmental conditions are placing more heritage sites in danger every year like the Bamiyan Buddhas (Barthel-Bouchier 2012:38). This makes the techniques of virtual preservation and mitigation increasingly vital because it is a way to preserve a site in virtual space, if it cannot be in the physical world.

Digital analysis of specific archaeological sites or excavation units within virtual archaeology can range from new mapping techniques to the implications regarding intra-site movement of inhabitants (see Arav et al. 2015; Bickler 2011; Cargill 2009; Entwistle, McCaffrey, and Abrahams 2009; Fernández-Hernandez et al. 2015). The questions posed by these articles regarding site usage and formation patterns are unique because they could not be done without the associated digital technology. The recording technology used is often a tripod-mounted LIDAR and the generated information used to create more accurate maps or site recordings. These maps or recordings are critical to generating a sites formation pattern. The use of excavation unit documentation for predictive modeling of artifact distribution and geographic change is yet one more application of these techniques and technology (see Dawson 2009; De Reu et al. 2014; Larsson et al. 2015; Losier, Pouliot, and Fortin 2007). Archaeologists studying these techniques argue that digital technology and virtual techniques can improve the way in

which sites are recorded. The precision of recording facilitates predictive modeling by creating more sophisticated maps that can utilize more data to predict where other features might be.

Within this vast array of analysis, applications, and conclusions, the methodologies, hardware, and software such as Terrestrial Laser Scanners (TLS) and PhotoScan Pro, a software for photogrammetry, unite this body of work. The questions being asked by archaeologists in this area are primarily methodological in nature. However, some of this research examines the mobility of inhabitants to spatially understand the functionality of a site (Cargill 2009). By carefully examining how space was used and inhabitants moved throughout a site, the function of an area can be better understood. This demonstrates that virtual archaeology's analysis can range from small to large scale and can be used for in-depth qualitative analysis.

An analysis of these works also reveals a distinct lack of public outreach or educational applications on the part of archaeologists. Since archaeology faces not only a growing funding crisis but also serious stereotypes and misinterpretations which have persisted in the public mind, the use of digital technology to disseminate the history uncovered by archaeologists and the way in which the enterprise is conducted, can help to bridge the gap between archaeologists and the public. This is an opportunity for all archaeologists to expand general knowledge of the discipline and engage the public in the past.

Archaeology and Video Games

Video games and archaeology, and more broadly anthropology as a whole, share many exciting connections. Video games provide analysts with powerful rendering engines to help create photorealistic 3D models and also provide dissemination outlets for information unlike anything that has been available in the past (González-Tennant 2013; Reinhard 2016; Reinhard 2017; Rua and Alvito 2011; Excavate! n.d.). The game "Never Alone," http://neveralonegame.com/, is a shining example of how important virtual techniques can be

when employed for public outreach because it expertly fuses digital technology and oral histories to provide dramatically wider audiences for Inuit history and culture (Never Alone - Homepage n.d.). Despite this example, past games have failed to truly engage their audience in a meaningful experience (Champion 2004). This trend, unfortunately, is supported by that of edutainment which worked to combine education and entertainment but prioritizes the latter over the former. Evidence for this can be found in early examples including Word Rescue, and current iterations like ABCya.com http://www.abcya.com/ (Miller 1993). Although these games are not being archaeological in nature, they are an excellent example of how edutainment often becomes more entertainment than educational.

Archaeology and Public Outreach

Archaeology has a mixed past regarding efforts to educate the public. Early archaeology was overseen by professionals and the grunt work done by amateurs (Nassaney 2017:2). As time passed people have become more interested and involved in the process and information associated with archaeology (Ibid.). Modern communities and people are collaborating with archaeologists to reap mutually-beneficial rewards. Archaeologists are provided with labor, finances, and people who are interested in learning. They are also forced to engage with questions and perspectives that they might otherwise not engage with because of this community involvement (Nassaney 2017:4). Involved peoples and communities are able to engage directly with their past and archaeology can serve as an excellent source of tourist income; see the longstanding project at Fort Michilimackinac in Michigan.

Despite the increase in participation and interest of the public, one of the major hindrances to this engagement is site access. Many people either do not know where active archaeology sites are or are unable to visit them if they want to. The application of virtual technology and techniques is one way to overcome this problem. There are multiple examples of

this emerging process throughout the world (Dawson, Levy, and Lyons 2011; Fairbanks 2015; Nichols, Prangnell, and Haslam 2005). These projects range in focus from using GIS for spatial pattern analysis to employing 3D virtual worlds in the process of knowledge repatriation. These examples are primarily focused on the back end of the archaeological process, and I argue they do not directly involve a community in understanding the full process of archaeology from excavation to interpretation. This thesis and its test location of Fort St. Joseph are specifically designed to focus on these processes. After all, it is not what you find, but what you find out.

A Brief History of New France, Fort St. Joseph, and the Fort St. Joseph Archaeological Project

This section will briefly explore the history of New France and Fort St. Joseph in order to provide necessary background information to understand the information recovered and related to Fort St. Joseph. The history of New France will establish the context necessary to understand the historical setting for Fort St. Joseph's construction and use. In turn, understanding the history of Fort St. Joseph will provide critical context for the recovered artifacts and ecofacts mentioned in *Minecrafting Archaeology*. It will also place this thesis within the growing body of public outreach scholarship associated with the Fort St. Joseph Archaeology Project.

New France: 1524 to 1701

The history of France's presence in North America can be reduced to one general concept: the desire to generate wealth with as little upfront cost and effort as possible. Evidence for this can be found in the frequent rotation of companies with the fur trade monopoly and lack of financial support from the crown prior to 1664 to name but a few (Trudel 1973:126; Wrong 1970:254). As well the French were searching for a shorter route to Asia rather than having to go around the southern coast of Africa. France was comparatively late to the rush of exploring the new world, and more specifically Canada, as their first notable expedition for the purposes of exploration was in 1524 (Trudel 1973:1). However, fishermen had been exploiting abundant cod

resources off the coast of Newfoundland since 1504 (Trudel 1973:1). The period of transition from exploration to serious entrepreneurial expansion was from 1603 to 1663 (Trudel 1973). It was dominated by the search for stable settlement locations, developing a colonial infrastructure, and merchants worked to increase the number of furs being brought to Montreal. 1663 marked one of the most significant shifts in the history of New France. The period from 1663 to 1701 was characterized by the solidification of a shifting but unifying political landscape. Under the direction of Louis XIV, the territory held by France in Canada became a royal province. It finally had stable management and support through the crown (Eccles 1964:6). New France's Ministère de la Marine, Jean-Baptiste Colbert, wished to transition to a compact and self-sufficient colony (Eccles 1964:250). The three dominating political factions present in New France were the church, the military, and the lay aristocracy (Peyser 1992:16). These factions worked in constant contention, but the governmental system stabilized as a result of this power struggle (Eccles 1964). Stabilization led to the colony's growth and development, which corresponded to an increase in population and infrastructure. The fur trade exploded during this time period. Its purpose was to extract as many beaver pelts as possible to supply the growing hat market in Europe. So many of the furs were harvested that shortly after the dawn of 1700 many of the fur-trade posts were closed and trade licenses revoked because of massive surpluses rotting in warehouses. The threat of Iroquois threat had diminished and the French were on the verge of a massive expansion of forts into the lower Great Lakes region and beyond. The construction of Fort St. Joseph came at the end of arguably the most productive period of New France history.

The History of Fort St. Joseph

The expansion of French forts into the Great Lakes served many purposes, from protecting key trading locations to seizing strategic military advantages. The French were determined to stop British advancement into fur-rich territories. The location of forts were many

times determined by military strategy. These locations also often coincided with riverine trade routes used by Native Americans. Therefore the French were able to achieve many goals with the placement of a single fort.

The earliest conclusive evidence for the establishment of a permanent French presence on the St. Joseph River near the modern city of Niles, Michigan can be found in Jesuit records. A grant of land was issued to the Jesuit order by the government of New France in 1686 for the purpose of establishing a mission to convert local Native American tribes (Cunningham 1961:66). This location resides at the confluence of two overland trade routes used by local Native American groups. The St. Joseph River also provided a critical connection from Lake Michigan to the Mississippi River system. Therefore, the chosen location was a key strategic trade and militarily location. The fort's presence would serve to limit the spread of the British and Iroquois. Fort St. Joseph was constructed in 1691 (Brandão and Nassaney 2006:63; Nassaney et al. 2003:109).

Fort St. Joseph served as an important military garrison, trade post, and mission throughout its occupancy. Despite the active military garrison at Fort St. Joseph, little in the way of military activity took place there. The garrison assigned to the fort was comparatively small and consisted of little more than a dozen soldiers. Since Fort St. Joseph was such a productive trade location, fur traders moved to settle within the direct vicinity of the fort. Evidence of this has been found through archaeological investigation of the site (Brandão and Nassaney 2006:67). Items such as trade beads, lead shot, gun parts, and other trade items have been found throughout the site (Ibid.) The founding of Fort St. Joseph as a mission left the presence of Catholic remnants throughout the history of the location. Evidence for this can be found in baptismal records, the mention of multiple priests associated with the site, and the presence of artifacts like

a cilice fragment and other religious paraphernalia (Brandão and Nassaney 2008:490). With the waning influence of the French, and then the British in the Great Lakes region, the fort was eventually abandoned in 1781 and seemingly all but lost to history.

The Rediscovery of Fort St. Joseph

The search for Fort St. Joseph has been surprisingly difficult despite its historical importance. Early surveys of the area do not mention the fort and there are few primary documents to help place it geographically (Nassaney et al. 2003:113). Two objects physically separated from the site have historically confounded the search for its location. They include a cross dedicated to the memory of Father Jean-Claude Allouez and a commemorative boulder honoring the memory of the fort. These objects can appear at face value to be plausible markers of the fort's location. While seemingly logical places to begin a search, they ultimately proved the failure of multiple organizations to discover the location of the fort prior to 1998 (Ibid.:118). They are not extremely distant from the fort but removed enough to confound archaeological survey teams. Prior institutions used these markers and restricted their searches to the immediate area. This problem continued to the initial surveys done by Dr. Michael Nassaney from Western Michigan University in 1998 which tested the area near the commemorative boulder. However, thanks to the support and information of local history enthusiasts, a shovel test pit grid ran alongside the river edge and the high concentration of period artifacts denoted the probable location of the fort.

The Fort St. Joseph Archaeological Project

The survey conducted in 1998 to re-discover the location of Fort St. Joseph did not arise by happenstance. The non-profit group Support the Fort, Inc. asked Michael Nassaney at Western Michigan University to conduct a survey to locate the fort (Nassaney et al. 2003:119). The ability to find the site of the fort itself was a cooperative effort between university faculty,

students, and local history enthusiasts and the City of Niles. The Project has always had a variety of stakeholders to provide a continuation of direct community involvement in the archaeological process. As the Project has grown, it has worked to employ numerous digital and in-person public outreach platforms. These include an annual lecture series, camper program, open house and maintains a vibrant social media platform through the use of Facebook, Twitter, and Instagram (see The Fort St. Joseph Facebook n.d.; Archaeology 2016; Fort St. Joseph Instagram n.d.).

The FSJAP was chosen as a test case for the creation of *Minecrafting Archaeology* because of its longstanding commitment to public outreach and education, and a high degree of detail present in the excavation records. For this thesis to reach the widest possible audience it is crucial to be paired with a project that has a background in public engagement. The longstanding dedication to public outreach has created a dedicated following for the Project. By making *Minecrafting Archaeology* available in locations where this community is used to receiving updates about the Project, it will increase the number of people that will view the map. The flexibility of this project allowed it to be created at any location in terms of archaeology. Minecraft worlds can host a nigh-infinite range of locations and details. The level of information present in the records kept by archaeologists at Fort St. Joseph provided the detail necessary for the unit recreation in *Minecraft.*

The dedication to direct community involvement drives all facets of the FSJAP. The five longest-running components are the annual lecture series, summer camps, website, blog, and open house. Each year, a theme is decided upon by the FSJAAC. The lecture series brings speakers related to the year's theme to Niles so the community can learn more about French colonial history and archaeology. By hosting a lecture series, the public can directly learn from

and engage in the past. The summer camps offer the opportunity for middle school students, teachers, and lifelong learners to participate in the process of archaeology at Fort St. Joseph (FJS). Participants learn history related to the site, excavation procedures, laboratory procedures, and interact directly with field school students. Teachers can gain continuing education credit which is required for them to renew their teaching license. The website associated with Fort St. Joseph was the first foray into digital outreach and has been active for a number of years. A complete overhaul and upgrade to Western Michigan University's content management system (CMS) have been done for the FSJ website https://wmich.edu/fortstjoseph. The website is important because it provides information on the history of the project, staffing, project findings, ways to support the FSJAP annual reports, and newsletters. The site also is host to the applications for students to participate in the field school and the summer camp programs which are run in partnership by the Niles History Center. The blog was created to be a forum for students and staff to upload information about important discoveries found during the field season and progress made in the lab during the offseason. It also provides students with an opportunity to research items of interest to them and post on their findings. Like the lecture series, this open format increases the amount of information available to the public. The open house, which is the culmination of the field season, invites the public to view the progress made during the summer, interact with reenactors and archaeologists, and hear presentations by public scholars. Guests can see an active excavation, meet living historians, hear brief lectures on historical topics, and learn about archaeology. Annual attendance ranges from 1,000 to 2,000 people over a two-day period. Through these various outreach efforts, the FSJAP has maintained a direct link with the community of Niles and the public at large.

New forms of outreach for the FSJAP are trending toward digital components which include a social media campaign and a teaching program. The social media campaign took place in two phases, the first being a Facebook page created a few years ago. Now the online presence has expanded to hosting both Instagram and Twitter feeds which are regularly updated. The expansion was initiated because, with so many people now active on social media, it has become a time effective and efficient means of sharing information, increasing the project's visibility, and drawing people to events. The teaching program is a face-to-face initiative by the Project to help spread information about the fort and project to students along with recruiting for the summer camps. While still in development, it features portions about history, display of artifacts and archaeological tools, and activities designed to engage students in archaeological thought systems. These new forms of outreach are designed to increase the range of information distributed by the FSJAP. This will greatly increase the effectiveness of the project in regards to its public engagement. As well the drive to create new forms of outreach are motivated by the immerging notion that community involvement helps to challenge the belief that "professionals" hold the monopoly on a true understanding of the past (Nassaney 2017).

Minecrafting Archaeology will contribute to the aforementioned outreach of the FSJAP by providing students with the ability to engage with the history and archaeology associated with Fort St. Joseph in the home or classroom when project associates cannot be present. Currently, the only way for students to experience an archaeological excavation, and the associated thinking, reasoning, and interpretive skills, is by participating in the summer camp or visiting the open house. Without a virtual platform like *Minecraft*, archaeological public outreach is primarily limited by access to the physical site location. The development of this project will allow outreach efforts by the FSJAP to expand beyond this common constraint. Digital

technology has been found by scholars researching its implementation in public education to be a uniquely beneficial addition to k-12 education (see Harrison 2013; Price and Rogers 2004). The use of archaeology as a teaching tool directly links with the established goals and standards in the Michigan curriculum.

Summary

Despite the trend of virtual archeology lacking an outreach component, there are some who have used platforms such as video games to engage and educate the public (see Anderson et al. 2010; Fairbanks 2015; Rua and Alvito 2011; Woolford and Dunn 2013). In addition to this there are quite a few games that revolve around an archaeological theme ("You Play an Archaeologist" 2014; Excavate! n.d.; Interactive Games & Activities - Archaeology for Kids n.d.). These games are some are somewhat informative, but out of date in terms of technology despite their recent creation, and often times perpetuate negative stereotypes associated with archaeology. The theme of treasure hunting and tomb raiding runs through many of these games which can be directly linked not only to the behavior of archaeologists in the 1800s but also to pop culture figures like Indiana Jones.

Archaeology, which began as a simple fascination with the material culture of the past has become an international discipline with ever-growing complexity. The evolution of thought regarding the past and the methodology associated with recovering artifacts have developed simultaneously as one facilitates the other. The recovery of artifacts is always dependent upon a research design, which in turn is influenced by theoretical perspective. Exploring the literature published by virtual archaeologists reveals this sub-discipline to be primarily methodology-based. Virtual archaeologists have attempted to increase the precision and complexity of analysis and recording of both artifacts and sites. Common artifacts to be analyzed by virtual archaeologists include projectile points, early human crania, and ceramics. From these projects, a

greater understanding of the manufacture of stone tools, physiological changes in human evolution, and much more have been discovered. Studies of locations focused more on recording and recreation using digital technology. The recording technology and technique advances allow difficult locations like caves to be precisely and efficiently recorded for further study. Recreation of sites in virtual space has led to a greater understanding of how space was used and navigated.

CHAPTER TWO: PUBLIC EDUCATION'S USE OF DIGITAL TECHNOLOGY

This thesis has been specifically designed to develop an educational tool for students in grades three to five but is accessible to people of all ages. The approach derives from constructivism which makes up the background of much of the research in education involving digital technology and avenues of research including distance learning and e-learning. Constructivist theory states that students explore new and old ideas by collaboration and construct new meaning by talking with one another (Hunter JL and Krantz S 2010:208). This development of thought and aggregation of new information is often facilitated by digital technology. As such, it is critically important to understand the background related to instruction through the use of digital technology. Starting in the late 1980s digital technology began to be incorporated into the world of public education. From the early computer labs of the 1990s to smartboards, iPads, and educational game websites like ABCya.com, digital technology is now common in the classroom. This technology provides students with increasingly innovative and engaging learning experiences (Byrne 2013). The intersection of education and digital technology has been discussed in academic scholarship for over three decades. This chapter will examine the relevant theory and definitions at the intersection of education and digital technology along with current literature associated with the incorporation of digital technology into the classroom along with e-learning and distance learning.

Background and Definitions of Trends in Education Scholarship

The use of digital technology in the classroom can be grouped into the oft-categorized buzzwords such as e-learning, edutainment, and distance learning (see Bouhnik and Carmi 2012; Jung 2001; Sangrà, Vlachopoulos, and Cabrera 2012). The theory of constructivism has been associated with digital technology in schools since its inception and exists as a supporting

framework for most of the other theories and definitions that will be explored later in this chapter (Dickey 2003). Constructivism is a theoretical conglomerate within the sphere of educational research. It is based upon the ideas that information is not transferred but constructed, and that people contextualize what they learn from prior knowledge and experience (Dickey 2003:106; Hunter and Krantz 2010:208). This thesis is based on constructivism which links it to the literature associated with digital technology in the educational world. This link is made through the questions posed by many of the information books in *Minecrafting Archaeology*. They require students to think more deeply and help create knowledge instead of simply providing immediate answers.

Constructivism serves as the backbone for many avenues of research in the educational sphere which include edutainment, e-learning, and distance learning. Through an examination of how these terms are defined, some goals and specific comparative research can be identified that further links this thesis to the growing literature surrounding digital technology's use in education. The first label, edutainment, is the combination of education and entertainment, and can be traced to the early 1990s (see Miller 1993; Perrone, Clark, and Repenning 1996). Some of the first projects that combined video games, education, and entertainment, including Word Rescue and Math Rescue can be placed within this category. The synthesizing concept for this group is that education and entertainment, with a specific emphasis on video games but can also be associated with heritage sites like Colonial Williamsburg, could be combined to produce a product that is both educational and fun for players to use. While there have been significant successes in this type of game that continue to this day, such as the website www.abcya.com for instance, there are some serious problems with *Minecrafting Archaeology* being labeled as edutainment. When entertainment is placed over information then the player is cheated from an

in-depth educational experience. Therefore, this category will be avoided by keeping the majority of the content related to education and not entertainment. The use of *Minecraft* for this project is not done for entertainment purposes, but because it is a modular and easy to understand digital platform. *Minecrafting Archaeology* has been designed to provide a familiar and flexible digital platform for the recreation of an archaeological excavation and its associated knowledge.

E-learning can broadly be described to encompass those endeavors that fuse education with digital technology and many times involves the internet and a physical separation between student and instructor. A detailed study in 2011 done by three experts from Universitat Oberta de Catalunya revealed that a specific definition cannot be generated due to its broad and ever-changing nature (Sangrà, Vlachopoulos, and Cabrera 2012). For the purposes of this project, it can be defined as education techniques or platforms that involve digital technology. Having an open and flexible definition allows those who work with e-learning to focus less on how much a certain project is or is not part of this group, and instead of searching for creative new formats (Ibid.:155). This project is clearly located within the e-learning domain because it both uses digital technology and the instructor and creator are separated by physical space from those learning the material.

Distance learning can be traced to the mid-1970s. Like e-learning, it requires the use of digital technology. It is different because e-learning can be done in person, while distance learning applies to programs that separate student and educator. These categories do tend to overlap a great deal. One major tenet of distance learning is a clear connection between the dialogue, structure, and agency of the learner (Jung 2001:527). The amount of dialogue between instructor and pupil, the amount of structure present in the project, and the ability of the learner to act on their own are all interconnected and must be balanced for a project to operate properly.

If the material is created with the knowledge that instructor and learner will never meet, then there is no dialogue and a great deal of structure. The learner has the necessary components to succeed because of the internal structure and direction. This thesis is most closely linked to distance learning because it not only uses digital technology, it also has a clear and complete separation between creator and player. By understanding the scholarship associated with this school of education, this project can be successfully formatted to educate the general public without any physical contact between educator and learner.

Current Scholarship – Digital Technology in the Classroom

There is a tremendous amount of ongoing scholarship surrounding the use of digital technology in the classroom. A review of selected literature related to the complexities and advantages of incorporating digital technology into the classroom, and e-learning and distance learning, will further place this thesis within the current research of both anthropology and education. A few pertinent examples will be provided to further illustrate the advantages of using digital technology and distance learning.

The incorporation of digital technology within the classroom has been a long process. Its use in k-12 schools began because it opened opportunities for students to explore learning in ways impossible without it (Facer et al. 2004; Grabinger and Dunlap 1995; Price and Rogers 2004). These opportunities include students being able to interact via computer with information and places they would otherwise only be able to read about. That being said there have been, and still are, challenges to the spread of digital technology in k-12 classrooms and schools. One early challenge was incorporating the physical equipment into the school, which still continues today (Keengwe and Schnellert 2012). While many schools had computers by the turn of the millennium, schools and students in traditionally underfunded groups like people of color, immigrants, and other disenfranchised groups have more limited access to such devices (Becker

2000). This can lead to a distinct separation in abilities between students who are able to utilize digital technology and those who cannot. While this project cannot supply groups with access to digital technology, it can provide a familiar medium which is also available for free. The difference in skill sets further compounds the disenfranchisement experienced by the aforementioned groups. This project helps overcome this barrier by using *Minecraft* which is accessible to many groups and can be understood by those with little computer skills. The use of said technology is a critical component of national and state education standards today (MDE Goals and Strategies n.d.; SS COMBINED n.d.; SSGLCE_218368_7.pdf n.d.). By fusing public outreach and digital technology, archaeologists can expand the range of their educational efforts and address numerous goals of the public education sphere.

Once computers and other digital devices have been incorporated into schools, there can be serious challenges relating to the accessibility and incorporation of content both by students and educators. Often times a steep learning curve and high financial costs associated with such technology and programs prevent them from being utilized to their full potential. To combat this, researchers have worked to develop software and hardware that integrates greater ease-of-use and educator/learner autonomy (Muñoz-Cristóbal et al. 2014; Muñoz-Cristóbal et al. 2015; Teo 2009). Programs are being developed to educate teachers on how to use digital technology effectively in the classroom to combat the steep learning curves associated with its use (Hutchison and Woodward 2014). One of the great strengths that *Minecraft* possesses as a digital vessel for the Fort St. Joseph recreation is its ease of use and familiarity. Not only can it be easily accessed by most people but the recreation runs on the base game structure and requires no mods, packages of content to expand upon the base game, to be used. This means that no additional information is required outside the *Minecrafting Archaeology* map for it to be used.

Offsetting the challenges of incorporating digital technology into the classroom are the impressive benefits it brings to those who have access to it. Early research in the 1990s which focused on Rich Active Learning Environments (REALs) found that digital technology could play a critical, if not necessary, role in facilitating learning scenarios that promoted, critical thinking and problem-solving skills, among others (Grabinger and Dunlap 1995; Grabinger, Dunlap, and Duffield 1997).

With the turn of the millennia and the evolution of mobile technology, the idea of pervasive education was developed. Pervasive learning situations are those that can be accessed by anyone at any time and place (Thomas 2005). Ideas like the separation of an instructor from the student, and learning situations from traditional classroom settings, have become critical for future developments for understanding pervasive learning. Distance learning and other forms of enhanced traditional learning practices are examples of some of these new ideas (Price and Rogers 2004). Further proof of the importance of using digital technology in educational settings can be found in a study that demonstrated a significant link between the perceived usefulness of technology and the desire for its incorporation into classroom settings (Teo 2009:310; Bouhnik and Carmi 2012:215). The study found that the more a digital learning program is viewed to be useful, the more it is desired by educators. By using and promoting the confluence of archaeology, digital technology, and education, virtual archaeology programs will be used and seen more by the public and educators.

Current Scholarship in E-Learning and Distance Learning

Current scholarship related to e-learning and distance learning primarily focuses on how techniques associated with these styles of education can enhance the learning experience, gauge effectiveness, and provide examples of new technologies and methodologies. It takes a significant amount of time and financial resources to establish digital education programs and

technology in schools. The benefits, as described in recent articles, clearly outweigh the necessary upfront costs (Al-Arimi 2014; Bahhouth and Bahhouth 2011). These enhancements to traditional learning practices include the ability for instructors and students to interact with each other without being in physical contact. It also allows students to interact with people and places that they could otherwise only read about or watch videos on.

Although there are many benefits to e-learning and distance learning, it is always important to understand the effectiveness of new programs regardless of their apparent improvements. The question of how effective this style of education is has been engaged with by many researchers. Studies done to test this efficacy as compared to traditional practices were conducted from the early elementary to collegiate level. This includes analysis from the perspective of both teachers and students. Studies in K-12 schools involving elements of distance learning have been encouraging but have yielded contradictory results (Beese 2014; Harris-Packer and Ségol 2015). These surveys do reveal the benefits of distance education and e-learning like increasing the efficiency of communication between educator and student. However, they also provide rather conclusive evidence that said programs are not comparably successful to traditional programs, and students did not consistently perform as well as in traditional classroom settings (Beese 2014:300; Harris-Packer and Ségol 2015:15). Since online learning programs are still in their formative states, these articles represent the reality of slow progress in the development of these programs. Despite the seemingly underwhelming performance of e-learning programs, their benefits and ever-evolving nature make them well worth the investment. They are also more cost-effective for schools to provide classes in an online format. The first forays into archaeology could be, in hindsight, looked at with equal

skepticism. If early complications or limitations had stopped the exploration of virtual archaeology, then the techniques and technology available today would not exist.

Teaching styles in higher education are quickly changing due to the developments of e-learning and distance learning. As such, there have been numerous studies regarding the effectiveness of these programs which primarily include the transition to online classes (see Cross and Palese 2015; Jaggars 2014; Lowenthal, Bauer, and Chen 2015; Shearer, Gregg, and Joo 2015; Zimmerman and Kulikowich 2016). This style of class is becoming more and more popular with increasing demands on educating students for less financial cost to the university. Student opinions of such classes are not nearly as optimistic as the universities' adoption of them (Jaggars 2014:35; Lowenthal, Bauer, and Chen 2015:96). Students are concerned with not learning the material as effectively as in traditional settings, specifically because of lack of instructor interaction and explanation. This will continue to be mitigated by the increasing ease and comfort with online communication.

While previous analysis focused on the effectiveness and perceived value of distance and e-learning projects from the perspective of students, it is also imperative to consider how educators feel about said developments. Ibrahim Almarashdeh argues that like students, the perceived effectiveness, available support, and ease of use, directly relates to how well rated these programs are (2016:253). In other words, if people think something is effective they will say as much. Understanding and tailoring programs to include in-depth instructor support that will help to improve student experience. As previously mentioned student perception of effectiveness is directly linked to the available support. It is also important to understand how instructors use and rate available programs because their perceived effectiveness is vital to how likely they are implemented (Ibid.:254).

The goal of this section was to provide an overview of education literature surrounding digital technology, distance learning, and e-learning. *Minecrafting Archaeology* has been specifically designed to be an educational tool, so it was necessary to understand how it connects to the aforementioned education literature to bolster its place within. Therefore, recent developments in educational use of digital technology and enhanced learning programs are directly connected to *Minecrafting Archaeology*. Its construction mirrors the key components of successful digital programs including a careful balance of direction, instructor interaction, and user autonomy.

Michigan Educational Standards

Minecrafting Archaeology is designed to be an educational tool for students in grades three to five. This grade range was determined by conducting a review of educational standards in Michigan from 2007 to 2015. These documents include the 2007 Social Science Grade Level Content Expectations, 2010 Common Core State Standards for grades three to five, Michigan Top 10 in 10, and the 2015 Social Studies Standards for grades K-12 (SSGLCE_218368_7.pdf n.d.; 3-5_ELA_357701_7.pdf n.d.; MDE Goals and Strategies n.d.; SS COMBINED n.d.). It became immediately clear that grades three to five were the closest in topic material to New France; these grades learn about Michigan and United States history. As well there were some broader concepts that permeated these goals and presented little change over the decade reviewed. These skills include critical thinking, problem-solving, familiarity with digital technology, and communication/collaboration. Both the topic material and broad-reaching skills will be directly addressed by this thesis. The topic material is covered in exploring the history of New France and Fort St. Joseph. The skills are addressed by creating the map to be able to be played by multiple people, using *Minecraft* helps foster familiarity with digital technology, and

the critical thinking and problem solving are addressed by having material which poses questions that make the user think about what they have discovered and what it might mean.

A Brief History of Minecraft

The choice to use the video game *Minecraft* as a digital platform for the reconstruction of an excavation from Fort St. Joseph was not done at random. An exploration of the game's history and current applications reveals it to be the appropriate vehicle to host the recreation. Its flexible nature, easy to understand and learn format, and wide current application for educators demonstrates that it functions well as a digital platform.

Minecraft, a voxel-based sandbox survival game, was created by the programmer colloquially known as Notch in 2009 (Kohler 2013). A voxel-based game is one where the world of the game including items and geography are comprised of one by one by one unit cubes. A sandbox survival game can be defined as those that focus less on plot and more on experience and require the player to manage elements such as hunger, thirst, and temperature in order to survive. Since *Minecraft*'s creation, it has grown in popularity and value at an exponential rate and was sold by Mojang, the software company created by Notch to facilitate *Minecraft*'s development, to Microsoft in September 2014 for $2.5 billion. This sale was prompted by Notch's reluctance to continue development because the scope was greater than his interest, which has continued to remain in small independently produced video games such as Cobalt (Stuart and Hern 2014). The aforementioned game has a drastically different style and would not serve as a recreation platform. Continued support and incorporations from the gaming community, Mojang, and now Microsoft, have allowed *Minecraft* to grow and evolve.

The connection between *Minecraft* and education is steadily developing as well because of user accessibility and familiarity. External content is added to the base game structure, the programming and effects that make up Minecraft, through data packets known as "mod(s)."

These additions range from simplistic art style changes for graphics to complex bundles such as qCraft, computercraft, and much more http://qcraft.org/about/ (About qCraft n.d.). The previously mentioned mods add quantum physics principles and programmable robotic computers respectively. These two mods represent the plausible complexity and diversity capable of being integrated into Minecraft. By using these and other mods, players of many different ages and educational backgrounds can engage with topics like quantum physics and computer programming. Therefore, *Minecraft* has a broad applicability for educational purposes. *Minecraft* has also been used to instruct students in basic Java programming in a fun and accessible format. In an official announcement by Mojang on January 19, 2016, *Minecraft* released a specific education edition which uses the game to promote "creativity, collaboration, and problem-solving" (*Minecraft*: Education Edition - Home n.d.). The key objectives of this new specialized *Minecraft* edition are directly reflective of skills learned by participating in archaeology. This commonality further enhances the use of *Minecraft* as a virtual platform for archaeological public outreach. To conclude, *Minecraft* is a rapidly developing video game that will perfectly serve as a digital platform to house the archaeological recreation. *Minecraft's* inherent flexible nature will allow easy recreation of the chosen unit from Fort St. Joseph. As well, the game's growing connection to the world of public education makes it an approachable platform for educators and gamers alike.

CHAPTER THREE: *MINECRAFTING ARCHAEOLOGY* ALPHA PHASE

Virtual archaeology projects have pushed the boundaries of archaeological analysis, digital preservation, and recreation for almost fifty years. However, the use of digital technology by virtual archaeologists for the purposes of public outreach and education represents only a small portion of research and projects. *Minecrafting Archaeology* was designed to contribute to this gap by providing a digital archaeological teaching tool for students in grades 3 to 5, but it can be used by people of most ages. The project houses two scale recreations of an archaeological unit excavated at the French colonial fur trade site Fort St. Joseph, located in Niles, Michigan. The player is able to digitally excavate the unit and directly engage with its material culture through identification and probing questions associated with the artifacts and ecofacts. What follows is a detailed description of *Minecrafting Archaeology's* creation process.

Minecraft was chosen to serve as a digital platform to host the recreation of a unit, a selected rectangular area for excavation, from Fort St. Joseph. However, there have been very few projects that recreate the archaeological process in a video game. The beginnings of using archaeological thinking towards exploring the development of a video game have been pioneered as archaeogaming (Reinhard 2016; Reinhard 2017). The technique of archaeogaming uses a video game as an archaeological site while *Minecrafting Archaeology* uses Minecraft to recreate an actual archaeological excavation. None of the virtual recreations or gaming projects have used Minecraft. They have drawn their examples from other games like World of Warcraft that have a profession labeled archaeology, but its information is limited to unearthing tablets that may reveal information about an in-game cultural group. Therefore, all the components for this project had to be created from scratch. The Alpha phase was designed to determine if the

disparate pieces necessary to facilitate *Minecrafting Archaeology* could be created and how they should best be designed.

World Type

The first step in the creation of *Minecrafting Archaeology* was to determine the type of world in which to begin the reconstruction. There are many different types of worlds that can be generated by *Minecraft*. The choices differ based primarily on biome and geographic constraints, which refers to the physical terrain and elements within. The preset types in the Superflat category include Classic Flat, Tunneler's Dream, Water World, Overworld, Snowy Kingdom, Bottomless Pit, Desert, Redstone Ready, and The Void. Each of the different presets provide a different landscape for the player. The type Redstone Ready was selected due to the high light-levels reflected from the sandstone blocks which naturally propagate the available ground. The lack of any naturally occurring features inherent to most world types such as trees, lakes, and other obstructions made the construction of the recreation easier. There is also no visible rain in a desert biome, which is the standard for Redstone Ready, which leads to fewer distractions and better visibility for the player. The final choice of map styles was chosen based on ease of construction and playability which is critical to facilitate the recreation (See Visual Appendix [VA] 1).

With the world type chosen, the next decision made was the game mode used to build the recreation. *Minecraft* utilizes four different gameplay modes: creative, survival, hardcore, and adventure. Creative mode was designed for players to build what they choose without having to gather any resources. All blocks are available to the player and many features such as flying in the game are added to facilitate construction. Survival mode is what many players use because it is how the game was meant to be played as a sandbox survival. Resources must be gathered, monsters defeated, and food found to stay alive and build and explore the world. Hardcore is

similar to survival except that when a player dies in the game the world ends and is automatically deleted. Adventure mode is used by map developers to provide a narrative experience where players can navigate a designed map but cannot break or alter blocks in any way. Creative was chosen for the construction of *Minecrafting Archaeology* because the player is allowed access to all in-game items along with the abilities to fly, use command blocks which can perform in-game commands such as teleporting a player from one location to another at the click of a button, the ability to destroy any item, and no in-game player death or survival mechanics. All of these advantages are used to facilitate the construction of the archaeological recreation.

Unit Shell

Before a hollow framework, or unit shell to house the reconstruction, could be constructed, the scales for it had to be determined. An endemic problem for many digital recreation projects is the conflict between time and resolution. The creation of a high-resolution image takes a great deal of time but provides a very realistic result. A low-resolution image can be created quickly but the distortions can have serious consequences in regards to interpretation. A ratio of one block to 10 cm and one block to 5 cm were chosen for the first recreations to allow for a manageable completion time for classroom or museum. This choice of time management over resolution does create a shift in the reconstruction. At 10 cm to one block, if an object is 5 cm long in real life, it still takes up 10 cm worth of space in the game. If a higher scale resolution of 1 cm to one block was used, the time it would take to play the map would be inordinately long for a class or museum setting. The problem of resolution vs. time is not just endemic to utilizing voxel-based video engines, but many digital applications within virtual archaeology.

With scales chosen, the 10 cm and 5 cm unit shells could now be created. To do this in *Minecraft* would require the breaking of all blocks in the pit one at a time until enough space was

created to build the shell. The program MCEdit, on the other hand, allows carefully controlled sections of the world to be created, destroyed, or changed rather than one block at a time in *Minecraft's* creative mode. The inside of each unit shell was then lined with a block known as bedrock which cannot be broken by the player. This type of block was chosen so that the player could not break out of the unit shell while playing. A layer of glass was placed with a single block gap between it and the bedrock to house a copy of the unit's vertical stratigraphy (See VA2). This glass separates the unit from the copy of the vertical stratigraphy while still allowing the player to see it. The type of glass chosen for the barrier was light grey as when compared the other colors, it has the greatest clarity. The glass can be easily broken by the player which provides the similar problem of maintaining a clean vertical stratigraphy.

Above the ground, the unit shell was extended using blue clay to hide the surrounding environment from the player. This was also done to increase the player's immersion within the game. This is important because it helps the player maintain their focus by not being distracted by outside elements (See VA3).

Level Template

The process of recreating the unit from Fort St. Joseph required a great deal of thought. Each level could have simply been stacked up block by block in the unit. However, if a mistake was made a great deal of material would have to be removed to fix it. Instead, a grid system was created for each scale that was comprised of enough one block deep sections to represent the whole unit. This way if a mistake was made in one of the layers it could be easily fixed without having to damage any of the other layers in the process. Stacking the one layer sections could be done through the use of MC-Edit as each layer could be selected, copied, and placed within the unit shell. The location of the level template was directly behind the Information Room and well out of sight of a player (See VA4).

Information Room

One of the primary components of the archaeological process is the information gained through identifying and analyzing artifacts. This process was deemed extremely necessary to *Minecrafting Archaeology*. To do this, a mechanism by which players would be able to gain information about the artifacts and ecofacts recovered from the unit recreation had to be designed. A version of a CTM (complete the monument) room was modified and constructed alongside each unit shell (See VA5). This style was selected because its base design is a location for players to deposit a series of blocks in order to complete the map. It is also a classic style of adventure map that is familiar and well established in the *Minecraft* community. The artifacts themselves cannot be modeled in the game because there are no blocks in the shape of a flintlock mainspring or glass trade bead. A placeholder had to be chosen to represent the artifacts. The colored wool block was chosen because the different colors are easy to distinguish from one another and they are not used in any other part of the recreation (See VA5).

With the design of the room chosen, a way for the player to exchange the recovered artifact or ecofact for information about it had to be determined. The system had to be calibrated so that only when the correct placeholder was placed within a chest would it provide an informational booklet to the player. The final mechanism design was a chest on a hopper chain with a Redstone comparator switch (See VA6). When an item is placed in the hopper, a block with five slots that can hold items and take them from a chest and move it to another chest or hopper, is removed by the hopper and passed down the chain. A Redstone comparator is a device that can read another block and output a signal based on the strength of the read block. For example, a hopper with seventeen items puts out less of a signal than one with eighteen. The final hopper has four of its slots filled with player heads as a space holder and the final slot has two blocks of the item that is set for this specific chain (See VA7). This way only the addition of

the correct block will trigger, through the use of a comparator which can tell the difference between two or more than two of the selected block, releasing a cover for a chest that holds the informational booklet. This mechanism was then copied in a row for the total number of artifacts and ecofacts that would need to have information provided for. The rest of the room was walled off to create a long corridor. At the end, an extra set of Redstone was created that would only work once the final artifact had been found, and would allow the player into the house reconstruction (See VA6).

Starting Room

When a player begins the game, or spawns as is known by colloquial terminology, it happens in a pre-designated area of the map. This was altered using the program NBT-Explorer to a specific location around which the starting room was constructed. The predetermined spawning area is 21 by 21 blocks and the starting room was created with this in mind so that the player can only spawn within the starting area. This area is also where the player will be provided with instructional materials, the tools necessary to complete the excavation, and paths to the two investigation scales. These paths were constructed as interconnecting tunnels to keep the player contained with a closed system (VA8).

This starting room, like the rest of the Alpha phase build, was designed to keep players in a contained system. The blocks chosen for its building are reminiscent of a fort as they are mostly wood. Paths lead from the starting room to the two unit excavations and information rooms (VA8).

House Reconstruction

Providing players with information about artifacts from Fort St. Joseph is one thing, but being able to show them a recreation of a French colonial style house is another. Since structural remains comprise a large portion of the artifacts recovered from Fort St. Joseph, it makes sense

to provide a house recreation. The purpose for providing the house for the user is to allow them to see the uncovered structural remains as they may have been used. Information for how these houses were constructed has been provided in part by excavations at the fort which point to a *poteaux en terre*, post in ground, style of construction (Loveland 2017:45; Loveland and Nassaney 2017). Pictorial evidence from the *Historical Atlas of Canada Vol. 1* provided further details that aided in the digital reconstruction (Harris 1987:138–141). The design of the house features the classical vertical logs with clay in between for chinking. On the opposite end of the house from the door a stone fireplace was constructed (VA9). A ceiling was made with a ladder leading up to the space between it and the rafters. The floor was made of wooden planks and the roof of wooden stairs, a typical construction style in *Minecraft* (VA10).

Summary

The Alpha phase of *Minecrafting Archaeology* was designed to test if the various necessary components could be assembled in *Minecraft.* The digital recreation of an excavation from Fort St. Joseph was designed to serve as an educational tool for students in grades three to five. Since a project in this format has not been attempted before, each portion had to be newly created. The different components of the excavation were interconnected to form a network for the player to move through without being able to leave. One of the necessities to balance a distance education program that has little to no contact between instructor and student is a large degree of control in terms of the user's movement and a high amount of instruction. The information for artifacts and instructions was not created at this time because it was not part of the Alpha phase's purpose. The Beta phase will involve refinement of the components created in Alpha phase and development of all the in-game text.

CHAPTER FOUR: *MINECRAFTING ARCHAEOLOGY* BETA PHASE AND REVIEW

With the initial in-game infrastructure created for *Minecrafting Archaeology* during the Alpha phase, the map could transition to the Beta phase. This portion of the project consisted of refining the portions created in the Alpha phase and developing supporting material necessary for the player to complete the map. The greatest amount of time was involved with refining the player's experience to provide a smooth transition from one area to another. Additionally, certain elements like adding an observation platform arose to ensure that the archaeological enterprise was fully represented. These additions ensured that processes like viewing the excavation from different heights and angles along with the ability to record plan and profile views are accessible to players.

Choice of Unit from Fort St. Joseph

The modular and flexible nature of *Minecrafting Archaeology* allows, in theory, the recreation of any archaeology unit anywhere in the world. Adapting the size and depth of the unit shell and changing the block template will reproduce an infinite number of contexts. This also includes excavations underwater as the unit shell could be filled with water. However, not all archaeological projects hold the necessary information to facilitate the recreation. The two critical types of information that made the Fort St. Joseph Archaeological Project the best choice for *Minecrafting Archaeology* is its longstanding public outreach component and the detailed unit records. The Project's history with public outreach will allow this project to reach a wider audience than just being posted to *Minecraft* map sites. The detailed records of excavations are critical to the recreation of the archaeological excavation. Without information on artifact placement, soil color and texture, and other data, the recreation would not have the same level of detail. The unit N29 E8 was chosen for its distinctive stratigraphy and archaeological elements.

The stratigraphy demonstrates the complexities of working in a floodplain through elements like flood-deposited soils, bioturbation, and clearly visible plowzone. Stratigraphy refers to the layering of soils in the ground which happens over time. This layering can be disturbed by natural factors like animals tunneling through the ground – bioturbation, and by human factors like farming which can create plow scars in the soil – a plowzone. The archaeological elements in this unit present both typical finds from Fort St. Joseph, like lead shot and trade beads, but also a unique find, an architectural timber that was most likely used as a wall sill. This unit provides the player with a comprehensive overview of what excavating and interpreting a unit at FSJ would be like.

Starting Room

One of the major changes incorporated into the Beta phase was the physical separation of *Minecrafting Archaeology* components. The process began by separating the starting room from the rest of the portions. This was done using MCEdit which can select and move entire components of the project. The starting room was designed to provide a place for players to spawn, activate the initial settings, and receive necessary equipment and information to complete the game. *Minecraft* has numerous specific settings for both the world and player that are initialized upon starting the game. Required changes to initial game settings include locking the time of day to midday and changing the difficulty level to peaceful. These settings were altered to provide the player with a smooth experience by giving the best lighting and smoothest playing experience. The initial settings are established through a device known as a command block. They allow the map creator to program specific actions that could not be done otherwise. They include allowing a player to teleport from one location to another and controlling the time of day. To accomplish this, the level that starts the initial settings activates a Redstone signal that crosses over multiple command blocks that, when they receive the signal, activate their code (VA11).

At the same time, these settings are activated by switching a lever in the game, which reveals a storage chest which contains necessary tools for the excavation and an instruction book (VA12). A total of six sets of materials are provided in case multiple players wish to use the map at the same time. Since *Minecraft* does not have a trowel as part of the base game structure, a shovel, ax, and pickaxe were selected for player tools as they are necessary to excavate the specific blocks used in the unit recreation and are the only options provided by the game. The tools are also enchanted. This means that they have been given a form of in-game enhancement to break blocks faster and last longer. The hub room is also host to buttons which teleport the player to the recreation scale of his or her choice; this is again accomplished by command block.

The aesthetical elements of the starting room were opened and simplified from the Alpha phase. The blocks used to make the walls of the starting unit were contrasting wood colors and the size was maintained to facilitate player spawning (VA12).

Unit Shell

The changes that took place to the unit shell in the Beta phase focused on facilitating the specific unit chosen for recreation and adding elements to better replicate the archaeological enterprise.

The initial unit shell was designed with a one meter by one meter unit in mind. This size was chosen because it was simple to create and many archaeological sites are excavated in one by one meter increments. Since the units at Fort St. Joseph are excavated in one by two meter sections, the unit shell had to be changed to accommodate this. The depth of the shell was also changed to reflect the actual depth of the chosen unit from the fort. N29 E8 was excavated to a final depth of 65 cm so the unit shell was one block deeper to facilitate a sterile soil layer (VA13). Archaeologists often excavate a unit until they reach sterile soil, which is defined as an area which lacks evidence of human activity. An archaeologist is able to identify sterile soils

through research into the sediments/stratigraphy of the area. Information about soil strata can be found through reports generated by soil scientists or by taking core samples in the area one is excavating. The sterile soil layer in *Minecrafting Archaeology* is comprised of red sand because it is drastically different in color and texture than any other block used in the rest of the recreation.

When archaeologists are excavating they often take pictures and stand to view the unit from different angles to examine changes in soils or features. In the Alpha phase, a glass layer was placed between the unit recreation and the portion of the unit shell that holds the vertical stratigraphy. The vertical stratigraphy is the recorded composition of a unit's walls which includes both soils and artifacts. This allows the player to view the stratigraphy while still keeping it intact (VA14). That does not, however, allow the player to get a distanced top-down view of the unit. The unit frame has a tall frame of blue clay to restrict the player's vision to the immediate area. This was done to increase the player's immersion and restrict view to the unit shell. A glass platform was constructed near the top of this frame with a ladder leading from the top of the reconstruction to the platform. This way the player could ascend to the platform and view the unit from a distance. This provides the player with a top-down view which is critical to level interpretation. It also provides the player a location to take a screenshot of each level (VA15). The directions on how to do this will are located in the instructional booklet. This will allow a record of soil changes over the course of the excavation. Players will be made aware of the importance and significance of such recordings in the provided introductory booklet.

Block Choices

The blocks chosen for the ecological portion of the unit recreation were based on how closely they represented the physical material engaged in the excavation. The bases for this choice was done by both color and the apparent texture of the block. Soil color at Fort St. Joseph

was recorded based on comparison with the *Munsell Soil Color* book. Blocks with similar colors were then initially chosen. Blocks with coarser textures, like sand, were avoided in favor of those like colored Terracotta. Since Fort St. Joseph is located in a floodplain and the soils are comprised of finer textures, the blocks that were chosen for the unit recreation should be reflected this through their smooth-appearing texture. The reflection of soil color and texture not only increases authenticity but also boosts the player's immersion. If the soils did not reflect this detail, then a component of realism would be lacking that is present in the rest of the recreation.

The choice of blocks to represent artifacts was based on an entirely different set of criteria. Since there were very few items in the game that corresponded to artifacts recovered from Fort St. Joseph, placeholders had to be found. Wool blocks were chosen as placeholders because they were not used in the unit reconstruction and are available in 16 distinctly different colors to facilitate identification. Each of the items that could represent an artifact and the chosen colored wool blocks were given the exact names of the artifacts they represent. This was done so that the player could more easily identify an artifact or ecofact.

Item Grid

The item grid, which was created during the Alpha phase, was modified to reflect the correct size and number of required grids to complete the respective recreation scales. Once the correct grid was finished, the block types for the recreation could be chosen. Since one of the major goals of this project was to develop the recreation without the use of any mods, the blocks had to be chosen from that provided by the base game structure. Level sheets from N29 E8 recorded the soil color based on the Munsell color system. These colors were then matched as closely as possible to blocks available in-game, see Appendix D for a list of block choices. The artifact placeholders, outside of the colored wool blocks chosen in the Alpha phase, also had to be chosen. The items available in the game that corresponded with recovered artifacts such as

bone and glass were used when possible. Each of the blocks or items chosen to represent artifacts was given a name that corresponded to the associated artifact. This way, when the player recovered one of the artifacts instead of find, for instance, a “Blue Wool” block they would find one labeled “Iron Frizzen” (see Appendix A for a list of artifact placeholders).

The specific blocks for the vertical stratigraphy were added during the Beta phase. Unlike the unit levels, a grid was not needed to house this set of material before adding to the unit shell (VA14). This is because the stratigraphy is only one block deep so there is no concern for editing. The information needed to create the vertical stratigraphy was found within the records from the unit. The stratigraphy was constructed against the bedrock unit shell and then a layer of light gray stained glass put in front of it. This separates it from the unit but still allows the player to see it as they descend.

The layout for the unit levels was constructed from information present in both the unit level sheets and artifact inventory. The artifact inventory was limited to the chosen unit and sorted by the level in which the artifacts were found. The first clear plan map provided by the unit level sheets started at 30 cm bd. Therefore, the levels from the surface through 25 cm bd had to be recreated from other sources (VA16). The wall profiles provided the outlines of the levels and the center could then be artistically recreated. Due to the location of the fort in an active floodplain, these top layers have been deposited in the last eighty years. A dam was created just down river from the fort site in the late 1800s and was then heightened in the 1930s. Therefore, the soils deposited from annual floods could only have happened since the dam was constructed. The material recovered from this portion is clearly unrelated to the site and is not meticulously recorded. The artistic reconstruction of these top layers, therefore, does not impact the integrity of the site material or the authenticity of the player’s experience in any way.

The information for the subsequent layers, as previously indicated, comes from the level sheets and the artifact inventory. Profiles were recreated by scale in the appropriate grid from the level sheets. These sheets recorded the layout of the unit along with soil colors and any large artifacts and ecofacts present at that level. The artifact inventory provided all the artifacts found within each level. The artifact placeholders were placed within chests so that the player can easily identify when one is found (VA17). Once the layers were created, they were all stacked in the final grid unit through MCEdit. This completed recreation was then placed within the appropriate unit shell.

Information Room

The information room, which was styled based upon a modified version of a "Complete the Monument" (CTM) room, was updated during the Beta phase. Despite the physical separation of many portions of the map at the beginning of the Beta phase, the information room was left physically connected to the unit shell. This was done to facilitate ease of mobility by the player between excavation and information areas. These two locations are the ones most frequently used by the player so the physical connection is more useful than a teleportation system.

The mechanism by which the artifacts were deposited and identified continued directly from the Alpha phase build. The number of the exchange mechanisms was increased to accommodate the finalized number of artifacts and ecofacts. In front of each chest there is an item frame holding an example of the artifact that should be placed in the associated chest (VA18). This was done so the player would know in which chest to exchange the artifact placeholder for an information book. There was also a series of six double-chests placed in the information room to store extra blocks from the excavation. This was done to ensure that the player's inventory would not become cluttered with extra blocks.

Linked to the artifact exchange mechanism is a lock to a room that contains a teleport to the house recreation. Only when the final artifact is placed in the exchange mechanism will a door be opened that allows the player to teleport to the house recreation. The house would not be able to be fully interpreted by the player without first experiencing the full excavation and the information it provides.

House Recreation

The house recreation was not changed very much from the Alpha phase. The one major design change was related to the fireplace. Due to changes in *Minecraft* for how fire spreads to adjacent surfaces, the original design caused the house to catch on fire. The hearth design was reconfigured to account for this (VA19). The other major change was replacing the dirt ground around the house to colored clay. Rabbits were recently added to the game in an update from Microsoft and they spawn on dirt. By replacing it for clay they no longer will appear. Most of these changes were cosmetic to increase the player's immersion.

Informative Books

Developing *Minecrafting Archaeology* as a distance education tool required a great deal of informational text. As previously mentioned, there is a required amount of instructional material necessary in this type of educational tool. An online learning program that has little to no contact between instructor and student requires a large amount of integrated instruction. The three sources of information provided to the player in *Minecrafting Archaeology* are informational books, an answer book, and an instructional book.

The information books were created to provide context to the artifact and ecofact placeholders in the game. *Minecrafting Archaeology* was designed to be an educational tool for students. This required a system of informational delivery that worked within the *Minecraft* game. Using books for instructions and information is common to many *Minecraft* adventure

maps. Before these books could be written, it was necessary to determine what grade level *Minecrafting Archaeology* was going to be created for and the curriculum requirements for these grades. From grades three to five in the Michigan public school curriculum the general areas of study include Michigan Studies, United States Studies, and Integrated American History (SS COMBINED n.d.:8; SSGLCE_218368_7.pdf n.d.:9). As the fur trade in Michigan is a component of these grades curriculum it fits directly into current state education plans. This project also contributes to larger educational goals that include the development of critical thinking skills, evaluating sources, and using evidence (SS COMBINED n.d.:3). This larger component is engaged by requiring players to build upon information they are provided to answer questions. Some of the artifacts and ecofacts are not conducive to follow-up questions and are thus not given any.

Each information book has up to two components: an informational paragraph and a question for the player. The informational section explains to the player what the artifact is and provides a brief context for how it was used at Fort St. Joseph (See Appendix B for the Informational Booklet). The question asks the player to think more broadly and apply what they have recently learned. While the information is important for the player to understand what they have found, it is far more important to engage with the questions. These questions are what connects to the larger and arguably more important portions of the third to fifth-grade curriculum goals. To answer the questions, players must use critical reasoning and build upon the knowledge they have just learned.

The answer books provide answers to the questions posed in the information books. The information gained and answers or narratives generated by archaeologists are rarely straightforward. Thus, this ambiguous nature has been applied to the answers in the book. They

are correct but offer more than one explanation for the questions posed. Instead of being separate books, the answer book is one to facilitate ease of answering questions. See Appendix C for the answer book content.

The instruction book provides the player with the necessary information to complete the map. This includes the initial settings, how to use the map, and what the player will learn in the completion of the map. The instructions are provided in a narrative form. First, the player is welcomed to the map and provided a brief overview of the setting and what they will learn. Next, the specifics for settings are provided. Lastly, a description of how the map should be played is provided. See Appendix D for instruction book content.

The Beta phase was designed to expand and refined the groundwork laid during the Alpha phase. The process of moving from one area of the map to the next was streamlined through the use of teleportation buttons, although the excavation and information room were left attached for convenience sake. The item grid was filled with the recreation information and stacked into the unit shell. All the information booklets were created and placed in their respective locations. With these changes complete, the map was ready for review and eventual publishing.

Review Process

The final phase of this project was a review of the created data and digital publication. While this project has not been designed as an active test of the created education platform, it does need to be reviewed to ensure that its content is appropriate. The review was separated into two portions: the game and the informational content. Digital publication involves making *Minecrafting Archaeology* free to the public.

The game was reviewed primarily by university colleagues. The reviewers consisted of two men and two women aged 30 or under. Individuals were chosen based on those who did and

did not have archaeological knowledge and by those who did and did not have *Minecraft* experience. This was done to create a double redundancy in the testing.

The physical content of the map needed to be confirmed for both playability and intelligibility of the recreation. Having reviewers who both did and did not have experience with *Minecraft* ensured that the map could be successfully navigated by the widest audience possible. Reviewers of all archaeological backgrounds ensured that the recreation successfully conveys the archaeological process and methodology. Those who had archaeological background could confirm that the archaeological enterprise was successfully replicated. For those who did not have an archeological background, their review determined if the archaeological enterprise and information about New France could be successfully presented. The importance of review by those who did and did not have expertise in archaeology and *Minecraft* cannot be understated. Without it, there would be no way to know if the project would be successful in a real-world application.

The comments I received were positive and helped to ensure that the layout of the game made sense. One of the main concerns was the motivation for players to complete the map. This is a legitimate concern. Much of the edutainment world was designed to push entertainment over education in order to keep players engaged. The design of this map has been tailored to make the content engaging without sacrificing learning for entertainment. The style of *Minecraft* map known as Complete the Monument (CTM) was used because the goal is to find numerous spread pieces to complete a monument. Players of *Minecrafting Archaeology* are doing something similar with the added educational content.

A second suggestion from the review process was to include a booklet both within the game and attached to the compressed file which contains all the game data to provide

information to teachers and players alike about accessing more material related to the history of New France and educational video games. This information will further the goal of directly connecting the players of this map with the history it represents. As I have previously argued, people only become engaged with the past when they believe they are a part of it. By learning more, and having further opportunities to do so, it is my hope that *Minecrafting Archaeology* will work to create more people engaged with the past. See Appendix E for the "Further Information Book."

The informational content of *Minecrafting Archaeology* has been specifically designed for grades three to five but is intelligible to almost anyone. As previously mentioned, the grade level was decided based on the connection with the curriculum. Despite controlling for language appropriate to this grade level, the content should be approachable by a wide range of audiences. To ensure that the material is appropriate for students in grades three to five one of my reviewers has experience teaching elementary school students. Reading levels in grade schools are specific, so this review was critical to ensure that the target audience was able to engage with the presented material.

Digital Publication

Once completed, *Minecrafting Archaeology* will be hosted online on both Western Michigan University's website and Curse.com which is a popular forum to find *Minecraft* material. The former was chosen to embed this content within the Fort St. Joseph Archaeological Project's public outreach material. Since the project already has an engaged group of people that follows its progress, it makes sense to publish the *Minecraft* content in a location where this community can access it. The second audience that this project is intended for are those who are interested in *Minecraft*. By publishing on Curse.com this project will be available to people who may not know about Fort St. Joseph or French colonial history. The choice of these two sources

should ensure that this project is available to a wide range of audiences in both the *Minecraft* community and to those interested in the FSJAP.

Another important reason for publishing this content for free online is to combat the trend of segregating information generated by archaeologists from the general public. Discoveries published in academic journals are rarely accessible to the public. This trend, unfortunately, works against the discipline's power to create new narratives about the past. The lack of public engagement is also evident in the literature associated with virtual archaeology. Even when common video games are used as a means of digital recreation, the end results are not made accessible to the public. There are certainly examples of public engagement, but they represent a clear minority of the work being done (Dawson, Levy, and Lyons 2011; Fairbanks 2015). If archaeologists are not able to produce content available to the public at large, then the information serves little purpose. Publishing *Minecrafting Archaeology* online for free in locations that are known to be visited by the public ensures that this content should reach a wide audience.

CHAPTER FIVE: SUMMARY AND CONCLUSIONS

Archaeology has evolved from a human curiosity regarding past material culture to an international academic discipline. Archaeologists are, in contrast to popular notions, not treasure hunters; the recovery of physical objects is only a small portion of the overall process. Ultimately, archaeologists work to construct narratives of the past. Virtual archaeology was created from the introduction of digital technology and those wishing to test if it could be applied to large sets of archaeological data. From there it has grown to encompass a wide range of technology and techniques. However, most of its analysis and recreations are not designed to be shared with the public.

Minecrafting Archaeology was designed to be a recreation of the archaeological enterprise in the video game *Minecraft*. It serves as an educational tool for students in grades three to five but can be approached by almost anyone. Examining the development of virtual archaeology places this project at the forefront of trends within the discipline. It separates itself from traditional uses of digital technology through its construction not as an analytical tool but as an educational one (Mol et al. 2016:14). Examining the use of digital technology in the world of public education provided crucial design elements for the project. Building on distance and e-learning principles I determined that in-game direction and user control was critical due to the lack of interaction between student and educator. Furthermore, this project has a place within a growing trend toward digitally-enhanced learning programs outside of archaeology. The specific information that students who play this map will learn includes information about French colonial history, archaeology, and geography. General skills that are forefront in current Michigan educational goals like critical thinking and problem solving are also addressed by this project.

The Fort St. Joseph Archaeological Project was chosen to serve as a test case for the creation of *Minecrafting Archaeology* due to its longstanding commitment to public engagement and the detailed records necessary for the digital recreation of a unit. The unit N29 E8 was selected because its stratigraphy and artifact content can provide the player with a wide range of educational experiences. Not only does it contain many types of artifacts but it also demonstrates the differing stratigraphy present at the fort site which is a common tool used by archaeologists to help understand the history of a site. The idea of extrapolating information regarding an artifact from its stratigraphic context is one of the aspects that contributes to critical thinking.

The development of *Minecrafting Archaeology* was split into three distinct portions, the Alpha, Beta, and review phases. The Alpha phase was designed to test if the disparate components of a starting room, unit shell, information room, item grid, and house reconstruction could be successfully created within *Minecraft*. With this confirmed the project transitioned into the Beta phase. This phase refined the content created in the Alpha phase and, with the specific unit for recreation chosen, the informational content could be generated. The review phase was designed to have the game mechanics and informational content reviewed in order to ensure that the target audience, students in grades three to five, could use it. Also, upon final completion, the map will be published online for free access by the public at large.

Future Development

There are multiple ways that this project could be expanded, or have been done differently. One way would be to set up a testing with 3rd to 5th-grade students. The material has been reviewed by educators and those with and without experience in New France history and archaeology. It was, however, not in the scope of this project for it to be tested in a classroom. Incorporating this component would allow for a further refinement of the material presented in *Minecrafting Archaeology*.

Another way to further this project would be to test it on another site. The flexible nature of *Minecraft* allows it to serve as a platform for the recreation of any site, assuming that the requisite documentation was present. With the process for recreation being established the addition of another site would help to further prove the versatility of this project. This would be done by removing the material in the unit recreation, level grid, and information books. This would be replaced by information from the new site. Developing another site recreation would also help refine the structures in the one for Fort St. Joseph. While the overlook platform developed for players to view the excavation from above works for this recreation, it might not for another. The only way to know if it will work for another site is to test it. Testing the features of the map on multiple locations would prove their strength for accurately conveying the information and process associated with field archaeology.

The final way this project could move forward would be to interact with another virtual archaeology project. *Minecraft* has such a flexible nature that the complete the monument format could be applied to different styles of interacting with the past. This could include moving through a recreated historical building or even neighborhood. Important portions of the building or buildings could have placeholders similar to those used for artifacts in *Minecrafting Archaeology* that would then be exchanged for information about the building, its history, and the people that lived there.

APPENDICES

A: Item Guides

Block Guide

10YR3/1 Alluvium	Black Terracotta
10YR3/1 PZ	Grey Terracotta
10YR 4/2	Brown Terracotta
Roots	Oak Wood
Sterile Soil	Red Sand
50CMBD Yellow Sand	Yellow Terracotta
50CMBD South Patch	Light Gray Terracotta
55CMBD Occupation	Cyan Terracotta
65CMBD South Patch	Coal Block
Architectural Timber	Dark Oak Plank

Artifact Guide

Non-Diagnostic Stone	Andesite
Structural Stone	Diorite
Animal Bone	Bone
Calcine Bone	Bone Meal
Teeth	White Wool
Ceramics	Bowl
Nail	Orange Wool
Glass	Glass

Bead	Magenta Wool
Daub	Clay
Shell	Light Blue Wool
Lead Shot	Yellow Wool
Copper Straight Pin	Lime Wool
Brooch	Grey Wool
Smoking Pipe	Light Grey Wool
Flintlock Main Spring	Cyan Wool
Stone Smoking Pipe	Purple Wool
Iron Hinge	Blue Wool
Iron Strike-a-Light	Brown Wool
Stone Gunflint	Green Wool
Iron Trigger Guard	Red Wool
Historic Artifact	Pink Wool

B: Information Books

Natural Stone - Andesite

Stones are a common item found at most archaeological sites. A stone can tell an archeologist many things depending upon where it is found. Fort St. Joseph is located in a floodplain, which is a portion of land near a river that floods every year. Even though the river yearly floods the area, the water is not strong enough to move large stones. Any large stones had to have been placed by humans.

What might stone have been used for by the people who lived at Fort St. Joseph?

Structural Stone - Diorite

Many stones recovered from Fort St. Joseph have been found with a white residue on them. This residue was most likely mortar. Mortar is the glue that holds stones together when used in house construction. These stones were most likely used in the construction of houses. Some of the houses at Fort St. Joseph had the bottom of their walls, or the foundation, made of stone. This was done because stone does not rot like wood and makes the house built on them last longer.

Animal Bone - Bone

Animal bone is a very common find at Fort St. Joseph. Archaeologists study bones for many reasons. One important reason is to determine what people ate. The most common type of animal bones found at Fort St. Joseph is the white-tailed deer.

Since Fort St. Joseph is located next to a river, what other types of bones might have been found?

Calcined Bone – Bone Meal

Bones that are blue or black on the edges are referred to as calcined bone. This type of bone forms when it is heated to high temperatures for a long time in a fire and also causes the bone to shrink.

What problems could the shrunken pieces cause for archaeologists?

Teeth – White Wool

Like bone, animal teeth are also often found at archaeological sites like Fort St. Joseph. They can be used to help discover what types of animals might have been eaten.

Teeth are often found less damaged than bone, why might this be?

Ceramics – Bowl

Ceramics are made out of clay mixed with a tempering material and hardened in very hot fires. Many dishes and bowls today are made using a similar method. When people lived at Fort St. Joseph the French used a specific style of ceramic which is called faience. Their decorations and shapes changed frequently so archaeologists can better understand when people lived at a site.

If a piece of faience was found in a Native American settlement, how might it have gotten there?

Nail – Orange Wool

Nails were used to construct buildings. They are cheap and easy to make today. In the eighteenth-century nails were made by hand by a blacksmith. Many have been found at Fort St. Joseph.

If an archaeologist finds a large number of nails in an area, what might this mean?

Glass – Glass

Glass was used for many purposes during the eighteenth century. Windows had glass although the pains were usually much smaller than those used today. At this time glass was difficult to make and even harder to transport. Another use for glass was to make bottles for everything from wine to medicine. Window glass was hard to move to locations like Fort St. Joseph because it had to travel by canoe over river and land.

What other things might be used in place of glass to make a window?

Bead – Magenta Wool

Beads, specifically small ones made of colorful glass, were a common trade item used by the French. They used them to barter for furs and other goods from Native Americans. Large

amounts of these beads have been found at Fort St. Joseph. Finding such large amounts of beads means it is very likely that fur traders lived at the fort.

If trade beads were found in a line next to a fireplace, what might that mean?

Daub - Clay

Clay was used for many things at Fort St. Joseph. It was different from that used in ceramics because it had no tempering, or added material to make it stronger. The clay was packed wet between the boards of a house and the sun and fire from the hearth would harden it. This clay was also used in the construction of chimneys, which removed smoke from the house. Archaeologists often call this type of hardened clay Daub.

Shell – Light Blue Wool

Animal shells were used for many different things in New France. Some were turned into beads, sewn into a belt, and used as trade goods. Shelled animals like mussels and clams were also an important food sources for people.

What other animals have shells? Do you think they were found at Fort St. Joseph?

Lead Shot – Yellow Wool

Guns in the eighteenth century are very different than those of today. Instead of using bullets they used musket balls and lead shot. It ranged in size and was often made by the person hunting through melting a larger block of lead into a mold. One type was similar in size to a modern BB. They were packed into a rifle with black powder and fired at small game like squirrels or birds.

If a large number of lead shot were found in a single location, what might that tell an archaeologist?

Copper Straight Pin – Green Wool

Pins were used by many new people in New France. Longer ones were more decorative and used to secure a hat on a person's hair. Smaller pins were used for holding the edges of clothes together when sewing. Sewing was a common activity during the winter when it was too cold to do much outside.

What other activities might fur traders or soldiers have done during the winter in New France?

Brooch – Grey Wool

A brooch was an item of jewelry that was used to hold clothing together. They could also provide others information about the wearer. More expensive brooches were most likely used by people of high status like governors or wealthy merchants. Information like what religion a person believed in could be shown by having a cross on one's brooch.

Smoking Pipe – Light Grey Wool

Smoking pipes are a common find at most French colonial sites. Smoking was a common activity for many different peoples in New France. Primarily made of clay by French manufacturers, these pipes changed in both design and size. Like ceramic dishes, archaeologists can use these pipes to help determine when a location was used.

Flintlock Main Spring – Cyan Wool

The guns used by the French in New France during the eighteenth century were called flintlocks. These guns used a stone called a flint to strike against an iron part, a frizzen, to produce a spark to light gun powder and fire. The spring provides the energy needed to make the flint strike the frizzen.

What were guns used for in the 18th century?

Stone Smoking Pipe – Purple Wool

Smoking pipes in the eighteenth century were not just made of clay. Native Americans made pipes of, among other materials, stone and are usually called Micmac pipes. The pipe was little more than a bowl with a hole on the side to place a reed in to create a stem to smoke through.

Iron Hinge – Blue Wool

Like nails, other general materials used in a house were made of iron and created by a blacksmith. Hinges for doors and windows were made in this style and some have been found at Fort St. Joseph.

Iron Strike-a-Light – Brown Wool

The iron strike-a-light was a common tool for the French, but a promising new invention for Native Americans. This was a textured strip of iron that, when struck on a hard stone, produced a strong spark to start a fire. Native Americans were using devices like sticks or a fire bow which were far more difficult to make fire with. Therefore the strike-a-lights became valuable trade item, representing in this case the superiority of imported goods, and were also kept by most of the French in New France.

Stone Gunflint – Green Wool

The flintlock rifles of the eighteenth century produced a spark by a stone, a gunflint, striking a metal object called a frizzen. These flints came in different sizes and styles that varied by the country that created them and the types of guns that were fitted to. By identifying their origin, these flints can help archaeologists establish the origin of peoples in the area where they were found.

How could a French gunflint end up in a location where no French person had been?

Iron Trigger Guard – Red Wool

A trigger guard is a gun piece which goes under and around the trigger to protect it from damage and the gun from firing prematurely. This part, like most others change based on the type of gun it comes from. The style changes over time and also by country of origin.

Iron Frizzen – Black Wool

The frizzen is the piece of a flintlock gun that, when struck by a gunflint, produces a spark to ignite the black powder in the gun and cause it to fire. Guns, like all other pieces of technology, are prone to break down over time with use. Places like Fort St. Joseph held stores of replacement parts, and excavations there have uncovered such a set of items.

What other objects might a French fur trader or soldier store for personal use?

No Artifacts

Archaeologists often times do not find any artifacts. At Fort St. Joseph, we know that the top 20 cm of soil has been recently deposited due to a dam just downstream from the fort. This dam caused the level of the river to rise and yearly flooding leaves soil behind. Because this material is so recent, we are not interested in any material left behind, and do not wet-screen (pass water through the dirt to remove the soil and leave the artifacts behind) it.

Modern Artifact

When archaeologists are excavating they often times encounter items that are not linked to the site being researched. The presence of these items have a large variety of meaning. If they are found near the surface it could mean that they were recently dropped by someone. Finding them next to material buried deeper in the ground could mean that the site was looted; dug up by people searching for artifacts and the hole then filled. In this case, the site of Fort St. Joseph was plowed as a farm field after it was abandoned which caused the soils and items in it to mix. This layer of soil is known as the plow zone.

10YR3/1 Alluvium – Black Terracotta

Fort St. Joseph lies in the floodplain of the St. Joseph River. The annual floods add new soil to the site every year. The flooding began in the late 1800s when a damn was added upstream of the site. The height of the dam was increased in the 1930s. The deposited soil is very dark and has a fine texture.

What might be some challenges of excavating in a floodplain?

10YR3/1 PZ – Grey Terracotta

This soil is found starting approximately 25cm below the surface. It is the beginning of what is known as the plow zone. After Fort St. Joseph was abandoned and before the dam was built, the land where the fort was located was a farm for a number of years. The plowing of fields mixes soils and anything that is in them. Soil colors and textures are mixed and artifacts are removed from the locations they were left.

10YR 4/2 – Brown Terracotta

This soil is lighter than the Plowzone and is a transition to the level which would have been occupied by those living at Fort St. Joseph. This soil would have most likely been formed by the decaying of leaves and other organic materials or especially high floods after the fort was abandoned but before the land was farmed.

Roots – Oak Wood

Roots are a common occurrence at almost all archaeological sites. They can cause damage or disturbance to artifacts by growing through or moving them, and can be difficult to dig through. This specific unit had a stump in the southwest corner.

How do humans and nature disturb archaeological sites?

Sterile Soil – Red Sand

Sterile soil is found below all archaeological excavations. This soil is where no humans have left physical presence. This is usually accompanied by a change in soil color, and many times texture. By finding this soil, the archaeologist knows that they have reached the bottom of an excavation.

50CMBD Yellow Sand – Yellow Terracotta

This sand was located as part of what archaeologists call bioturbation. This is a word which means that a natural process like roots, animals, or other non-human events caused a disturbance in the soil. The bioturbation is most likely caused in this case by small animals digging through the soil of the unit.

Architectural Timber – Dark Oak Plank

This piece of wood found in the northeast half of the unit was most likely part of the bottom of a wall of a house. It did not have any bark on it to suggest it was a root and there were marks on it that could have come from an axe in its shaping from log to square beam. This beam would serve as the base of the wall that was constructed on it.

C: Answer Book

How did the people who lived at Fort St. Joseph use stone?

Stone was used in many ways by those who lived at Fort St. Joseph. Native American tribes who lived in villages around Fort St. Joseph used stone for making tools like arrow heads. Archaeologists study stone tools to discover what groups of people lived in a certain area at a certain time. Stone was used by people at Fort St. Joseph to build their houses. Stones were placed in a line on the ground and then walls could be built on them. Since stone does not rot, it gave the houses a more stable foundation. Stone was also used to construct the base of a fireplace to support a chimney.

Since Fort St. Joseph is located next to a river, what other types of bones could be found?

Other types of animal bone found at Fort St. Joseph include sturgeon, beaver, and turtle. While the presence of animal bone at a site is often linked to what people ate, there are other reasons why bone might have been found at a site. Animals are not just hunted for food, but also for their skins, bone, teeth, and horns. At Fort St. Joseph deer were chosen both for food and for their hides which could be made into leather for clothing.

What problems could the smaller sizes of bone pieces cause for archaeologists?

The size and shape of a bone is used to help archaeologists find what animal it came from. For example, a leg bone of a deer looks very different from that of a cow or pig. So if the size of a bone is changed when heated in a fire, it could be misidentified and change the amount or types of animals found at a given site. This would change the understanding of the lives of the people who lived there.

Why are teeth often found less damaged than bone?

There is a general rule in archaeology that hard things survive and soft things decompose. Teeth, especially the hard coating called enamel, take a very long time to break down in the ground. Bone is many times softer and easier for things like plant roots to dig into and break down. It is the hardness of items like teeth, stone, and many metals, that help them survive untold years buried under the ground.

How might a piece of faience been found in a Native American settlement?

Native Americans traded not only with the French, but other native groups, the English, and Spanish. An item traded to an individual from the French in Michigan could travel many hundreds of miles away through trade. Finding an item linked with a specific culture does not always mean that culture lived in the location the object was found. Objects were also dropped

and lost by people where they lived or traveling, and this too places objects in seemingly strange locations.

What might it mean if large amounts of nails were found in one location?

Nails are one of the most common finds around a house. Their uses ranged from holding a house together, to fastening hinges, to being bent into hooks to hold clothes or other items. Finding them in a small area could be evidence of a house. It could also be a storage shed that held items like nails and other tools. Archaeologists must use clues like this to draw conclusions about the past; answers are rarely simple or easily found.

What other things might be used in place of glass to make a window?

In the eighteenth century, glass for windows was difficult to move over long distances. To get a pane of glass from Quebec or Montreal to Fort St. Joseph required at least a month spent in a canoe and pack to move over water and land. Therefore, glass was difficult to transport, and it became more expensive the farther it traveled. Materials such as thick paper or thin animal hides were coated with resins, sticky materials that helped waterproof and strengthen the paper or hide, and used in place of glass. People could not see through these materials, but they were less expensive and easier to transport.

If these beads were found in a line next to a fireplace, what might that mean?

Residents of the fort often sewed glass beads to clothing as a form of decoration. This activity often occurred during winter in front of their fireplaces which provided heat and light. Sometimes small beads would slip from one's hand and fall through the floor boards or directly on the dirt floor. When archaeologists are excavating and find a line of beads, especially if they are near a fire place, they could have fallen through a gap in a houses floor.

What other animals have shells? Do you think they were found at Fort St. Joseph?

A great number of animals have shells, from clams to turtles. Shells were found at Fort St. Joseph because it lies on the bank of the St. Joseph River. Shells had many purposes during the eighteenth century. They could be heated in a fire until brittle to be used in making pottery. Other shells, which did not come from the St. Joseph River, were shaped into beads and sewn into belts to be used as trade items.

If a large number of lead shot were found in a single location, what might that tell an archaeologist?

Storing groups of items was a common habit for French traders in the eighteenth century. Items such as lead shot, trade goods, and food were collected and stored for later use. The discovery of a large number of lead shot in a single location could represent a cache. A cache is a small and usually hidden spot where a group of items can be stored. It could have been a place where a hunter, trader, or soldier made the shot by melting a larger block of lead and pouring it into a mold to make the shot.

What other activities might fur traders or soldiers have done during the winter in New France?

Winter was a time of rest, work inside, and socializing. Traders repaired their guns and made or stocked items to trade in the following season. Singing and dancing along with storytelling were common activities. They also took the time to make trade belts, strips of cloth or leather with glass beads sewn on, that could be used to exchange for pelts or other goods.

What were guns used for in the 18th century?

Guns are primarily used for either hunting or defense today. However, in the 18th century guns were a multipurpose tool. The same gun could be used for hunting and be used by a soldier. Also, due to their tough construction when a person ran out of ammunition in battle the gun

could be used as a club or fitted with a bayonet, a knife that fixes to the end of the barrel, to attack an enemy.

How could a French gunflint end up in a location where no French person had been?

Guns were one of the most sought after trade items by Native Americans. They were obtained from the French, Spanish, English, and Dutch. The guns then moved all across the eastern United States by the owner or trade from one person to the next. Therefore, a gun traded for in Michigan could have easily made its way into Ohio, Indiana, Illinois, or beyond.

What other objects might a French fur trader or soldier store for personal use?

Items like gun parts were stored by traders for quick repair in case of an emergency. Trade items including glass beads, brass kettles, strike-a-lights, and more were kept for yearly voyages in search of furs. Spare clothing was kept by all to combat the changes in temperature from winter to summer.

What might be some challenges of excavating in a floodplain?

A floodplain, an area that floods each year from a river, has special challenges to excavate in. At Fort St. Joseph large electrical pumps are used to lower the ground water. As well, because the site is completely flooded at certain times of the year, it limits the period when excavations can take place.

What else might move artifacts or soil underground?

The movement of soils underground by natural forces like plants and animals is called bioturbation by archaeologists. Roots, animals, and water are common things that move soils and artifacts underground. Aside from bioturbation, human actions such as farming also disturb archaeological sites. These disturbances affect the ability of archaeologists to construct a narrative of a site.

D: Instruction Book

Welcome to *Minecrafting Archaeology*!

Minecrafting Archaeology was created to allow players to experience a real archaeological excavation which has been recreated in *Minecraft*. The purpose of archaeology is not to find stuff but to tell a story. The evidence recovered by archaeologists actively writes and rewrites history. There are two scale recreations of an archaeological excavation that took place at the historic French colonial fur trade post, mission, and garrison, Fort St. Joseph. It is located in southwest Michigan on the bank of the St. Joseph River. The content of this map has been designed to be a teaching tool for students in grades 3 to 5, but can be enjoyed by all ages!

Created by: James Schwaderer. Portion of a Master's Thesis at Western Michigan University. Please keep this book in your inventory to answer questions. Settings: The base settings were set by flipping the Start Lever. In case they are changed: Set difficulty to peaceful only. Please do not use creative mode or break outside the areas. Please do not use any texture packs.

Instructions: In the chest that held this book are the tools needed to complete the map. As *Minecraft* does not have a trowel, one of the primary tools that archaeologists use, a shovel, pickaxe, and axe have been provided in place of the trowel. Next, please choose one of the three scales: 1 block to 10 cm for a shorter length of time, approximately one to two hours, and 1 block to 5 cm for a medium amount of time, approximately five hours.

The excavation has two parts, the Information Room and the Excavation. The Information Room holds chests that have booklets describing the artifacts and other items that can be found in the excavation. Since *Minecraft* does not have most of the artifacts found at Fort St. Joseph as part of the game, named wool blocks have been used for placeholders. Once you find an artifact, check the Information Room for a chest which matches. Place the artifact in the

chest and you will receive an information book about it. The Excavation is where the excavation from Fort St. Joseph has been recreated. Please remove one horizontal layer of blocks at a time. After finishing each layer of blocks, or level as archaeologists call it, go into the Viewing Area to see how the surface of the excavation has changed (I recommend taking a screenshot by pressing F2 or making a drawing to refer back to). Screenshots can be found in C:\Users\(your specific user name)\AppData\Roaming\.*Minecraft*\screenshots. Once you have found all the artifacts an answer book will be provided for the questions and a path to a French colonial house recreation. By the end of the map, you will learn about French colonial history in Michigan, archaeology, and much more!

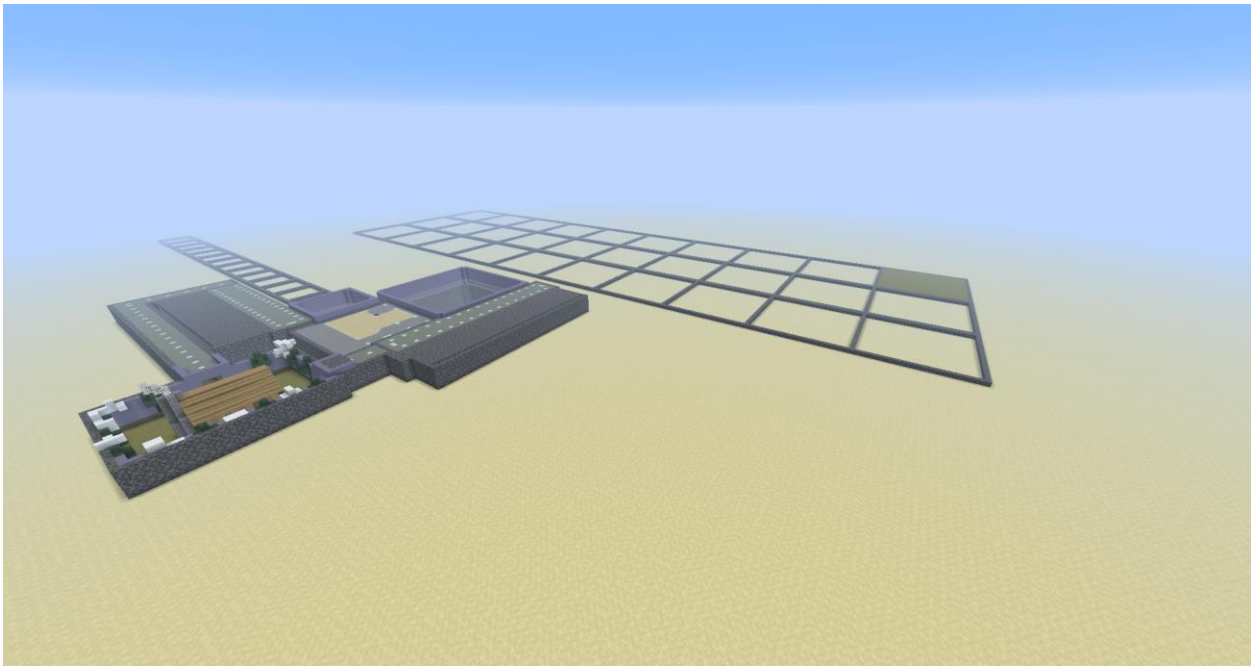
E: Further Information Book

Thank you for choosing and playing *Minecrafting Archaeology*. The pages of this booklet contain links to further information about the history of New France, and links to other educational content that works with video games.

1. A Virtual Museum of New France - http://www.historymuseum.ca/virtual-museum-of-new-france/
2. A list of sites for education directed towards children hosted by the Society for American Archaeology - http://www.saa.org/publicftp/PUBLIC/links/websites_kids.html
3. The Minecraft Education Edition homepage - https://education.minecraft.net/
4. The Fort St. Joseph Archaeology Project homepage - https://wmich.edu/fortstjoseph

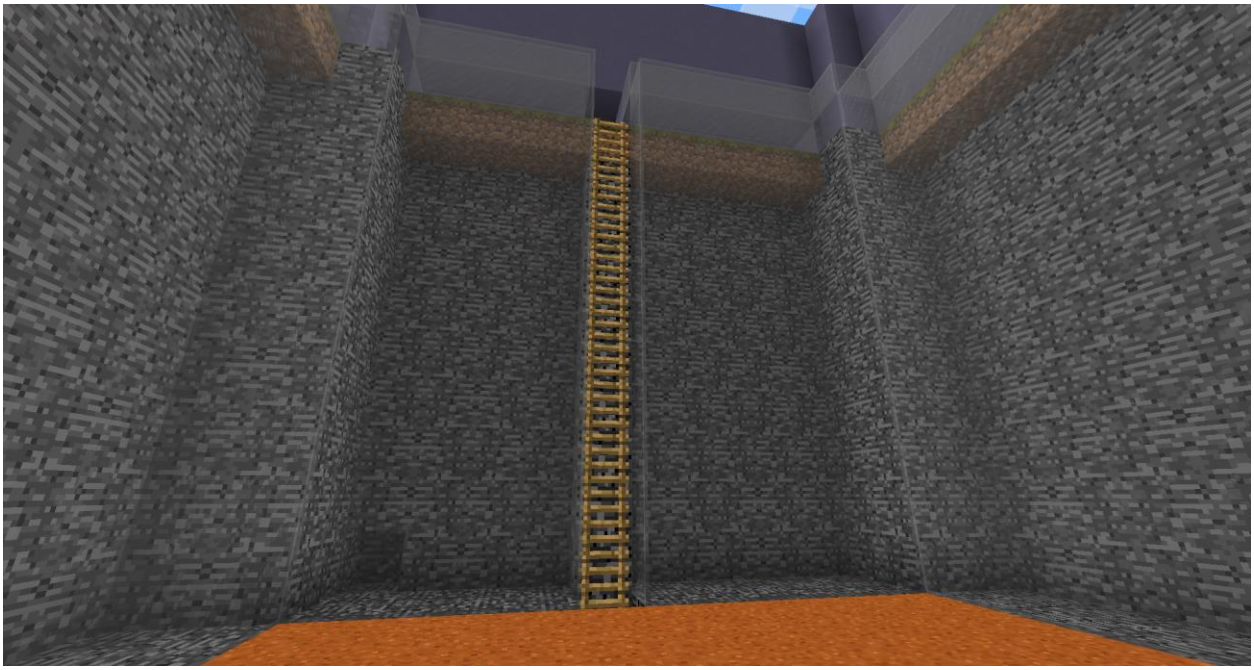
VISUAL APPENDIX

VA1



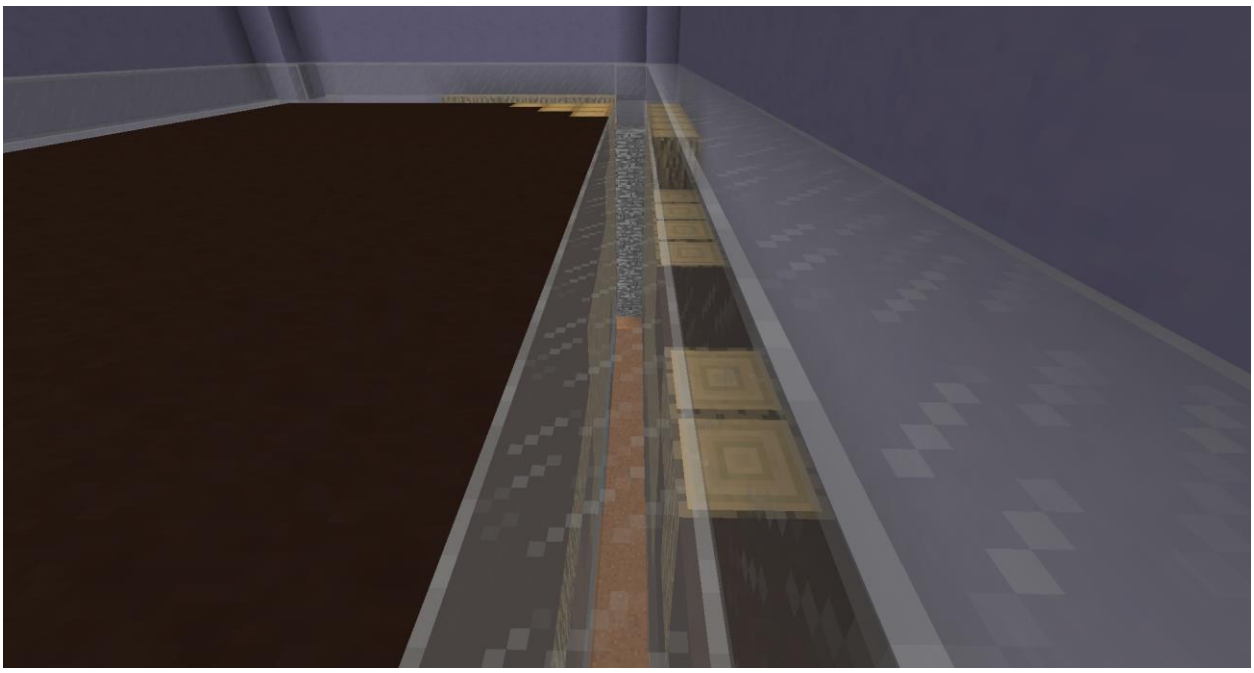
This picture shows the landscape of the Redstone Ready preset. Notice that the ground is made of sandstone and the bright light to make it easy for players to see. This overview is from the Alpha phase map

VA2



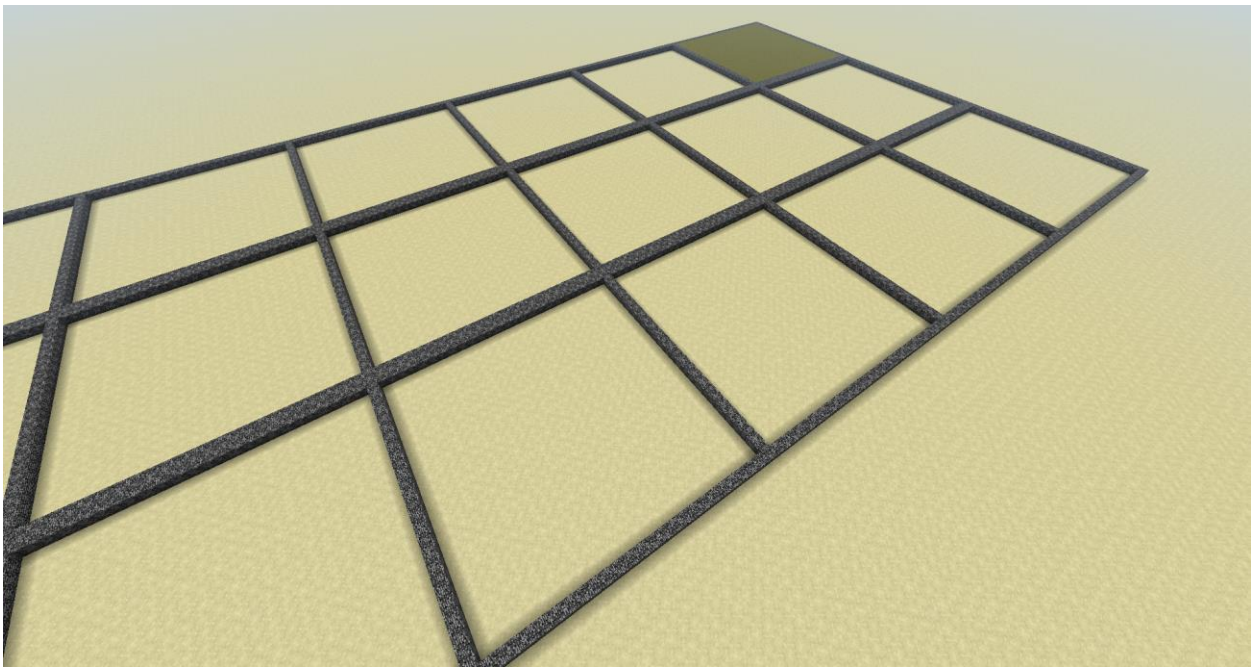
This picture shows the layer of glass that separates the recreation of vertical stratigraphy.

VA3



This picture shows the blue surround placed above the unit to limit the player's line of site.

VA4



This picture shows the unit frame. Each square represents a new level. The levels can be copied and stacked through MCEdit after creation.

VA5

This picture is of the Alpha phase monument room. The chests are where the player deposits the recovered artifact placeholders. When the correct block is placed in the chest, a new one is revealed which contains a book providing information about it and asking a following question.

VA6

This picture shows the mechanism by which the placeholder triggers the second chest. The top chest deposits the placeholder in the chain of hoppers which leads to a comparator. The correct placeholder will trigger an increase in the redstone signal that will reveal the booklet. The final mechanism also triggers the door that leads to the house recreation.

VA7

This picture shows a close-up of the hopper and comparator. The hopper has the correct placeholder in it, so only the corresponding item will work.

VA8

This photo shows the Starting Room from the Alpha phase. Notice the starting lever and path leading to one of the Unit Recreations.

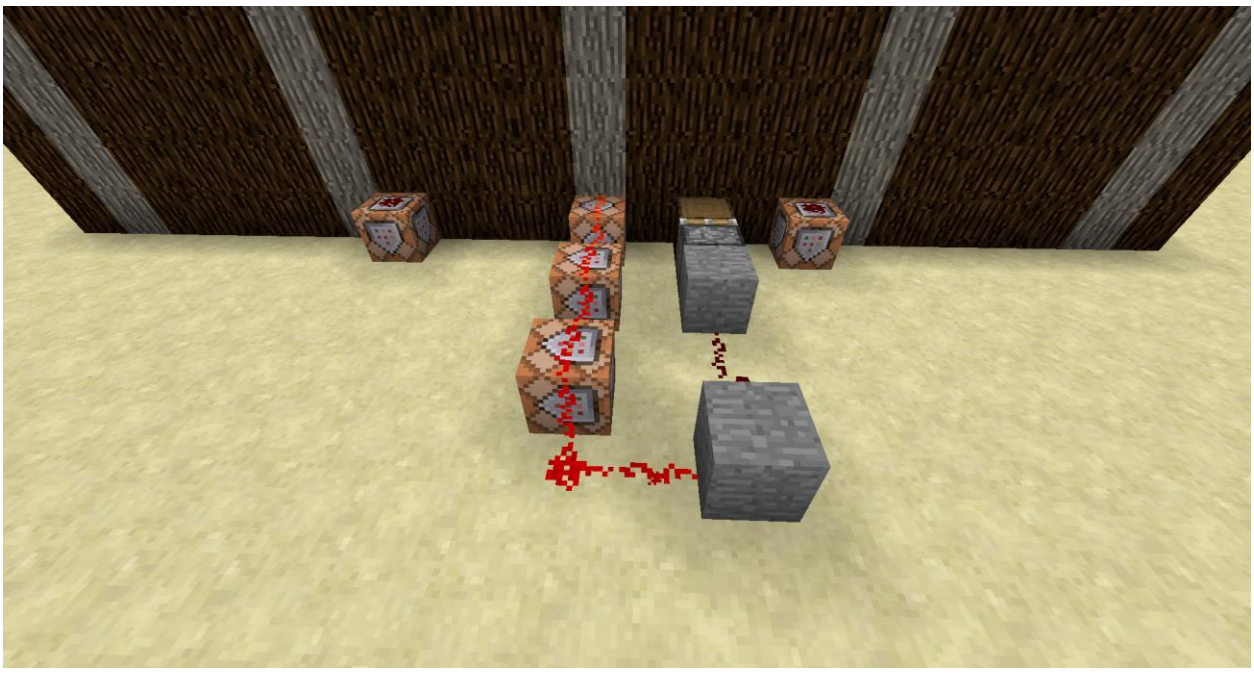
VA9

This photo shows the interior of the house. Notice the wooden walls and chinking between wooden pillars. The perspective is from the door with the fireplace on the opposite wall.

VA10

This picture shows the house recreation from the outside.

VA11

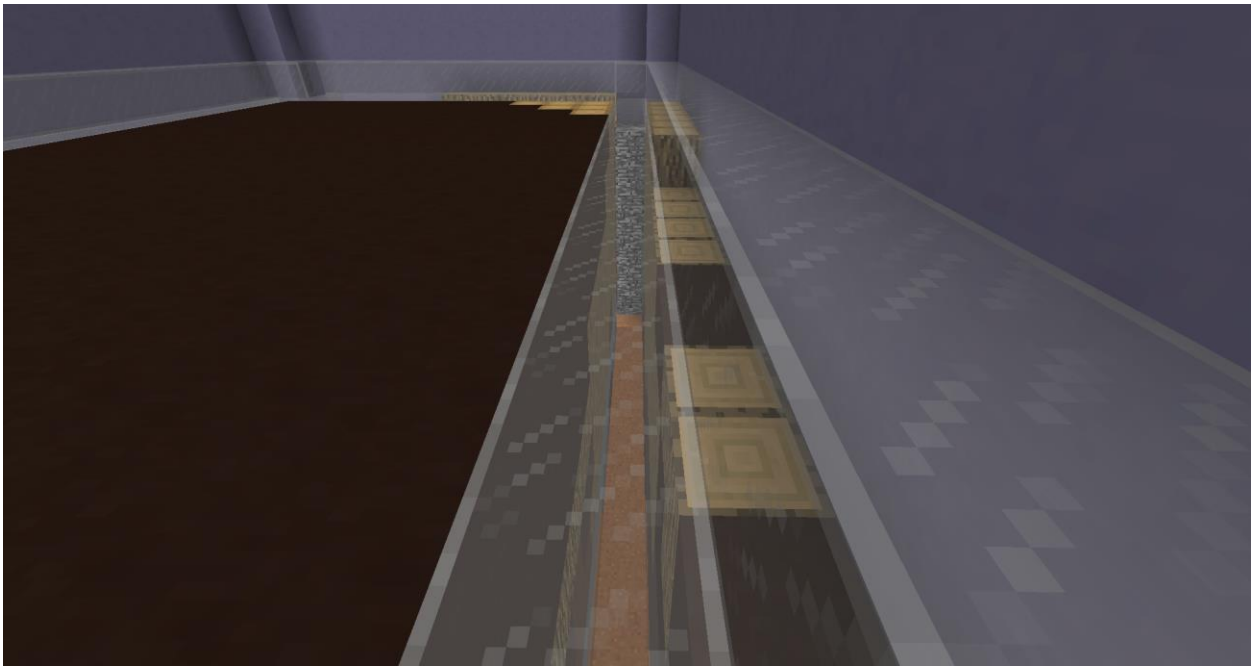


This picture shows the series of command blocks that establish the initial settings and teleport players to the Unit Recreations.

VA12

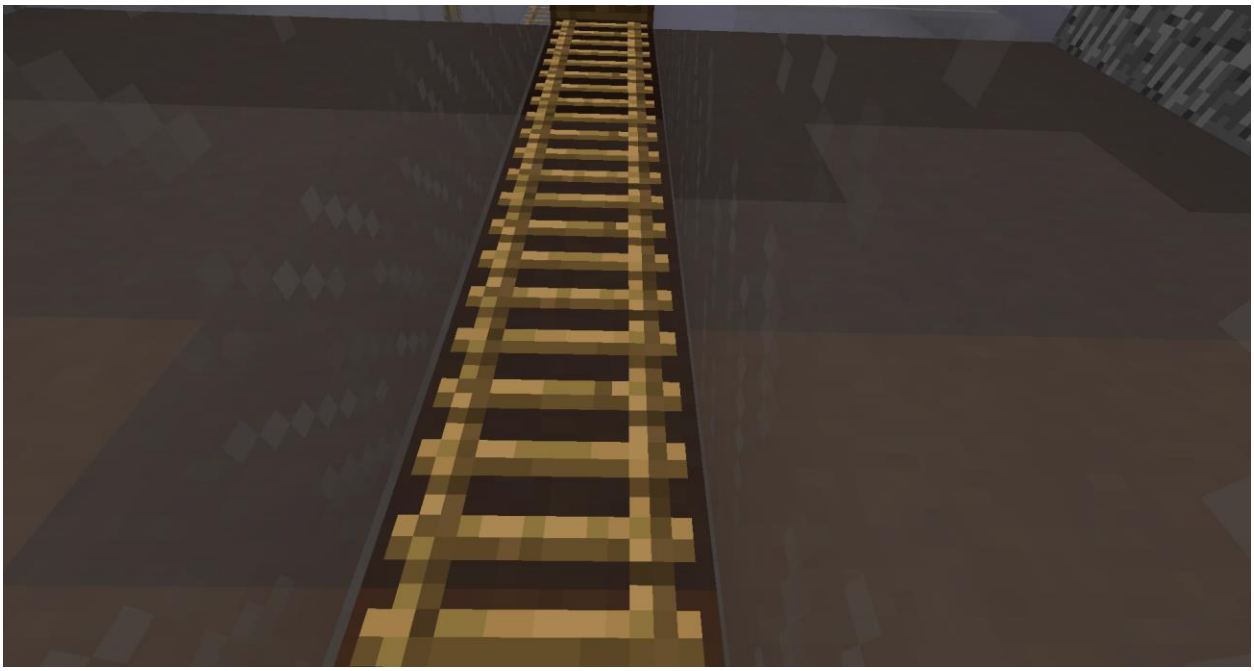
This picture shows the starting and teleportation controls in the Beta phase Starting Room.

VA13



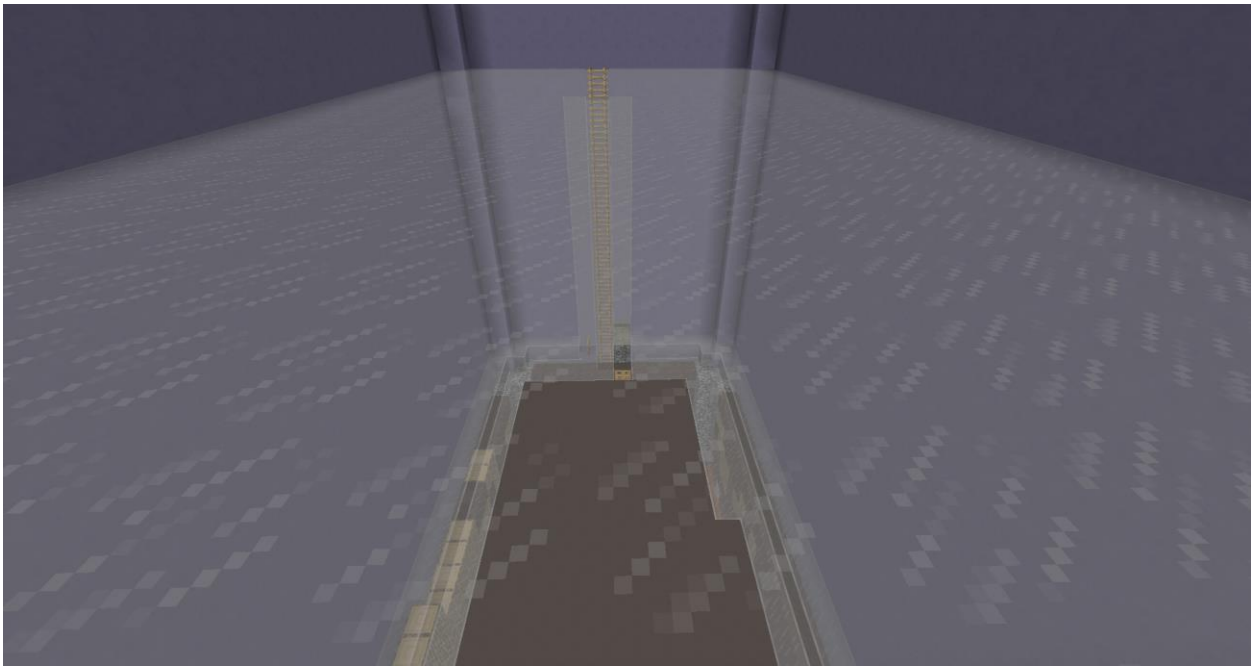
This picture shows the vertical stratigraphy of the Unit Recreation with the orange sand at the bottom representing sterile soil.

VA14



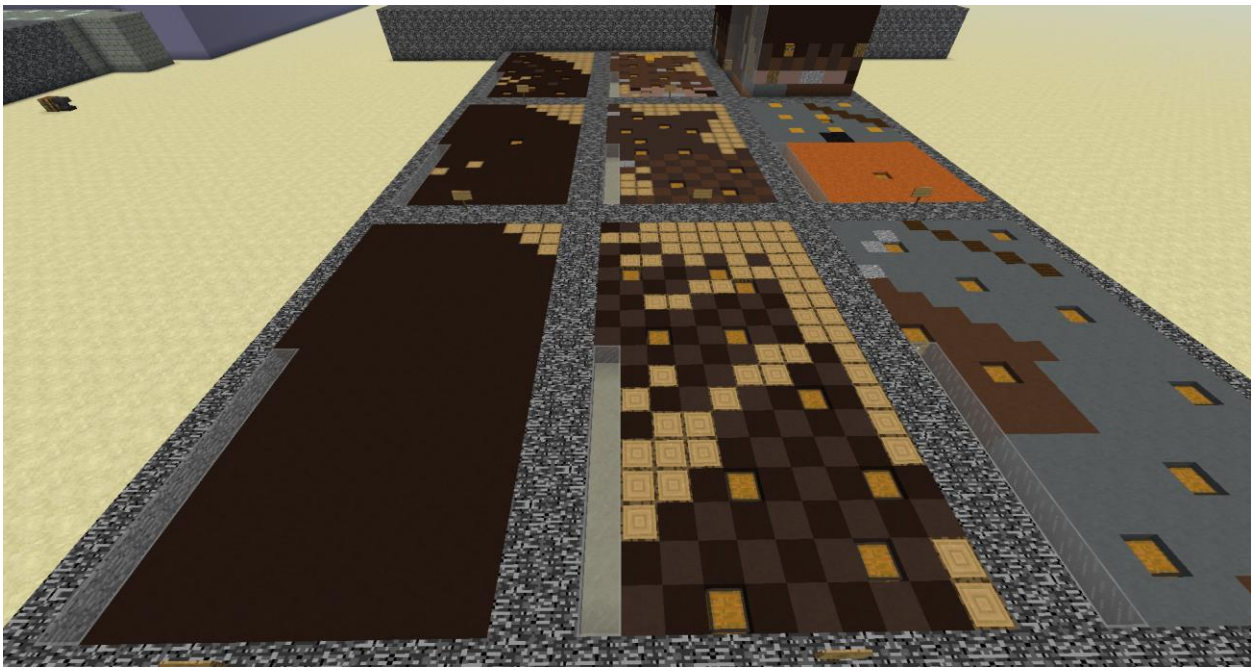
This picture is a close-up of the vertical stratigraphy in the Unit Recreation. The ladder allows the player to move back to the top as they excavate deeper.

VA15



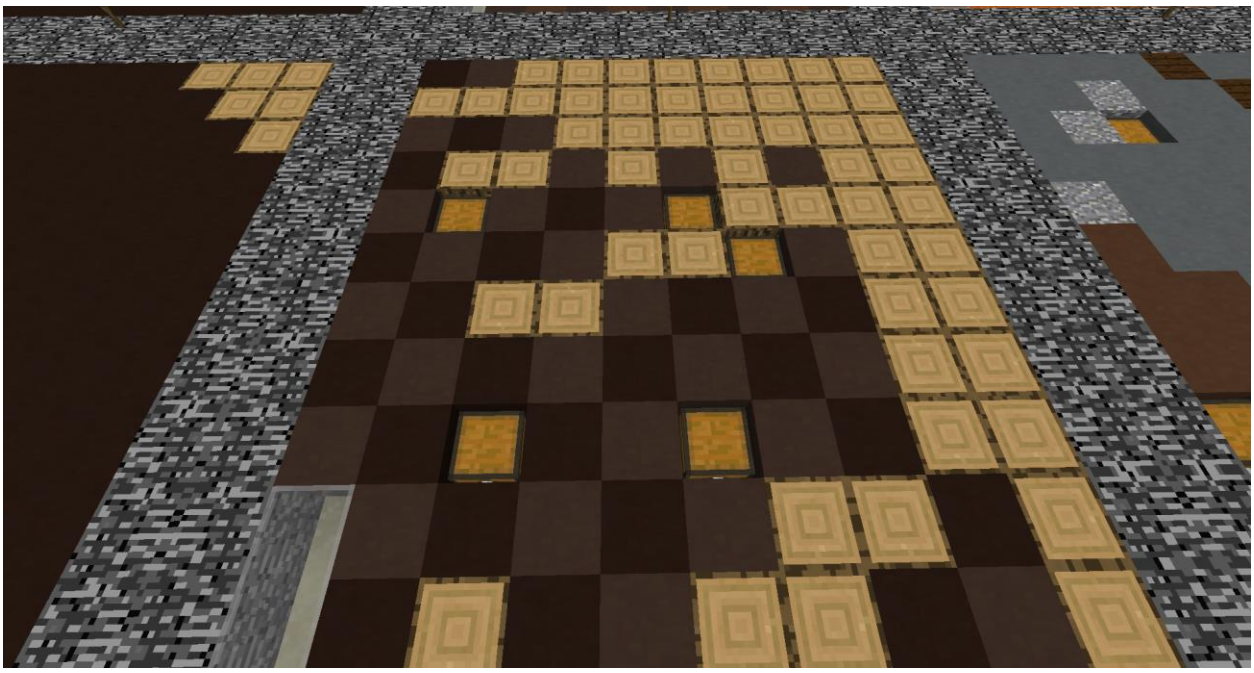
This picture shows the viewing platform which allows the player to view the unit from above.

VA16



This picture shows the filled item grid, in this case the one block to 10 cm scale.

VA17



This picture shows the chests within the recreation that store the artifact placeholders.

VA18

This picture displays that each placeholder has had its name changed to be that of the artifact it is representing.

VA19

This picture shows the redesign of the hearth. It was changed because the spread of fire in *Minecraft* changed between the Alpha and Beta phase. If it was left as it was, the house would burn down before the player would reach it.

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