

Gaming the Past: Designing and Using Digital Games as Historical Learning Contexts

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A thesis submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

2019

In memory of my parents Marta and Mario.

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ACKNOWLEDGMENTS

This has been indeed a very long journey, which would have been impossible without the help of so many people who accompanied me along the way. I owe my gratitude to all them. First, I would like to thank Alberto Dittborn for sharing his passion and never-ending enthusiasm in designing all sorts of learning materials and environments for education. The privilege of working with him many years ago set me in the path that became my own passion and academic career.

I also want to give special thanks to all my supervisors: Professor Mathias Fuchs for encouraging me to start this project and helping in defining it at its initial stage; Dr Michael Goddard for showing me the value of academic rigour; Sam Ingleson for her encouragement and for drawing brilliant multidisciplinary connections; and Dr Marianne Patera for her invaluable support in critically and thoroughly reviewing every chapter and helping me finishing this thesis.

I am also in debt to a vibrant community of researchers who have supported me in different ways throughout this project. I would like to give special thanks to Professor Erik Champion, whose work served as an inspiration for this research; Dr Adam Chapman, for helping theorise on subjects I was not familiar with; and Dr Robert Houghton, for sharing his passion on medievalism and games.

I am grateful to all the brilliant and enthusiastic group of researchers at the Centre of Digital Heritage at the University of York: Dr Colleen Morgan, Dr Sara Perry, Dr Gareth Beale, Tara Copplestone. Their continuous support and invitation to participate in JAMs, conferences, and seminars helped me to keep the enthusiasm along this project.

This research would have been impossible without the support of primary and secondary schools from the towns of Bollington and Macclesfield, in Cheshire. Special thanks to Sara Bayliss, and all the teachers, staff, and students that facilitated my research at their schools.

Lastly, I want to thank my family: my wife June for her support and for patiently listening to me all these years; my son Simón, and my daughters Julieta and María. They all have been patiently waiting for me to finish this thesis, and now is time to dedicate my weekends to them.

DECLARATION

I, Juan Hiriart, declare that the work in this thesis was carried out in accordance to the regulations of University of Salford, and is an original piece of research, except where indicated by reference in the text.

Signed.....

Date.....

ABSTRACT

In the last decades, digital games based on historical themes or settings have become an important form of historical engagement. In many ways, this new way of connecting with the past presents unique characteristics, setting the medium apart from previous forms of historical mediation. In spite of the growing academic interest in harnessing this power for historical education, many questions remain unclear with regard to the representational appropriateness of the medium and the theoretical and practical problems involved in designing and using historical computer games in school classrooms. Focusing on these educational settings, this research aims to analyse the potential of digital games as a new form of historical representation, gaining a better understanding of they can be designed, produced and effectively implemented in these contexts.

Succinctly, this research project was designed to explore, reflect and evaluate, through the establishment of an ongoing dialogue between practice and theory, the effectiveness of video games as educational instruments for learning and teaching history. By adopting a practice-based approach, this study was led by the iterative development of a series of historical game prototypes, designed to explore everyday life in early Anglo-Saxon Britain. At different stages of design, the prototypes were evaluated by historians, archaeologists, and educators, moving at a later stage to their implementation and testing within the history curriculum of a primary school. In this phase, qualitative and quantitative data was collected following a pre-post test methodology. By making empirical connections between educational theory, historical learning, and game design, this research contributes to a better understanding of the theoretical and practical issues involved in designing and implementing historical game-based learning environments.

CHAPTER 1: INTRODUCTION

1.1 Motivation

This doctoral research was led by a strong interest and passion in two separate areas: the design and use of educational technologies, in particular games, and the knowledge field and disciplinary practices focused on the study of the past.

The first area of interest emerges from my professional and academic experience as a designer. After my graduation, I always felt attracted to the development of educational resources, as well as on the ways in which the designer's particular modes of thinking and doing could contribute to improving the design of learning experiences.

Following this interest, I moved from a School of Design, where I started my career as a Higher Education lecturer, to a School of Education, where I worked in a multidisciplinary research centre focused on the development of learning resources for primary, secondary and adult's education. The experience of working at this centre alongside educators, psychologists, and anthropologists among other professionals in the creation of learning resources and environments was truly eye-opening, influenced the direction of my career and convinced me of the importance of a multidisciplinary and participatory perspective in improving educational processes. This perspective can be regarded as one of the main pillars of this research.

After many years of working at this research centre, accompanied by a bulk of knowledge and situated experiences developing instructional technologies, I became more and more interested in games and game-based learning. Following this newly found interest, I decided to specialise in games development, firstly through a postgraduate course in creative games, and then through a six-year role as a games designer and programmer in the games industry. From this period, I collected a portfolio of successes and failures (the ones we can often learn the most) developing casual, mobile, and learning games in multiple genres. Perhaps more importantly, I also saw my interest rise in applying my knowledge and skills, this time as a games developer, to the creation of rich and meaningful learning experiences.

The second area included in this doctoral study – the disciplinary fields of history and archaeology – is also led by my past involvement in academic projects.

Despite not being a professional historian, I had the opportunity to work alongside historians and anthropologists in the collection, systematisation and dissemination of local histories from native American communities from Southern Chile. What started as a request from the communities' traditional authorities to tell *their version of the past* to the new generations, and not the one written by the dominant group, led to a series of publications about the communities' past memories and everyday lives. Through these projects, I acquired a sense of how important history is for individuals and social groups to imagine and construct a common future, as well as how relevant is to develop innovative ways to facilitate their understanding. In a post-capitalist world marked by an increasing relativisation of truth, perhaps this is more needed than ever before.

1.2 Statement of the problem

Traditionally, history has been conceptualised as the most plausible account of the past that is possible to construct from the pieces of evidence found in the present. The work of the historian, therefore, has been regarded as basically uncovering *what essentially happened* and presenting the meanings of the past in the form of linear narratives. This notion of history, however, has been challenged in the last decades by new ideas introduced into the discipline and the recognition of the multiple and dissimilar means by which people connect with the past. For most people, “[t]he past is not only present”, as Rosenzweig and Thelen (1999) noted, “it is part of the present” (p. 178). History does not just exist in historiographies, but plays an important part in people's lives through books of historical fiction, films, video games, and in the re-enactment of past battles and ways of living. History, thus, encompasses a myriad of dissimilar activities and cultural engagements with a far larger scope and complexity than what has traditionally been believed.

In this cultural context, undoubtedly digital games have become one of the most important forms of historical encounters, specially for the new generations of digital natives. Through the agency of their game controller or mouse and keyboard, players can decide to play a decisive role in a historical battle, control an entire civilisation, or simply walk through an ancient city reconstructed with an impressive level of detail. These forms of engagements, as several scholars noted, extend beyond pure entertainment. With their ever-growing ability to immerse players in highly realistic environments, the representational, procedural, and motivational powers of the new medium can be productively used in the heritage and educational sectors. To be used

effectively, however, its defining properties and affordances require to be fully understood. Through analysing commercial game titles as forms of historical representation, scholars have criticised the medium for being inherently unhistorical (Ferguson, 2006; Galloway, 2006), or for depicting too narrowly defined and biased versions of past (Fogu, 2009; Schut, 2007). Moreover, despite the evidence-based research showing the educational potential of educational games (Gee, 2004; Squire & Barab, 2004a; Ritterfeld & Weber, 2006), several scholars have expressed their concerns on bringing these technologies to formal and informal educational settings without a clear understanding of their effects and methods of implementation (Champion, 2006; Van Eck, 2006).

1.3 Research aims and questions

Deriving from the aforementioned problems, the research aims of this project were defined as:

1. to explore the suitability of video games as a medium for the representation of historical knowledge, and
2. to investigate the role digital games can play in fostering the meaningful understanding of history in formal educational settings.

From this general outline, the research was set to answer three main questions:

1. Can digital games be considered a suitable medium for historical representation?
2. Which defining characteristics of digital games are relevant and advantageous for producing a historical representation?
3. How can historical digital games be designed to foster the meaningful understanding of history in formal educational settings?

1.4 Research overview

This research was conducted following a practice-based methodology, relying on the iterative construction and critical analysis of a series of game prototypes in order to find meaningful answers to the stated research questions. By following this approach, the study was distinctly different from previous research conducted on this subject. The study of games as historical media, along with their potential as educational tools in formal and informal settings has been examined by researchers from various humanistic fields. Although their contributions are certainly important,

most of their research has been conducted looking at existent commercial games, some of which have been produced without a clear educational or heritage-orientated agenda. Arguably, this approach overlooks the field of historical game design as a new problem space, which requires the creative experimentation with new design solutions to move forward, both at a theoretical and practical level.

This research, therefore, adopted the method of developing experimental historical game prototypes as an integral part of a process of “*reflection in action*” (Schön, 1985), shedding new light onto the problem of designing historical games with explicit educational purposes.

This journey started by analysing the problem of developing and implementing procedural simulations from actual historical data. As many authors have pointed out, games rely on simulations – a semiotic structure that sets the medium apart from previous media forms. Game simulations enable players to explore not just *how things looked*, but also *how things worked* in the past. Even though the educational potential of this form of engagement seems self-evident, some authors have argued that systems like these also blur the distinction between historical speculation and factual fidelity, a problem that cannot be trivialised. Hence, the present study took into account the multiple problems and bias that emanate from the encoding of historical meanings into procedural simulations, made accessible through ludic forms of interaction.

Through iterative cycles of development and critical reflection on game prototypes, the project moved to a second phase, where it was implemented and evaluated in the real context of a primary school classroom. This phase aimed to investigate the ways in which the ludic and narrative structures of digital games can be used as means to foster high-order historical thinking skills, defining the key aspects that determine their effective implementation into formal learning settings. From this perspective, the research intended to contribute to an area that has received little attention. Although paper-based role-playing games have been successfully used in history classrooms for many years (e.g. Keller, 1975), still not many instances of digital games, with the notable exception of the work developed by Taylor (2003) and Squire & Barab (2004a), have been systematically studied in these contexts.

1.5 Scope of the research

With a clear multidisciplinary focus, this research project is concerned with three main areas: games, history and education (Fig. 1.1). As such, the dynamic intersections between these academic fields need also to be explored to gain an understanding of *game-based historical learning*, the concept that better encapsulates the main focus of this research. For Champion (2008a), this concept can be broadly defined as the “*use of real-time rendering engines, game editors, game platforms, game peripherals, and/or game-style interaction metaphors to help the public enhance their awareness of historical issues and heritage sites*” (p. 220). Although we can adopt this definition to delimitate the scope of this research, the educational context of this research requires to be defined in more precise terms, therefore the setting of primary school education has been selected as the primary context of research.



Figure 1.1: Intersection between the main areas covered in this review: games, history and learning.

Accordingly, one of the main areas of concern for this investigation is the study of games and play, and, more specifically, the sub-field denominated with the label of *serious games*, or games produced and used for purposes beyond entertainment (Abt, 1987). To understand the ways in which digital games affect or conditions the representation and understanding of history, it was considered essential to gain a thorough comprehension of games both in their non-digital and digital

incarnations, with an emphasis on determining the properties that separates them from other media.

A second important focus of this project regarded the connections between digital games and history. In the last five decades,¹ this field has been subjected to important epistemological revisions, leading to significant discussions and reconceptualisation of what history is, how it should be practised, and how it should be taught in schools. With the advent of digital technologies, these discussions had to incorporate the new representational affordances that new communication technologies bring into the discipline, a new level of complexity that, as mentioned, still needs to be fully understood. In recent years, a community of scholars have focused their attention to the study of one of these technologies, computer and video games, joining their efforts in a field now established as *historical game studies*; “the study of those games that in some way represent the past or relate to discourses about it” (Chapman, 2016, p. 16). The present work can be located within this field of inquiry, as well within the scope of the more recently proposed research area of *archaeogaming*, the “archaeology both in and of digital games” (Reinhard, 2018, p. 2).

The third area of study explores the connections between games and learning. In this relationship, the learning theories more commonly associated with game-based learning need to be first explored and understood to an adequate level to make sense of any academic research on producing and/or using games in history classrooms. This body of knowledge was considered to be essential for the practical and conceptual efforts involved in producing historical game prototypes, and ultimately for drawing conclusions from their in-context testing and critical reflection.

Finally, two clarifications must be made. As this project relied on the development of functional game artefacts, a historical context aligned with the history curriculum for schools in the United Kingdom had to be selected. After some consideration, the early medieval period, taught at primary school level, was defined as the thematic content for the game prototypes. Although a considerable amount of research about this historical period had to be conducted in order to produce game content for the prototypes, in no case this research should be seen as focused on Anglo-Saxon history or on the archaeology of this particular period.

¹ I am considering the publication of Carr's (1961) controversial '*What is history*' as the starting point for the debate about the epistemological standing of historical knowledge.

Similarly, for the development of the game prototypes a considerable number of files, ranging from three and two dimensional assets to computer code, had to be produced. Despite that the specific details of their development can be considered as belonging to established research fields such as computing science, this research focused on the design process and decisions taken during their development rather than on the technical aspects involved in their production.

1.6 Thesis outline

This thesis is organised according to the following structure:

Chapter 2 reviews the academic literature relevant to this project. This review is organised in three main sections. In the first section, the review focuses on relevant topics from game studies: games, serious games and game-based learning. The selection of these topics followed the intention of providing an adequate background for the understanding of games as historical representation, which is the focus of the following section. Here, the properties and affordances of games are examined. Special attention is given to the properties and affordances of digital games to generate immersive historical experiences. In the third and last section, this chapter looks into game-based historical learning, examining the practical experiences and theoretical developments in designing and using digital games in history classrooms.

Chapter 3 describes the research methodology defined for this project. The research ontological approach is first explained, moving the discussion to the research's philosophy, strategy and methodological approach. This chapter makes the case for the use of the *action-research through creative practice* as the most appropriate method for the addressing of this investigation aims and research questions. In general terms, this research strategy was structured into two phases: the first phase focusing in the iterative development and critical reflection of a historical game, and a second phase where the investigation moved to a primary school, where the final prototype was implemented and tested as part of the school curricular materials.

Chapter 4 describes and analyses the design and development of an educational historical game. This game was developed in three stages through which an initial design brief materialised in functional game prototypes. In this chapter, the design decisions and work produced on each one of these stages are explained, followed by a critical reflection on the process and the work produced at this point. This critical assessment emerges from two sources: a personal reflective examination of the personal

design process; and the assessment of the work produced by expert reviewers collaborating with this project: historians, archaeologists, and history educators.

Chapter 5 presents and analyses the results obtained from the implementation of the final historical game in a primary school. The context of the implementation is described in detail in the first sections of this chapter, providing a detailed account of how the methodological strategy outlined in Chapter 3 was implemented. In this phase, the researcher worked in collaboration with the school teacher, who participated in all the research activities carried on in the school. In general terms, the collection of data followed a pre-post design, using the same data collection methods before and after the game playing session. In the final part of this chapter, the research data is synthesised, driving a set of observations and preliminary conclusions that continue to be analysed in the subsequent chapters.

Chapter 6 discusses the key themes that emerged from the design and development of game prototypes (covered in Chapter 4) and the contextual implementation of the final prototype in a primary school (reviewed in the previous chapter). First, the theme of *games as historical challenges* is discussed, looking at how the spatial and temporal structures of games can be used pedagogically to foster the understanding of life in the past. Following, the discussion moves to the theme of *games as interactive ludic environments*, looking into the specific properties of digital games as historical contexts. Third, the discussion centres on the theme of *games as empathic encounters* in which the educational potential of encoding historical knowledge or data into conflicting situations is examined. Lastly, this chapter closes with the proposal of a design framework for designing historical gameplay, build from the experience gathered in this project.

Chapter 7 provides conclusions to the research contained within this thesis. It discusses how the research performed against the aims and research questions, contextualising the research main findings and contributions to knowledge. The limitations of the research design are also presented along with recommendations for further research. This chapter concludes with a personal reflection, where, reaching the end of this project, the motivation, research identity and plans for future research involvements are stated.

Finally, this thesis concludes with appendices and bibliographic references.

CHAPTER 2: LITERATURE REVIEW

2. 1 Introduction

In this chapter, the intersections between the fields of games, history, and education are critically reviewed. This review starts by examining the concomitant concepts of play and games, identifying the most relevant theories associated with both concepts. From this general analysis, the review moves to the particular case of digital games, looking into the properties that makes them different from their non-digital counterparts. The intersection between games and education is considered as highly relevant for this project, therefore the concepts of game-based learning and serious gaming are also covered by giving special attention to the pedagogical approaches more commonly associated with digital games. The discussion then moves to the overlap between both areas and history. This part has been organised around two main sections: a) the theoretical implications of using game technology for the representation of historical knowledge and b) the research done on the pedagogical use of games in history classrooms.

2. 2 Games: Serious Games and Game-Based Learning

2.2.1 Play and Games

Play and games are both difficult concepts to define, and so is to determine how they relate to each other. While the English language establishes a clear distinction between the concepts of *play* and *game*, this differentiation does not remain consistent across all modern languages. Also, the relationship between both concepts tends to vary depending on the way we frame it as it is possible to consider *play* both as a superset and component of games (Salen & Zimmerman, 2004). In spite of this ambiguity and the strong linguistic determinism involved in defining both words, a first differentiation can be established. From a general perspective, *play* can be regarded as a free-form activity, not commanded by the imposition of formal structures, while games can be seen as objects or activities inherently structured by rules. Regardless of arguments showing the relativism of this distinction (Vidart, 1995 in Frasca, 1999), this can be regarded as the starting point in our systematic study of play and games.

This first distinction between *play* and *games* can be further elaborated by looking into games as a space of communication. For Gregory Bateson (2006), play constitutes an act of *meta-communication*, a logical paradox in which signs enacted by participants communicate opposing meanings at the same time. For example, while playfully interacting, a sign that denotes aggression, along with communicating that an attack is taking place requires to clarify that the attack above is not real, but only simulated within the context of play. This sophisticated level of communication, while entirely necessary in non-structured play, is no longer required in organised systems like games, in which the presence of formal rules delimitate the space of play beyond ambiguity and subjective appreciation (Neitzel, 2008).

2.2.1.1 Play

According to the anthropologist Sutton-Smith (2005), the inherent difficulties in defining play originate from a series of factors, with its most relevant being the broad universe of cultural ideologies associated with the concept. In order to bring coherence to the field of play theory and to position it in its wider spectrum of cultural meanings, Sutton-Smith deconstructs literally hundreds of theories of play and compiles them in seven “*rhetorics*” aimed to “*express the ways play is placed in context within broader value systems*” (p. 303). Sutton-Smith distinguishes between the “*ancient*” ideologies of play, present in culture from a very early stage, and the “*modern*” rhetoric, which acquired significance only during the last 200 years. Central to this scholarship, is the understanding of the multiple roles of play in the development of the social individual. Instead of finding a universal definition, Sutton-Smith embraces the ambiguity of play and concentrates his efforts in systematising the multiple ways in which disciplines and cultures across times have conceptualised the notion.

In his famous work ‘*Homo Ludens*’, Dutch scholar Johan Huizinga (1949) also rejects the idea of confining the function of play to totalising definitions as for him “*play is a function of the living, but is not susceptible of exact definition either logically, biologically or aesthetically*” (p. 7). Instead, Huizinga describes the main characteristics of play, which he lists as freely accepted, separate from ordinary life, uncertain, unproductive, regulated and fictive. His complete statement describing the notion of play is reproduced here in full:

Summing up the characteristics of play we might call it a free activity standing quite consciously outside ‘ordinary’ life as being ‘not serious’, but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no

profit can be gained by it. It proceeds with its own proper boundaries of time and space according to fixed rules and in an orderly manner (Huizinga, 1949, p.13).

For Huizinga, one of the most important aspects of play resides on its separation from ordinary life, an idea that he conveys through the metaphor of the “*magic circle*” (a space defined by rules in which the functions of play acquire separate meanings from the real world). This idea proved to be very influential, becoming an important referent for subsequent scholarship on play and games, however, more recent studies called into question his modernist approach on defining play and, in particular, its interpretation as a space wholly and completely separated from ordinary life (Consalvo, 2009; Raessens, 2014). Although this line of criticism has led to a number of academic works, and even to entire conferences dedicated to challenging the notion of a strict division between play and other human aspects of life, for other authors this interpretation needs to be revised, as a thorough reading of Huizinga’s *Homo Ludens* shows that the idea of an absolute division between play and not-play was never implied in the author’s original writings (Zimmerman, 2012).

Further criticism has questioned Huizinga's definition regarding its effectiveness at separating playfulness from other human activities, not necessarily related to any ludic form of interaction (Egenfeldt-Nielsen, Smith, & Tosca, 2008), or to establishing the differences between the broad range of human activities and objects associated with play. In this sense, Huizinga’s definition can be expanded and complemented by the contributions of game scholar Roger Callois (1961). This author agrees with Huizinga in considering play as a separate activity from ordinary life but instead of merely describing it in general terms, he makes an effort to define the unique and irreducible characteristics of play in its infinite variety of manifestations. Following this rationale, Callois proposes a conceptual scheme (Fig. 2.1) in which play is divided into four categories: 1) *agon* (contest), standing for competitive games like football or chess, 2) *alea* (chance), games in which the outcome depends on chance, 3) *mimicry* (imitation), games of make-believe ranging from children’s symbolic play to various forms of re-enactment and 4) *ilinx* (vertigo), covering games in which the physiological perception of speed and movement is predominant. The scheme is completed by a continuum that traverses the mentioned categories, ranging from *paidia* (referring to systems not based on formal rules) to its opposite *ludus* (systems structured by formal rules).

	AGON (competition)	MIMICRY (simulation)	ALEA (chance)	ILINX (vertigo)
<p style="text-align: center;">PAIDIA</p> <p>Tumult Agitation Immoderate laughter</p> <p>Kite flying Solitaire Patience Crossword puzzles</p> <p style="text-align: center;">LUDUS</p>	<p>Racing, athletics, playing jazz</p> <p>Soccer, chess, sports tournament</p>	<p>Children imitations, masking and pretending to be someone else</p> <p>Theatre</p>	<p>Counting out rhymes, head and tales</p> <p>Lottery, roulette</p>	<p>Acrobatics, horseback riding, merry go round</p> <p>Mountain climbing, tightrope walking</p>

Figure 2.1: Callois' classification of games (1961).

With this scheme, Callois follows the steps of Sutton-Smith and Huizinga, acknowledging the diversity of play, and its resistance to be described in rigid terms, but moves the analysis forward by proposing a form for mapping any existing game according to its dominant play form. The usefulness of this scheme thus requires to be judged insofar the proposed categories reflect the multiplicity of games in their infinite variety and possible combinations. Considering the model from this perspective, some authors have criticised its weakness to fit games that present a combination of forms of play, or fall outside the boundaries imposed by the model's strict categories (Egenfeldt-Nielsen, Smith, & Tosca, 2008; Eskelinen, 2001). In spite of the fair criticism, Callois' model has proved to be a useful device to understand games in their multiplicity of manifestations.

2.2.1.2 Play and liminality

The division between play and ordinary life, in spite of not being defined in absolute terms by Huizinga, becomes useful as a way of building connections between play and similar social processes where the rules and structures of normal life are subverted. In this line of analysis, the links between play and Turner's (1969) concept of *liminality* become apparent. *Liminality* is defined by Turner as a state of mind "*betwixt and between*" (p. 95) where distinctions of rank, status or other social structures disappear or become homogenised. In this ambiguous period, an individual's identity is *rewritten*, in a process in which is "*reduced or ground down to a uniform condition to be fashioned anew and*

endowed with additional powers to enable them to cope with their new station in life” (Turner, 1969, p. 95).

Applied as a filter to understand other modern social phenomena, the concept of *liminality* or *liminoid* (as “like liminal”), acquires a special significance. Building on this idea, some authors argue that games constitute experimental spaces where personal identities and normal social structures are subverted, therefore can also function as liminal spaces (Squire & Barab, 2004a; Harvey, 2006). Through play, games can function as experimental spaces where players can take on new identities and observe the world from new critical standpoints. *“As such, liminal spaces are sites for learning; they are cultural spaces where identities may be formed and transformed”* (Squire & Barab, 2004a, p. 66–67).

2.2.1.3 Games

Although the intuitive recognition of what constitutes a game seems like a trivial task, the systematic identification of the common attributes of games, along with their separation from other aspects of the world has proven to be a difficult undertaking. In the traditional Aristotelian view, things can be grouped according to their sharing of common characteristics, which also come to be the aspects that define the category itself in which the elements are found. The problematic nature of constructing definitions following this method is exposed by philosopher Ludwig Wittgenstein (1953), who uses games as examples of things that, by not having all-encompassing common characteristics, can only be linked together by “*family resemblances*”. In truth, Wittgenstein does not seem to make a serious effort in finding those shared commonalities that he claims do not exist, but the fact that he chooses games as a central part of his argument, serves well our purpose of illustrating the inherent difficulty in defining the term.

Many definitions of games do exist, certainly more than is possible to analyse in this review, so I have decided to concentrate on the definitions provided by authors Salen & Zimmerman (2004) and Jesper Juul (2005). These two authors have been chosen because they both construct their definitions from the meta-analysis of contributions from several previous authors, which are meticulously deconstructed and analysed distilling their fundamental characteristics. In selecting these two authors, I have also purposely restricted the review to *essentialist* definitions (definitions centred on finding common attributes) leaving aside pragmatic versions that, although more or less useful as guides for game design, do not offer much help

in describing what constitutes a game, what is not, and what can be considered a borderline case.

In their notable book *'Rules of Play'*, Salen & Zimmerman (2004) propose this elegant definition of game: “*game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome*” (p. 80).

Firstly, this definition claims that games are systems, complex structures integrated with many interrelated components. Secondly, it stresses the presence of “*artificial conflict*” as an essential characteristic of games. In the authors' view, games always present a “*contest of powers*” that can assume many forms, but always remain separate in time and space from real life. Thirdly, Salen & Zimmerman regard formal rules as a defining component of games, which are later in the book defined as *fixed, shared, unambiguous, binding* and *repeatable*. Finally, the definition emphasises the numerical logic of games and its ability to determine unambiguous relationships between the players that participate in the contest.

Game scholar Jesper Juul (2005) concurs with the definition offered by Salen & Zimmerman in all its components and expands it by compiling the work of seven previous authors.² His definition, which he identifies as a “*classic game model*”, states that:

A game is a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels emotionally attached to the outcome, and the consequences of the activity are negotiable (Juul, 2005, p. 36).

Juul regards games as systems, commanded by rules, capable of establishing formal relationships between all the parts conforming the system (players, board, counters, etc.). This author agrees with Salen & Zimmerman in that, as a direct result of the players' interaction with the game systems, quantifiable and unambiguous outcomes are yielded. These results are determined by the players' performance, with positive outcomes, in general, being harder to obtain than negative ones. Players spend energy in influencing the outcome, leading to emotional attachment to the result. Finally, Juul claims that games can be optionally assigned real life consequences, which is an idea that in principle

² Juul constructed his definition from a systematic revision of the previous definitions of games proposed by Huizinga (1949), Callois (1961), Suits (1978), Avendon & Sutton-Smith (1981), Crawford (1984), Kelley (1988) and Salen & Zimmerman (2004).

opposes the concept of games as separate activities from the real world, as defined by Huizinga and Callois.³

2.2.2 Digital games

2.2.2.1 The properties of digital games

So far, we have examined the academic scholarship committed to the study of play and games, highlighting the differences between both concepts, and the ways in which they relate. This section builds on this work, focusing on the aspects of digital games. Are video games so different from their non-digital manifestations that we need to expand our review to examine this additional theoretical layer? For Galloway (2006) this distinction is necessary as in order “*to arrive at a definition of video games, [...] one must take Huizinga and Callois’s concept of play and view it as it is actually embedded inside algorithmic game machines*” (p. 21).

Indeed, many video games have been built as re-mediations of non-digital predecessors and thus the principles that apply to non-digital games are still valid in their digital versions. The algorithmic nature of video games however, forces us to look into the elements that makes them distinctive from non-digital media forms.

One of the main characteristics of digital games and what makes them different from other media is their capacity to represent aspects of reality both participatory and procedurally (Laurel, 1993; Murray, 1998; Salen & Zimmerman, 2004). While traditional media (i.e. printed media, radio, TV) are undoubtedly able to represent a situation of some sort, digital video games are the only medium with the capacity to dynamically generate multiple representations of a section of reality, making continuous adjustments in response to the player’s interaction. To a certain extent, it is possible to argue that any game, physical or digital, allows participation and relies on procedural structures, whether calculated by machines or by some sort of human agency. Digital games, however, are fundamentally distinct from their physical counterparts in that every representational outcome produced by the medium is procedurally generated. In performing these operations, computers not just perform all the mathematical calculations derived from player’s actions, but also render these effects on-screen in real-time and with an ever-increasing degree of fidelity. This new

³ As commented, the idea of the “*magic circle*” as a strict separation from ordinary life remains controversial. As Eric Zimmerman addresses in a blog post published on the site Gamasutra, this notion has led to a series of academic works challenging its validity, however, in his view, Huizinga’s writings have been misunderstood, and the strict division between games and life was never really stated in this terms by the author. For further information, see http://www.gamasutra.com/view/feature/6696/jerked_around_by_the_magic_circle_.php.

ability introduces two new unique representational properties: the power to navigate through computer generated worlds and to store and manipulate large amounts of information (Murray, 1998; Manovich, 2001).

For Murray, these new affordances can potentially revolutionise the way we tell stories, provided that a new generation of programmer-storytellers master the abilities needed to translate real world behaviours into procedural rules. The author's focus is on the expressive and representational capacities of digital technologies; a re-conceptualisation of the computer that follows the lead of the pioneering work of Brenda Laurel (1993) in connecting drama techniques with human-computer interaction. Both authors are enthusiastic about the narrative potential of interactive media, but, in their analysis, they both restrict their scope to the representational properties of games, overlooking what we could state as their primary purpose: the function of play.

Ultimately, the analysis of games focusing reductively on the narrative or representational properties misses what can be regarded as their most relevant characteristic: the capacity to simulate pivotal aspects of reality through numerical algorithms, open to intervention and interpretation through play. For the game scholar and designer Gonzalo Frasca (2003) "*video games are not just based on representation but on an alternative semiotical structure known as simulation*" (pp. 221-222). To simulate, for this author, is "*to model a (source) system through a different system which maintains to somebody some of the behaviours of the original system*" (p. 223).

In essence, the distinction between games and an external reality constitutes a strong argument to consider all forms of games as simulations (Salen & Zimmerman, 2004; Nitsche, 2008). Even abstract games like the popular '*Tetris*' (Pajitnov, 1984), which in appearance does not exhibit a strong connection to the real world, reflects an underlying reality encoded in mathematical constructs (Koster, 2004). Later, Ian Bogost (2006) defined simulation as the "*representation of a source system via a less complex system that informs the user's understanding of the source system in a subjective way*" (p. 98).

Both Frasca's and Bogost's definitions emphasise the simplified nature of simulations, as well as the inherent subjectivism of their interpretation. Both authors also coincide in their view of game simulations as a new expressive form, equipped with the power to communicate meanings that traditional narratives are unable to articulate. For the first time, a media form gives general access to the internal structures of systems, uncovering their constitutive components and complex

interrelations. This “*procedural literacy*” entails the capacity to read and write processes, uncovering the inner-workings of complex systems and structures. This new form of meaning-making, according to Bogost, holds the potential to reconfigure a player’s structures of knowledge, enabling them to solve problems beyond the world of the digital game. In other words “*we can become procedurally literate through play*” (Bogost, 2005, pp. 34-35).

2.2.2.2 Game models

The procedural nature of digital games introduces new layers of complexity into its representational and ludic components. As formally encoded algorithmic structures, games do not exist before they are enacted. Espen Aarseth (2003) writes that “*since a game is a process rather than an object, there can be no game without players playing*” (p. 2). Aarseth describes digital games as *cybertexts*, a new type of media that insofar requires a “*nontrivial effort*” (Aarseth, 1997, p. 1) to be decoded and cannot be studied using the same methodological toolbox used in previous media forms. To make sense of games, it is mandatory to pay close attention to the machine running behind the screen, and to build models able to describe in satisfactory terms the relationship established with its operator. This relationship unfolds in two separate, albeit interrelated levels of meaning: 1) a narrative world where players, by redefining their identities, are able to participate in its construction and 2) a formal system of encoded rules responsive to our actions and decisions. For Aarseth (2007) this dialectic defines game worlds as spaces where players simultaneously interact over three ontological layers: the *real*, *fictional* and *virtual*.

While certainly digital games can be designed to remediate older media such as written text, images or films, what sets them apart from all these forms is their ability to put us in front of objects that are not real (i.e. capable of displaying the exact behaviours that we would expect from them in the real world) nor fictional (as the relationship we establish with these objects goes beyond the pure interpretation of the signs by which they are constructed in our imagination). In between these two poles there is a new level of interaction: the *virtual*, where we are allowed to explore the causalities, effects and limits of the simulation in a way that is denied by previous fictional media.

With this three-part model, Aarseth makes an effort to conciliate two opposing factions in game studies: the group identified as *narratologists*, for whom games should

be seen as a new type of fictional media, and the *ludologists* who regard games as an entirely different kind, susceptible of being studied only through the description of their ludic components and relationships. In opposition to their mutual exclusivism, Aarseth argues that the debate has not been driven by a rigorous consideration of modern narrative theory but by a discussion that has remained at a meta-level, “*through comments on, and characterizations of, the debate itself rather than by direct engagement with it*” (2012, p. 1). In contrast to approaches that make a clear-cut between games and stories, Aarseth focuses on the elements that are ever-present and shared by both media forms, namely a world, objects, agents and events. In the scheme that follows, Aarseth applies the virtual-fictional dichotomy on each of these dimensions, studying how they vary in their configuration, from the fictional pole where limited or zero player agency grants the author control over the development of the story, and the virtual or ludic pole, where higher player participation produces emergent narrative outcomes at the expense of authorial direction.

Following the same intent sought by Aarseth of reconciling both fiction and ludic in a working model of digital games, game researcher Galloway (2006) proposed a different scheme that analyses digital games according to the relationship established within the computer and its operator – an interface that generates outcomes or *acts* (Galloway’s preferred terminology) – that can be seen to belong to the world of narrative action (*diegetic*), or have no discernible connection to it (*non-diegetic*). Using this initial sketch as a starting point, Galloway produces a scheme (Fig. 2.2) where every game becomes susceptible of being located in one of the four quadrants that result from the intersection between the machine-operator and diegetic-nondiegetic analytical axes.

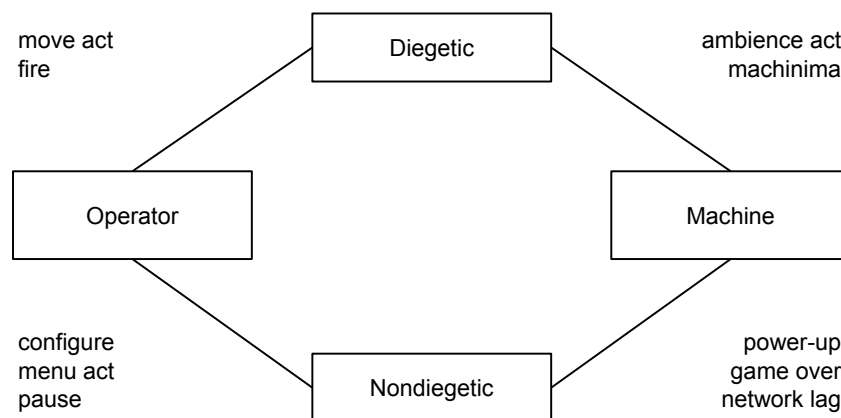


Figure 2.2: Galloway’s model of digital games (2006).

In the first quadrant, *diegetic machine* acts stand for the area where computer or game machine produces fictional elements without the player's intervention, such as cutscenes or non-interactive text. In the second quadrant, *non-diegetic operator* acts define the space of interaction between the player and the game system, with no relation to the fictional world (i.e. pausing the game or hacking the system to get an advantage not obtained by playing the game). The third quadrant defines the space of *diegetic operator* acts where players interact with the world of fiction either by moving around in the virtual world or by expressive acts such as clicking, selecting or shooting. Finally, the fourth quadrant of *non-diegetic machine acts*, regarded by Galloway as "*the most interesting category*" (p. 28), defines a space of power-ups, goals, high-scores, software crashes and temporary freezes, among other software elements and occurrences produced by the machine with no relation to the narrative world.

Galloway's model serves as a good illustration of the additional layers of complexity introduced by the algorithmic nature of digital game worlds. A close examination of the complex interfacing between player and computer code provided by the model, makes a strong argument for the need to study games, not just as mere *electronic* extensions of physical games, but as a different mode of interaction, with layers of complexity that cannot be explained using conventional theories of play nor fit into the narrative space of the game. As Galloway puts it there are "*many significant aspects of gaming that happen completely outside play proper (e.g. the setup act) or are not part of a traditional narrative (e.g. machinic embodiments)*" (p. 37).

Despite its manifested usefulness, and the simplification of every modelling of a complex phenomenon, I think Galloway's model, in terms of the strict separation between machine and operator that it seems to suggest, can be subjected to further questioning. In this regard, it can be argued that any expressive acts in the fictional world (i.e. navigation, combat and so on) require the intervention of both the operator *and* the machine, blurring in many instances the well-defined distinction between both sides of the interface. In this sense, this model would probably benefit from a more precise description of the participation and amalgamation of both machine and operator in-game acts, but this by no means renders it less relevant. In highlighting the presence of the machine, Galloway introduces a layer of analysis not fully covered by Aarseth: the presence of game elements, actions and occurrences that, even though are not related to the fictional-virtual game world, still play a key role in the gaming experience.

Game scholar Nitsche (2008) proposes a model that can be seen as expanding the interfaces studied by Aarseth and Galloway, and incorporates analytical dimensions not explored by these two authors. The resulting scheme dissects the game experience into five analytical planes: a) a *rule-based space* defined by the mathematical models and calculations required to set up all the “engines” (e.g. physics, AI, sounds, progression and so on) running inside the computer b) a *mediated space* where all the cybernetic operations, along with cinematic and interface components are rendered in the image plane of the screen c) a *fictional space* where the player constructs an imagined representation of an alternate reality d) a *play space* where meaning arises from the player’s interaction with the simulation through game hardware and finally e) a *social space*, formed by the relationship established with other players interacting synchronically or a-synchronically with the simulation.

Despite analysing digital games from different angles all the models that were reviewed share commonalities. First, we can find similarities between all the models on the emphasis they make on the algorithmic nature of digital games, along with the extra layers of complexity brought by this dimension. Second, all the models give importance, and in some cases precedence, to the *game world*, a shared but not entirely akin representation constructed between the machine and its operator. Third, it is possible to infer from the multiple zones, spaces or interfaces schematised in the visited game models, that meanings in games are not passively assimilated, but actively negotiated, in a process where the player’s identities are constantly shifting, reflecting the at times simultaneous interaction with multiple spaces. In this regard, it is useful to connect the presented models with the model of player’s levels of consciousness introduced by Fine (1983). According to this author, a player can be seen simultaneously assuming three different identities: that of a *person* with their eyes fixed on the screen and their hands on the input gaming device; a *character*, not only manipulating the strings of his or her electronic character, but inhabiting the fictional character’s goals and motivations and finally, a *player* interfacing with a simulation where their actions and decisions are governed by a complex set of rules and constraints.

2.2.3 Motivation and Fun

One of the foremost characteristics of digital games is their ability to motivate and engage players (Felicia, 2009). In many cases, the engagement with games results in countless hours and a significant amount of effort spent in an activity that does not

give back in return anything apart from the playing experience. Games, in this sense, seem to uphold Huizinga's idea of the "*magic circle*", a metaphor used by this author to describe human pursuits that operate according to different rules than those regulating ordinary life (Salen-Zimmerman, 2004).

In contrast to most of the things we do in everyday life, games are played for no other reason than the enjoyment they provide and as such become primary examples of *intrinsically motivating environments*, defined by Malone and Lepper (1987) as spaces where time and effort is spent on actions for their own sake, rather than in exchange of some external reward or as a means to avoid some sort of punishment. What makes games intrinsically motivating? For Malone and Lepper, the intrinsic appeal of games can be explained by a taxonomy of four psychological engagements: *challenge*, *curiosity*, *control* and *fantasy*. In this model, *challenge* occurs when the activity is driven by goals whose outcome remains uncertain and which depend on the participant's performance to be achieved. The attainment of the goals involves somehow the participant's self-esteem, and while striving to complete them, the activity also provides an adequate level of performance feedback. Second, *curiosity* arises when the activity introduces variations and changes in the sensory stimulus present in the environment (attracting the participant's attention) and/or when is capable of evoking the prospect of modifying his or her cognitive structures, driving him or her to see or understand the world in a different way. Third, an activity offers *control* when is designed to provide a range of possible outcomes, where the probability of the outcome is dependent on the actions and decisions taken by the individual. And finally, *fantasy* is provided when the activity "*evokes mental images or physical and social situations not actually present*" (Malone & Lepper, 1987, p. 240).

Game designers and scholars Hunicke, LeBlanc & Zubek (2004) proposed a different model composed of eight categories or "*aesthetics*" of play. This model, intended to overcome the ambiguity of the terms *fun* and *gameplay* as a means to explain what makes games appealing, overlaps and extends Malone and Lepper's taxonomy, adding some dimensions not previously recognised. In Hunicke et al. taxonomy, people engage in playing games seeking one or more of the following experiences: 1) *sensation*, games as sense pleasure, 2) *fantasy*, game as make-believe, 3) *narrative*, game as drama, 4) *challenge*, game as obstacle course, 5) *fellowship*, game as social framework, 6) *discovery*, game as uncharted territory, 7) *expression*, game as self-discovery and 8) *submission*, game as pastime. With this taxonomy Hunicke et al.

attempts to build a more direct vocabulary to describe the appeal that different games evoke to different players, or to the same player at different times.

It can be argued that Malone and Lepper's (1987) and Hunicke et al. (2004) approaches, in their attempt to understand motivation and fun by enlisting their components, follow the steps of Callois' categories of play (*agon*, *mimicry*, *alea* and *ilinx*), discussed earlier in this literature review. The comparative examination of the three models promptly reveals their common points but, arguably, still cannot bring a more unified explanation of *fun* – the intrinsic appeal that we find in every instance of play, independently of its components or aesthetics. Such an approach, or the closest explanation of fun in more abstract terms, can be found in the theory of *flow* proposed by the psychologist Mihaly Csiksgentmihalyi (1990). Briefly, *flow* describes the subjective experience not just occurring in games but also in many other activities, where the right balance between the challenge the activity poses and the skill the participant has results in a heightened sense of achievement and a feeling of being in control – a state of mind that Csikszentmihalyi defines as “*optimal experience*”.⁴ While in this state, the participant becomes deeply absorbed and completely focused on the task at hand, losing the normal perception of time and “*becoming subservient to the greater whole of the experience*” (Salen and Zimmerman, 2004, p. 9–10).

Theoretically, flow could be used as a framework to model the functioning of motivation in games but, as Juul (2005) suggests, there are multiple instances of games experiences that seem to contradict this theoretical construct. As an example, Juul cites Myers' (1992) observation of the fascination that certain players have in performing repetitive and seemingly unchallenging tasks and the fact that most games actually alternate intense challenge with moments that do not offer any challenge at all, which nevertheless play an integral part on the overall appeal of the game. In acknowledging these discrepancies, however, Juul is clear that his intention is not to deny the challenge-skill relationship as a key component of the playing experience, but to point out that “*challenge can range widely, and that the way they are created, their difficulty, and the order in which they are presented to the player all contribute to the player's subjective experiences and enjoyment of different games*” (Juul, 2005, p. 113).

⁴ The game designer Jenova Chen has built a series of games taking the principles of flow as guides for constructing the player experience. His game ‘Journey’ (Chen, 2012) is a good example of flow theory applied to game design.

2.2.4 Serious Games and Game-Based Learning

The *serious games* industries are a fast growing business. According to a report from the Allied Market Research (2017), this economic sector is expected to grow from \$2,731 in 2016 to \$9,167 by 2023. The educational applications of serious games cover many different sectors, including but not restricted to the military, healthcare, corporate, educational and government. This market growth gives evidence of an industry that has successfully capitalised on the public's interest and economic success of the games industry, for purposes beyond pure entertainment. This section of the literature review discusses the concept of serious games, the multiple ways in which the term has been defined and its connections to related concepts such as simulations and game-based learning.

The term *serious games* is credited to Clark Abt (1987). The term rapidly became established in academic circles, in spite of the misleading and contradictory coupling of the words *serious* and *game* (Egenfeldt-Nielsen, Smith, & Tosca, 2008). In general, the term serious games is used to denote games built with goals beyond entertainment, although some authors make strong associations between this concept and game-based learning (the production and implementation of games in educational settings) (Michael & Chen, 2006; Sorensen & Meyer 2007).

According to Martens, Diener, & Malo (2008) the existence of educational goals is not a sufficient condition for a game to be considered *game-based training* (their preferred terminology for serious games). Martens et al. propose a scheme that positions game-based training in the intersection between games, simulations and learning – all dimensions that require to be present in almost equal measures. The model is certainly useful to conceptualise serious games but its strict separation makes it prone to criticism. Indeed, we have already seen how other authors consider all types of games as simulations, which makes it difficult to establish a strict division between games with or without simulational components.

Likewise, the distinction between games with and without a learning component is equally problematic. For many authors, games are learning artefacts per se, as learning is always present as an intrinsic part of playing a game (Juul, 2005; Koster, 2004; Ritterfeld & Weber, 2006). To progress, players need to master the game's systems of interaction and apply hard-gained knowledge and skills to overcome the challenges it presents. By doing so, players engage in forms of interactions that incorporate good learning principles, supported by research in cognitive science (Gee,

2004). This assumption, however, is challenged by other authors such as Clark Aldrich (2009) who writes that:

[A] game is not an educational simulation. Playing SimCity will not make someone a better mayor. Some players of, for instance, World of Warcraft may learn deep, transferable, even measurable leadership skills but not all players will. The game does not provide a structure for ensuring learning. Just because some players learn these skills playing the game, that does not mean either that most players are also learning these skills or that it should be adopted in a leadership development program (pp. 2-3).

In a similar tone, Van Eck (2006) warns about the danger of making totalising statements about the educational potential of video games:

If we continue to preach that only games can be effective, we run the risk of creating the impression that all games are good for all learners and all learning outcomes, which is categorically not the case (p. 2).

Crucial to the development of serious games, along with their effective application in formal educational contexts, is the expert understanding of cognitive science and game design theory, as knowledge from both fields should be solidly integrated across all the development processes. Nevertheless, a review of serious game projects/studies during the last decade reveals the difficulties and failures in establishing this multidisciplinary dialogue. Many educational titles have been harshly criticised for taking the worst from both game design and education, resulting in dull games with little educational value (Van Eck, 2006; Prensky, 2001; Papert, 1988; Kee, Graham, Dunae, Lutz, Large, Blondeau & Clare, 2009). The key to developing games capable of engaging students in meaningful learning experiences resides in generating good synergies between pedagogical models and the best theories of engagement and game design, something that can only be achieved by bringing together the expertise of game designers, experts in the particular subject area and educational theorists (Kee et al., 2009). Ultimately, the implementation of game-type technologies cannot be reductively understood as an add-on to an established coursework; it must be led by a fundamental reconsideration of disciplinary content knowledge and pedagogy so as to develop a coherent educational framework that recognises how teaching and learning can be changed as a result of “*technological affordances*” (Lévesque, 2008, p. 26).

2.2.5 Pedagogical approaches in Serious Games

Arguably, any systematic approach to the pedagogical study of serious games requires to be grounded in learning theory and to explore its connections with game design. Unfortunately, the task presents a fair deal of complexity, given that there is no uniform pedagogy applied to serious or educational games (Ulrich, 2010, p. 5).

Rather, different theoretical approaches have been used over time, with earlier games following a behaviourist learning model. BinSubaih et al. (2009) identify three generations of educational games defined according to their underlying pedagogical models: behaviourism, cognitivism and multiple models. According to Egenfeldt-Nielsen, Smith, & Tosca, 2008 (2008) and Bogost (2010) the pedagogical approaches more commonly applied to serious games can be grouped in three educational paradigms: *behaviourism*, *constructivism* and *constructionism*. Each one of these models will be examined in more detail.

Behaviourism derives from the work of Pavlov, Thorndike, Watson and Skinner and is regarded as one of the most influential theories in instructional design. As its name implies, the focus of this theory is the observable behaviour of individuals and the means by which it can be modelled and controlled. Learning, from a behavioural perspective, is conceptualised as the “*process of forming connections between stimuli and responses*” (Bransford, Brown & Cocking, 1999, p. 6), which is susceptible to be modelled by coupling the necessity of satisfying internal needs such as hunger with external forces such as rewards or punishments. This approach can be recognised in a vast amount of games released to the public under the label of *edutainment*, defined loosely as “*any electronic game that uses entertainment in the service of education*” (Egenfeldt-Nielsen, Smith, & Tosca, 2008, p. 233). Following closely the principles of the behaviourist approach, this kind of game commonly focuses on the development of a particular area or skill through repetitive actions, which are reinforced mostly through external motivational systems. Although this approach proved to be effective in domains that require repetitive training and skill-and-drill practice, it received a fair amount of criticism for its simplistic game mechanics, lack of integration between learning experience and gameplay, little intrinsic motivation and complete disintegration of teachers or tutors from the learning process (Egenfeldt-Nielsen, Smith, & Tosca, 2008; Bogost, 2010). In the context of historical education, behaviourism has received even further criticism for its lack of consideration of the learner’s historical preconceptions and their role in processing new historical information. In this respect, Wineburg (2000) argues that:

[t]he images students carry with them come from places quite distant from the classroom – from the media, from popular culture, from the church and the home. Rather than lamenting the inaccuracy of those images [...], we might ask how these images come to be formed in the first place and why they, rather than the content from school courses, become lodged in the national consciousness (p. 307)

During the decade of 1950's attention shifted from the sole observation of behaviour to the study of the mental processes that govern human understanding and sense making. This change was propelled by a growing criticism of the behaviourist methods and assumptions, and the development of new experimental tools and methodologies that allowed scientists to study the human mind in ways that were unimaginable in previous decades (Gardner, 2011). The combined multidisciplinary efforts to understand human thinking and understanding raised a new discipline: cognitive science, which made it possible to test theories empirically, instead of just relying on speculative assumptions about thinking and learning.

Constructivism develops from the advances of this new science of learning and its focus on the process of knowing. Humans are viewed as agents who actively seek information and *construct* their knowledge from the direct interaction with their environment. As opposed to behaviourism, where learners are considered blank slates, constructivism emphasises the role of previous knowledge, skills and beliefs in the interpretation and organisation of the information from the world. Jean Piaget (1936), one of the most important contributors to this school, introduces the concept of *cognitive disequilibrium*, to explain the mechanisms by which new information is acquired and organised in previous mental schemes. According to Piaget, the learner's encountering of novel information is interfaced by two complementary processes: *assimilation* (an attempt to fit the piece of new data into previous structures of knowledge) and *accommodation* (a process where learners modify their previous models to situate pieces of information that cannot be located otherwise).

From a Piagetian perspective, games embody the processes of cognitive disequilibrium and resolution (Van Eck, 2006). Well-designed games constantly challenge what players already know or have mastered by introducing cognitive disequilibrium while creating the conditions that allow them to modify previous structures without exceeding their capacity to succeed. This continuous cycle of unbalance and resolution (via assimilation or accommodation) can be considered as one of the primary factors that make games succeed as engaging and effective learning environments.

Constructionism, a model developed by the mathematician, computer scientist and educational theorist Seymour Papert (1987, 1993), can be seen as a distinct constructivist approach emerging from the study of the possibilities that new technologies – in particular computers – bring to education. In this approach, the process of formation or modification of new structures of knowledge is designed to

occur in particular contexts, identified by Papert as *microworlds*. In these contexts, where a small slice of reality is implemented through procedural technologies, learners are encouraged to explore and play with a high degree of freedom, gradually accessing higher levels of abstraction in their understanding of the world.

Papert's microworlds have been successfully applied in a myriad of educational projects in science and mathematics, but concerns have been raised about their educational appropriateness in social sciences and humanities (Corbeil & Laveault, 2008). In this respect, game designer and scholar Gonzalo Frasca (2007) highlights the limitations of the approach as a means to raise critical awareness in social or human matters, where disciplinary knowledge appears ill-structured and difficult or impossible to reduce to numerical functions. As an alternative, Frasca suggests looking into the theatrical techniques developed by Boal (2000), a form of theatre that implements simulations in order to explore social or political problems. In this form of theatre, the spectator is encouraged to interact with other participants, losing the critical distance that characterise Aristotelian poetics. According to Frasca, by engaging audiences in this form of participatory simulation, the medium becomes a powerful method to challenge previous ideological assumptions about the world.

Games are not just procedural quantitative systems but also environments for the social enactment of roles, passion and drama, yet they have much to learn from non-digital role-playing games used for decades in many high-school level subject areas. Drawing from these experiences and decades of teaching in history classrooms, educator Mark Carnes (2004, 2011) developed a methodology named '*Reacting to the past*', where theatre techniques and gaming elements are combined to create environments where students *play* using core academic skills such as reading, interpreting evidence, academic writing and debating. The connection with Boal's theatre becomes evident when reviewing descriptions of how *reacting* works:

Imagine being in a play with no director, no script, and no set conclusion – instead the cast confronts historical scenes and settings that involve intricate but conflicting ideas and goals. These conflicts have to be navigated by the actors, each pursuing their own objectives and agenda. The actors aim not to influence the emotions and views of an audience, but the actions and beliefs of other actors. Imagine further that this “play” is performed with the pretence that it is not a play, but an epic historical conflict with huge stakes for all participants – and an entirely uncertain outcome. Among the cast there are few or no members with acting experience; some initially profess a dread of public speaking (Higbee, 2009, p.48)

The results obtained by implementing the reacting method, as reported by a considerable number of teachers and academics, are impressive. In most cases, after

an initial period of hesitation, participants become strongly attached with the “*victory objectives*”, investing much more time and effort than in traditional academic units. Drawing from these experiences, reacting gives a strong support to the idea of establishing good synergies between drama and game-type interactions as a means to teach humanistic subjects.

While all the reviewed academic works on educational gaming so far have concentrated on the value of students playing games, the more unconventional approach of learners *making games* has been suggested by the scholar Yasmin Kafai (2006). Adopting Papert’s constructionist stance, this author does not dismiss the educational value of playing games – which she identifies under the instructional label – but centres the attention on games design and development as learning contexts where students are provided with multiple opportunities to build new relationships with knowledge. Recognisably, games are complex artefacts to build, but recent advances in development frameworks and tools have considerably lowered the technological barriers necessary to build functional games. While adapting knowledge from a subject area into the form of a game, students have to find the way to translate ideas into mathematical models, making them accessible through gameplay. Central to this process is the need to frame it within “*communities of practices*” (Wenger, 1998) where students are able to share their work with other students, who can play, give feedback and also *mod* the game, correcting its internal models, extending functionality or tweaking gameplay.

2.2.6 Summary of the literature about play, games and serious games

In the last sections, the academic literature on play, games and serious gaming was reviewed. This revision has been purposely general in scope, serving as an introduction to the more specific topics that will be examined in the following sections. As the examination of the literature revealed, games are complex cultural artefacts, which resist being straightforwardly encapsulated in overarching definitions. Moreover, the added layer of complexity of using them with educational or “*serious*” intent makes them even more complex to conceptualise. The conceptual understanding of play, games and serious gaming is a necessary requisite to explore digital games as medium for the representation of history (research aim 1) and fostering its understanding in educational settings (research aim 2), so, consequently, this general review has been deemed justified.

As this project moves to the next research stages, these consulted academic works will play a critical role in evaluating and guiding the creative practical engagement with research's aims and questions. Two perspectives are deemed of especial significance in this effort. First, the conceptual understanding of the expressive properties of digital games (Galloway, 2006; Salen & Zimmerman, 2004; Frasca, 2003; Nitsche, 2008; Aarseth, 1997, 2007; Galloway, 2006; Malone & Lepper, 1987; Hunnicke, LeBlanc & Zubek, 2004; Juul, 2005), and, second, the educational potential of the player's interaction with historical game-worlds through the embodiment of an avatar (Papert, 1987, 1993; Van Eck, 2006; Carnes, 2004, 2011; Murray, 1998; Bogost, 2006). As discussed, the possibility of becoming a virtual other in the "liminal" space of a reconstructed past reality can potentially lead to truly transformational experiences (Turner, 1969; Squire & Barab, 2004a). This lines of inquiry will continue to be investigated in the next stages of practical and theoretical development, in connection with the revised perspectives on player identities (Fine, 1983) and on games as dramatic engagements (Frasca, 2007; Boal, 2000; Carnes, 2004, 2011).

2.3 Representing History through Digital Games

2.3.1 Postmodernism and the *ludic turn* of history

The beginning of history as a modern professional discipline can be traced back to the nineteenth century, a point in time when the notorious German philologist Leopold Von Ranke established its chief epistemological and methodological foundations. Following the ideal of presenting the past "*as it actually happened*" (*wie es eigentlich gewesen*), Von Ranke delineated the methods that established history as a separate discipline, influencing generations of historians to this day. In general terms, the *Rankean method* established that the objective scrutiny of facts empowered historians to attain historical truth, overcoming the problems of bias, subjective interpretations, and the use and abuse of stylistic ornamentation in historical writing (Carr & Davies, 1961).

Arguably, nothing challenged the scientific version of history, established by Von Ranke and continued by his many followers, more than the arrival of postmodern theory in the 1980s. As famously Lyotard (1984) defined it, postmodernism presents itself as "*an incredulity toward meta-narratives*"—the sudden collapse of the whole of all-encompassing worldviews that "*anticipate all questions and provide all answers*" (Rosenau, 1991, p. 6). The arrival of postmodernism marked the beginning of heated debates on the nature of history, prompted by a profound scepticism about its empirical-

analytical methods as valid means to reach an objective version of the past. In its more moderate forms, postmodernist proponents called for a relativisation and re-invention of the discipline, while the most radically positioned called for its relegation “*to a peripheral role in the larger scope of human affairs*” (p. 63).

Henry Jenkins (1991), one of the most noted postmodern historians, argues that in order to understand the nature of history it is mandatory to look carefully into its epistemological, methodological, ideological and practical constituents, and to examine rigorously the effects of the historian’s values, positions and ideological perspectives on their final accounts. For Jenkins, the analysis of history as a form of knowledge shows that the gap between the past and the historian’s work is an ontological one; one that cannot be bridged regardless of the multiple methodologies that have been devised to overcome the problem of personal interpretation and bias. History thus must be regarded as an ideological construct, continually re-ordered and reworked following the pressures of antagonistic groups of power. In Jenkins’ words history is “*a contested discourse, an embattled terrain wherein people(s), classes and groups autobiographically construct interpretations of the past to please themselves*” (p. 23).

For the British historian Alan Munslow (1997) history can be defined as the “*narrative interpretation and explanation of human agency and intention*” (p. 4), a definition that regards all works of history primarily as literary texts, not different from other works of literature. This *linguistic turn* makes explicit the historians’ dependency on the traditions and conventions of textual representations that we have gradually developed into sophisticated forms to tell stories, but which cannot be considered in any way an inherent part of the past itself. In the same line of thought, Hayden White (1979) writes that historical narratives should be regarded as what they manifestly are: verbal fictions, “*the content of which are as much invented as found*” (p. 82). According to White, historians do not restrict themselves to only narrate the past, like adopting “*a perspective that looks out on the world and reports it*”, but rather they *narrativise* the selected traces from the past, giving them a structure and “*an order of meaning that they do not possess as mere sequence*” (p. 5).

For Stéphane Lévesque (2014), the narrativisation of events gives a structure to the past that it does not possess in its original form, but this does not make narratives devoid of any value in historical terms. For this author, “*narrative and objectivity are not in principle opposed*” (p. 8). Even though different historians may differ on their interpretations of events, ultimately there is a historical reality, and not just

mere fictions, to access from the scrutiny of the multiple accounts. Lévesque identifies this as the *polythetic* version of history, a form of understanding instead of a passive reading, requires the use of “*historical thinking*” skills, a “*particular way of thinking about historical reality beyond the common use of memory*” (p. 9).

According to William Uricchio (2005), an interesting coincidence seems to be that the postmodern “*crisis in representation*” (p. 332) appeared at roughly the same time as the advent of computer technologies, a revolution with more impact and reach than any previous in media history. For this author, procedural technologies, in particular computer games with their forms of interaction based on free exploration and play, appear as potential proponents to fulfil the demands for more reflexivity and subjectivity implicit in the linguistic turn, and to overcome the limitations of traditional linear media for historical representation. In his analysis, Uricchio stresses the need to look at digital games beyond their capacity for historical documentation and representation, for which the dynamic generative nature of games does not seem to adapt well. Even though digital games can emulate the capabilities of traditional media, their potential lies in their power to produce alternative outcomes as a result of the explorative interaction between players and procedural game systems.

By noting commercial game titles as points of reference, Uricchio defines two historical game genres with separate epistemological goals: (1 *event games*, centred in the simulation of particular events and (2 *process-oriented games*, built around a more abstract replication of historical processes. Event games attempt to “*maximise historical accuracy, allowing the setting, conditions, and period details to constrain and shape gameplay*” (p. 328). As iconic examples of this type of games, Uricchio presents wargames, a particular genre that tends to show a high degree of fidelity in the simulation of historical conflicts. On the other side of the spectrum, process-oriented games (identified with games such as the successful ‘*Civilization*’ (Meier & Shelley, 1991)), also allow players to engage speculatively with the past, but instead of focusing on authenticity, are built on “*particular visions of longterm historical development*” (p. 328), generating narratives not necessarily attached to specific referents.

Even though this differentiation allows to create a general scheme with two different historical game types, it is hard to apply it to a more systematic analysis of historical games in all their multiplicity. Industry-based genres are simply too volatile to be used productively for understanding the differences between games dealing with the problem of representing the past. In this respect, a better approach results from

looking into the internal constituent patterns and mechanics that form games, an approach recently mentioned by Juul (2014) as a better way to determine similarities and differences between existent games and to classify them accordingly. This approach would most certainly offer a better standpoint to understand how games as systems relate to specific historical epistemologies.

At its core, the argument that Uricchio presents in support of the *ludic turn* in history is that games, whether focussed on the accurate recreation of historical events or the simulation of macro-scale processes, present a viable and potentially revolutionary way for historical engagement by incorporating the multiple critiques that postmodern thought brought into the discipline. While various authors have noted the unsuitability of games to convey the meanings of *fixed* authoritative historical narratives (Galloway, 2006; Champion, 2008b), on the other hand the medium seems to provide an ideal platform for the study of history as a highly subjective and interpretive field, in fact it could be the perfect medium for the counterfactual historical genre developed by historians Niall Ferguson (2011) and Andrew Roberts (2010). This approach, although still not fully recognised by traditional historians, is gradually gaining acceptance as a means to achieve a better understanding of the contextual forces of causation surrounding historical events. As Sabin (2012) points out, “*one cannot ask why an event happened and whether it was bound to do so... without admitting the possibility that it might not have occurred*” (p. 15). The emphasis on game simulations as devices for counterfactual speculation does not just restrict the production of hypothetical outcomes, which have limited value, but also allows for the explorative construction of historical process, a form of understanding for which games appear to have considerable advantages when compared to traditional linear media. This last argument is supported by Jenkins (2003) who analyses Tolstoy’s ‘*War and Peace*’, as an example of counterfactual writing. In this work, Tolstoy explores alternative endings to Napoleon’s disastrous Russian campaign, but as they are developed in the context of a novel become “*dead weight*”(n.p.) yet outlines ideas which could have been easily communicated in the form of a game.

2.3.2 Authenticity

Computer technology, following the exponential increase in rendering ability, has progressed to a state in which it is challenging to distinguish, even for an expert eye, what is real from what is not. Characters, buildings and spaces from the past now can be reconstructed with a high and ever increasing degree of fidelity, and it is not

difficult to imagine a moment in which virtual representations will be completely indistinguishable from the world around. Photographic realism, although commonly considered a measure of success in virtual representation, has also raised significant concerns as it quickly becomes equated with authenticity of representation, potentially leading to widespread misleading assumptions about the past (Roussou, 2008, p. 268). Along with the increase of realism comes the responsibility to inform the public about the design decisions and *creative licences* involved in generating the models.

Because 3D models convey a strong sense of realism no matter how complete the data on which they are based, scholars working with and presenting these virtual reconstructions should include descriptions of the underlying archaeology and the interpretative leaps that had to be made to build the model (Kantner, 2000, p. 49).

While the virtual reconstruction of the physical traces of the past raises concerns, the presentation of past events using procedural technology seems equally problematic. To a large extent, the discussion over authenticity in games is led by the comparison between this medium and more traditional media forms (e.g. academic literature), in terms of the ways in which each medium deals with factual fidelity. This line of criticism can be followed in Galloway's (2006) argument that the modelling of history, even using the most sophisticated algorithms, can only be considered a "*reductive exercise of capture and transcoding*" (p. 103). By analysing the game '*Civilization*' (Meier & Shelley, 1991), Galloway concludes that:

[...] the more one begins to think that Civilization is about a certain ideological interpretation of history (neoconservative, reactionary, or what have you), or even that it creates a computer-generated "history effect," the more one realizes that it is about the absence of history altogether, or rather, the transcoding of history into specific mathematical models. (Galloway, 2006, p. 102-3)

For Chapman (2013b), Galloway's argument appears fundamentally flawed, as the limitations of game algorithms "*are clearly made in comparison to something he considers 'more history', likely academic literature*" (p. 321) and in fact "*algorithm (as games) can be history*" (p. 315). Chapman summarises his counter-argument to Galloway in the following quote:

Far from being a destructive process of eradicating the "truth" of the past (which is, most likely, irretrievable anyway), the production of a videogame-based history (like any history) is a creative process, as meaning is produced even whilst a duty of care is given to the referential nature of the evidence. When Meier built Civilization he didn't erase or ignore the meaning of the past; like all the historians before him, he constituted it (p. 315).

In his view of historiography as a “*creative process*”, Chapman’s argument can be aligned with Rosenstone’s (2006) analysis of films, a medium from which video games have inherited much of their narrative conventions. For Rosenstone, the “*rules of engagement*” of historical films are fundamentally different from written historical narratives. Typically, each scene of a historical film is carefully constructed to convey layers of meaning that most of the times go beyond the mere retelling of past events. In historical films, the past is not just presented – a process that according to theorists always implies a certain degree of selection and interpretation – but also invented by “*making up traces of the past which are then highlighted as important and worthy of inclusion*” (p. 8). The power of this medium, as Rosenstone explains, resides in its abilities to communicate ideas not just literally but also “*poetically and metaphorically*”.

The argument presented by Rosenstone is that the level of historic-ness of each form of media should be analysed according to its particular affordances and limitations and by avoiding to centre the analysis merely on their degree of literality to factual information. In a same line of thought, Salvatti & Bullinger (2013) elaborate over the concept of “*selective authenticity*”, defined as a “*form of narrative license, in which an interactive experience with the past blends historical representation with generic conventions and audiences expectations*” (p. 154). In contrast to accounts offered in historical written texts, which are often judged according to their strict adherence to factual historical data, in games the narrative elements serve multiple purposes, with the support of play dynamics being, arguably, its most important function. The primary concern of games thus, is the creation of feel and experience rather than being abide to strict factual fidelity. This view can also be applied to the comparison between games and data-driven historical simulations. Although the distinctions between the two forms of representation often blur and they both certainly share many defining characteristics, games should not be seen as gamified interfaces to interact with scientific models. Nitsche (2008) writes that:

Unlike the data-driven scientific simulation models, which aim to deliver reliable findings, accurate training conditions, and highly elaborate answers to very specific scientific problems, games are centered on the dramatic experience. They do not provide new knowledge through the execution of their code but instead present engaging questions. The necessary dramatization leads to a different kind of product that concentrates not on the data, but on the player. (p.9)

From this point of view, the critique of games as an *inauthentic* and hence an inappropriate form of historical representation needs to be revised. Clearly, digital

and physical games may be a poor choice for a historical engagement where all that matters is to *bring the story right* but this reductive judgement completely weakens the value and affordances of games as historical media, manifested in their capacity to bring experiences that are not available in any other form of media.

2.3.3 Space

A closer look into the history of video games reveals how the medium has evolved predominantly due to the increasing sophistication in spatial representation. For Wolf (2001), this evolution can be seen as a progressive series of innovations that parallel the development of space in cinema. From the first experiments in computing science that allowed a small spaceship to be controlled in a small two-dimensional screen,⁵ games have moved at a fast pace to the rendering of highly realistic environments constructed with a painstaking level of detail. Realism became one of the major selling points for new games introduced into the market, pushing the computing industry to develop machines with the capacity required to render millions of polygons of hi-res detail.

Looking at this advancement in spatial representation, it is easy to become seduced by the beauty and perceptual richness of these virtual environments and become convinced that the ultimate goal of the medium is the complete mimesis in representation. Furthermore, as the environments turn more and more realistic, the natural expectation is to extend realism to the interactive affordances of the medium. The landscape does not only have to look real but it has to trick the senses by immersing the user in the perfect replication of the *Holodeck* (the fictional system from the television series *StarTrek*) borrowed by Janet Murray (1998) to imagine the new narrative possibilities of computer generated environments. Although appealing, the problems of conceptualising digital technologies in this manner, in particular video games, has been noted by several authors and has led to long-standing debates about the appropriateness of the metaphor of immersion and the definition of the narrative capacity of the medium as its defining property. Ultimately, the relationship between the player and the game world is mediated by play, a characteristic that “*makes [games spaces] allegorical: they are figurative comments on the ultimate impossibility of representing real space*” (Aarseth, 2001, p.169).

⁵ I am referring here to the video game ‘*Computer Space*’ (Bushnell & Dabne, 1971), credited to be the first video game ever released to the public. In this video game players had to control a spaceship flying missiles to flying saucers. The technology behind the game was very primitive; the machines operating it had no micro-processors or modern architecture, and was made of only 74 logic circuits using diode arrays as memory.

2.3.3.1 The production of space

The conceptualisation of game spaces is far more complex than the mere translation of real space into virtual form. This necessarily leads us to look for more sophisticated theoretical approaches to the understanding of how users perceive, navigate and make sense of historically reconstructed game worlds. Henri Lefebvre's (1991) theory of space offers a good point of departure in this undertaking. For Lefebvre, space is a social product, a dimension that does not exist *in itself* as a separate objective reality. Space is never finished or *complete*. Rather, this dimension is constantly being constructed and reconstructed from the social interactions and everyday practices of people living in it.

To gain a better understanding of how this process works Lefebvre proposed a dialectical model composed of three parts: *spatial practice*, *representations of space* and *representational space*, where all aspects hold equal value and play together in the production of social space. Before going into more detail, it is important to note that Lefebvre describes his model as "*dialectical*", implying that the construction of social space arises from contradiction. Thus, Lefebvre's model does not lead to a logically aligned concept of space, but rather to a way to navigate into the multiple and often contradictory ways in which people use, transform and understand the space around them.

In Lefebvre's triad, *spatial practice* refers to the perceived experience of living in an urban reality, where space is traversed through networks of communication, allowing people to reach the places where their daily practices and routines are performed. The physical space is then perceived through the senses, establishing a close connection with its materiality and constant change.

By *representations of space*, Lefebvre refers to the ways in which space is conceptually conceived by the multiple disciplines that converge in the effort of building descriptions, definitions and theories about it. This is the dimension of scientists, planners, urbanists, technocrats and any other representative of domains for which space is central. Although with some exceptions, this dimension is intellectually constructed and therefore most commonly expressed through verbal signs and other means of systematic representation such as maps and architectural plans.

Finally, *representational space* refers to the ways in which space is lived by configuring a layer of symbolic associations that overlay the physical space. In this layer, natural and built features are linked to symbols that do not necessarily refer to space itself

but to other shared meanings such as state, divine power, death, etc. In contrast to the previous category, representational space is more commonly expressed through nonverbal means of representation, capable of conveying meanings that resist being put in verbal or rational representations.

The importance and relevance of Lefebvre's spatial theory has been recognised by several scholars but in general terms still lacks an adequate level of consistency (Fraser 2011; Crawford 2015). Flynn (1991) for example makes a first attempt to map the dimensions of space proposed by Lefebvre into game worlds, but his analysis does not move far from a very preliminary stage. Aarseth (2007) also recognises the relevance of Lefebvre's theory to understand the spatial quality of games, but admits the difficulty of strictly mapping Lefebvre's triad into game spaces, so he does not continue the effort to move the discussion forward. Finally, Nitsche (2008) builds his own model of games space identifying a distinct series of planes of interaction, loosely based on Lefebvre's theory.

Despite the apparent lack of a serious academic effort in applying Lefebvre's theory to game space, I regard this line of analysis of great importance for making sense of game spaces in general and for translating historical meanings into ideas of space. First, Lefebvre's ideas provide an analytical frame to look into the spatial practice of players, registered in their paths of movement and actions as they traverse and interact with the game world. Second, Lefebvre's dialectical model provides a filter to understand game environments as ideological constructions, in the same way that architects and urban planners build representations of space, game designers and indeed players also impose their views into the spatial configuration of the game world. Finally, this concept also allows a glimpse into the symbolic associations and affective connections that players build when moving and interacting with the game world.

2.3.3.2 Space and place

Many authors have pointed out the fundamental distinctions between the concepts of *space* and *place*, and the implications of these conceptual differences in terms of human inhabitation. For example, Relph (1976) claimed that space is "*amorphous and intangible and not an entity that can be directly described and analyzed*" (p. 8). According to Tuan (1975):

Space is abstract. It lacks content; it is broad, open, and empty, inviting the imagination to fill it with substance and illusion; it is possibility and beckoning future. Place, by contrast, is the past and the present, stability and achievement. (p.164-5).

On the same tone, Kalay and Marx (2005) remarked that “[p]eople inhabit places, not spaces”, and Ingold (2009) claimed that “[s]pace is nothing, and because it is nothing it cannot truly be inhabited at all” (p.29). Without finding ourselves part of a particular cultural and historical context, the understanding we can get from a game-world remains at an abstract, top-level perspective, failing to connect us with the rich and complex layers of meaning from historical worlds. But the construction of meaningful places within game worlds is not an easy task, as it involves far more than digitally reconstructing a referential landscape with an adequate level of realism. With current technologies, game-worlds can be built to resemble historical locations with a photographic detail, but as far as they are only perceived as scenery put together to support gameplay, this goal remains unfulfilled. In the context of this investigation, the question we might ask is: how can we turn *historical game spaces* into *historical game places*?

Both in the real and virtual worlds, one of the first steps into the conversion from space to place (place-making) is the acquisition of a sense of familiarity with a portion of space. Tuan (1977) argues that “[w]hen space feels thoroughly familiar to us, it has become place” (p. 73). For Calleja (2011) this process is primarily the result of the cognitive mapping of the game space, the formation of spatial gestalts which players build through their navigation and gradual memorisation of recognisable landmarks. As spatial recognition becomes less and less demanding, players find a “*sense of comfort and belonging*”, leading to an “*attachment between player and game environment*” (p. 87), which Calleja identifies, reductively in my view, as *inhabitation*.

What Calleja misses in his conceptualisation of game inhabitation, is the recognition that our familiarisation and “*sense of belonging*” to a place goes beyond its mental mapping. A place becomes truly meaningful to us when we are able to read it at many different levels. Ingold (2000) stated:

[t]o perceive the landscape is [...] to carry out an act of remembrance, and remembering is not so much a matter of calling up an internal image, stored in the mind, as of engaging perceptually with an environment that is itself pregnant with the past (p. 189).

As Champion & Bharat (2002) indicates “*places are not just memorable, but also evocative*” (p. 8). A game environment committed to be experienced as a historical place, should be constructed to trigger a cascade of mental associations, driving us to

interpreting or imagining passages of its previous history, activities and events that have happened in it, and even the personal connections with other similar places where we have been. From a Lefebvrerian perspective, these evocations of meanings connected to place would also include the realms of symbolism and imagination, which, according to his dialectic model, are not separable from the physical (game geometry) or social space (multiplayer and NPCs).

However, the ways in which video games convey evocative meanings about place, as opposed to traditional media, appear to be intrinsically linked to ideas of space. As Jenkins (2003) eloquently argued in his very much cited '*Games Design as Narrative Architecture*', video games fit within the tradition of "spatial stories" and as such utilise the clues from the environment (i.e. graffiti, writings on walls, human induced erosion and so on) as one of its most expressive ways to communicate the subtle meanings of human inhabitation.⁶ This technique however, is not commonly used in virtual heritage projects, where virtual reconstructions are rarely build to communicate meanings with this level of subtlety, or to leave a record of the player's personal interventions in the game environment (Champion & Bharat, 2002).

2.3.3.3 Zooming in and out of history

The ability of the computer to generate three-dimensional environments, along with the unique capacity to allow players to navigate and change the point of perception in real-time has significant implications for historical representation. Often, historical semantics in computer games are primarily represented and interfaced by the metaphor of the camera. Aarseth (2003) believes the perception of space can be seen as a key meta-category to categorise games, as all of them utilise space and spatial representation in one way or another. Aarseth distinguishes between two broad categories: 1) *Omni-present perspective*, in which the player can examine and interact with the entire game arena and 2) games based on *visual perspective*, in which the player sees the world using first person, third person or isomorphic camera views. Although useful for analytical purposes, Aarseth warns about the difficulties of using spatial perspective as a defining criterion to categorise games in genres, as many modern games allow players to switch between camera modes, dramatically affecting their perception and form of interaction.

⁶ Jo Walton (2008) defines this technique by the term 'including' in literary works, where the reader 'pick up things about how the world works from scattered clues within the text' (para. 8). In contrast exposition describes the world with a greater level of detail, leaving less room for the reader's interpretation.

Coincidentally, the same dualism in spatial representation can be seen in two opposed forms of academic historical writing. These two traditions, *micro* and *macro-history*, have evolved as different epistemologies, each one with its particular methods and distinct ways of representing accounts, agents and objects from the past. The metaphor of the camera and its effects in terms of distance, scale and detail becomes apparent when we analyse each tradition separately.

The subfield of *micro-history*, defined as “*the intense historical investigation of a small area*” (Szijártó, 2002) studies a particular historical event with an intensity and level of detail that is impossible to achieve when covering larger extensions of time and space. The study is commonly restricted to a single, often very ordinary person, place or event, which is scrutinised in meticulous detail to reveal its broader socio-cultural structures. Micro-history gives a level of agency to characters that are often dismissed by structuralist historians, who view people as objects rather than as subjects of history (Brewer, 2010 p. 3). According to Carlo Ginzburg (1993) the emphasis on closing up the perspective of the study generates from dissatisfaction with the quantitative model that dominated the mid-1950s and mid-1970s, where the search of the broader patterns of history equalised individuals in their roles of economic or socio-cultural agents. In contrast, micro-history concentrates on the personal experiences of everyday life, operating in the conviction that these small narratives provide a better standpoint for looking into the general aspects of past societies.

The goal of the micro-historian is to construct “*thick narratives*” that allow to interpret the past through precise and concrete descriptions of particular practices and events. The challenge is to make descriptions thick enough, so they reveal not only the superficial elements of culture but also its inner structures, institutions and models of thought (Lepore & Hochschild, 2002). According to Geertz (1973), the focus is not centred on the ontological status of what is being observed but on its import: “*what is ridicule or challenge, irony or anger, snobbery or pride, that, in their occurrence and thought their agency, is getting to said*” (p. 315).

Micro-histories often are presented as gripping stories, exemplified by Carlo Ginzburg’s *The Cheese and the Worms* (1976) – the story of an Italian Miller condemned by the Inquisition to burn at the stake in 1599 – or the unusual occurrence of a man that assumes the identity of another in a small medieval village in France, as in Natalie Zemon’s *The Return of Martin Guerre* (1983). Both works are archetypical examples of historical micro-narratives; the characters’ personal life is rendered with a rich level

of detail, also driving the reader to make conjectural approximations about the cultural and psychological structures of their time. In both examples, the stories are constructed deliberately to let readers oscillate between two contradictory interpretations: the perception of historical characters as human beings with feelings, motivations and problems akin to our own, but at the same time part of a distant and strange past.

Kee et al. (2009) believe that computer games present significant advantages, compared to traditional media, to deliver micro-historical accounts. Using procedural technology, players can explore a determined historical event from a variety of perspectives, investigate different outcomes and engage with historical events in ways that linear media simply cannot. Instead of following a predetermined storyline, players can actively participate in the construction of the narrative, an experience that is intensified when the player assumes the role of the historical character and *re-enacts* his/her story by making empathic connections with their problems, feelings and ordeals.

On the opposite side of the spectrum, macro-history studies the “*histories of social systems, along separate trajectories, through space and time, in search of patterns, even laws of social change*” (Inayatullah, 1998). In contrast to the micro-historical approach, macro-history’s emphasis is “*less on language than on ideas of space, size and distance and their relationship to effects and historical interpretation*” (Brewer, 2010, p. 1). The definition of the distance from the object of study acquires bigger significance, as the project can include “*many different larger scales up to and including the largest scale of all, those of cosmology*” (Christian, 2005, p. 23).

Jared Diamond, arguably one of the most important and influential authors in this field, presents a concept of world history based on the causal connections between environment, climate, geographical constraints and general patterns of historical change. In his Pulitzer-prize-winning ‘*Guns, Germs and Steel*’ (1998), Diamond offers a compelling theory explaining the asymmetries between build-up rates from different human societies, a point of view that he later extends in his book ‘*Collapse*’ (2005), in which he offers similar arguments to explain the factors and processes that drive human groups to fall dramatically.

Diamond’s concept of history reflects his background as an evolutionary biologist, following the scientific goal of finding the *ultimate causes* behind observable phenomena from the world. His highly materialistic and deterministic view of historical change, although still received with scepticism by many professional historians, provides a

model to look into history as a procedural system. As Bogost (2010) explains, by de-emphasising the role of events and individual achievement and narrowing history into the procedural aspects of historical change, Diamond presented “*its own rhetoric about how history takes place – one in which geographic accidents generate historical events*” (p. 254).

Translated into video game form, macro-historical ideas have played a central role in the development of strategy simulations and city-building games. In these titles, the player tends to undertake a detached God-like point of view, making decisions where agency follows the empowerment of authority figures such as military generals, presidents, majors or city planners. Often this type of games, reflecting the bias of macro-historical analysis, tend to reduce or ignore human elements, which often become reduced to an undifferentiated conglomerate of units which the player controls without much empathy or concern.

Although the micro and macro approaches have resulted in clearly different game types, there is no reason to keep these two forms of historical understanding separate from each other. As Carvalho (2016) and I (Hiriart, 2016b) have argued, micro and macro historical approaches are not in principle antithetical, and can be integrated in an unified playing experience. In this regard, Sabin (2012) has presented an integrated approach to war conflict simulation using a nested approach, where a series of board games are used to zoom in and out at different scales of representation. Similarly, digital games often overlay different scales of spatial representation. For example, in ‘*Battlestation: Midway*’ (Viktor & Botond, 2007) it is possible to switch between a micro-mode, where a ship or plane is controlled in an immersive view, to a macro-mode, where the representation changes to a top-down stylised map and multiple units can be selected and mobilised. By creating modes of interaction where players are able to switch between different points of perception and interact with agents in different ways, games can integrate both levels of historical understanding in a playing experience designed to build links between both of them.

2.3.4 Time

2.3.4.1 The relational view of game time

Compared to the available literature on game space, the dimension of time in games has received comparatively less attention. However, its understanding is crucial for determining the ways in which this medium can act as a representational substrate for historical knowledge. In the same way as with the concept of space, time has

proved to be a very difficult concept to define. Since antiquity, generations of philosophers have struggled to systematise this concept in logical terms, mapping its relationships with the concomitant notions of space and motion. Without entering into a discussion impossible to fit in this review, we can summarise the philosophical discussions about time in two opposing views: the *substantial or absolute view*, which in synthesis proclaim that time (and space) exists independently to the material world and its events, and the so called *relational view*, which argues that time only exists as a set of relationships between events happening in the physical world. In other words, from a relational perspective time is not conceptually independent from change; we are only conscious of the passing of time through the discernment of movement and change happening in the world around us (Van Fraassen, 1985).

Manifestly, a review of the literature concerned with the study of time in video games shows an adherence to the relational view. Wolf (2001) for example, starts his discussion of time in video games by comparing this medium with its predecessors in terms of the degree of movement perceived on the screen. According to this author, the perception of change on the screen, which signals the passing of time, can be noticed at three distinct levels: 1) the level of the medium (static slides vs running film), 2) the level of the image (freeze frames vs still shots) or 3) within the content of the image (still shots where there is little noticeable change vs shots with moving things and/or people). If none of these levels are perceived, the medium provides little or no indication of the passing of time, a condition that in video games is associated to a possible malfunction (crash) of the system – an indication that the machine has become locked in a never-ending loop.

Further in his discussion, Wolf highlights the difference between *real-time* and *game-time*. In the same way that films are capable of condensing events stretching for many years in presentations of just a few minutes (through cinematic conventions such as feature ellipsis and compress time), games can also take advantage of these devices for narrative purposes. However, as games give players the opportunity to participate in the occurrence of events, the duration of the narrative becomes dependent on the player's performance. As Wolf remarks: “[t]he more interactive a game is, the more control the player may have in the game's duration” (Wolf, 2001, p. 83).

In a later study, Juul (2004) also elaborates on the perception of time within video games. For this author, a fundamental aspect in the understanding of this dimension resides on the fact that any action performed within a game holds a double meaning (i.e. moving a counter in a war-game can also be read as repositioning an entire

regiment in a battlefield) and since every action takes time, this dimension also becomes part of this duality. From this perspective, every player action happening in real-time may hold a completely different temporal value in *fictional-time*, the frame used to determinate the time of the events in the game-world. As both *real-time* and *fictional-time* run parallel while the game is played, it becomes possible to schematise the ways in which different games project time and actions into the game world. As an example, while in real-time game worlds such as ‘Counter Strike’ (Le & Cliffe, 2000) the projection is entirely symmetrical, other game worlds may present universes where fictional time runs faster than the real world, depending on explicit cultural markers, such as dates or calendars, to communicate a coherent passing of time. Similarly, the introduction of non-interactive narrative components, such as cutscenes, constitutes a type of projection where play-time is disconnected from fictional time.

For Zagal and Mateas (2010), time in its most primary form resides in the billion of computational changes that a computer executes per second while the game is played but as these transient events cannot be perceived, the study of time necessarily needs to shift to the perceptual experience of playing games. From this perspective, time can be categorised in four different temporal frames. First, *real-world time*, the perceptual experience triggered by any physical event occurring when the game is played (e.g. mouse movement, keyboard interaction, etc.). Second, *game-world time*, which is established by all the events within the represented game world, independently of its level of abstraction. Third, *coordination time*, which is triggered by the perception of events coordinating the actions between multiple players and possibly in-game agents. Within this frame, we can group the events marking the end of a player’s turn in a turn-based game or the end of a round. Finally, *fictive time* refers to the application of socio-cultural labels to a sub-set of events, so the passing of time can be coherently interpreted by the player. As examples of this time frame the authors mention the labelling of play rounds in “*days*” or “*years*”, changing the player’s expectations of what can be achieved in a game round.

2.3.4.2 Time and everyday life

One of the most important potentials of video games lies on their ability to bring the player inside a world from the past and providing a personal and subjective encounter with life in the past. However, this goal, is not anywhere close to being complete

with the mere representation of buildings, objects and agents. For everyday life to be translated into a video game form, its temporality needs to be understood. For this purpose, I would like to refer to the works of Henri Lefebvre (1971) and Tim Ingold (2000) on time and human inhabitation.

Lefebvre's preoccupation with the temporal dimension of human experience came later in his life and represented a shift from his previous writings, mostly centred on the notion of space. Only after his death, his wonderings about time came to public light, compiled and published by his colleague and close friend Rene Lourau. This body of work, organised under the umbrella notion of "*rhythmanalysis*", represents a singular effort in the comprehension of the temporal dimension in the functioning of society. Central to this analysis is the realisation that rhythms, cycles and repetitions form an integral part in every aspect of human experience. As he writes: "*everyday life is made of recurrences: gestures of labour and leisure, mechanical movements both human and properly mechanic, hours, days, weeks, months, years, linear and cyclical repetitions...*" (Lefebvre, 1971, p. 18). Rhythms are found on every aspect of the human world; they are present in the natural cycles of the environment and in the biological individual, affecting the functioning of society and in return are imposed by social structures, regulating and controlling the individual's life.

In his study of rhythms, Lefebvre identifies the human body as the key to make sense of time. With its cyclical rhythms of sleep, hunger, thirst, excretion and so on, the body serves as a "*metronome*" of the human experience – a point of contact between the coexisting forces from biology and society that come to define human life. Accordingly, and very much in line with his theory of space, Lefebvre rejects the notion of time as an abstract measure, independent from the subjective experience of everyday life. From his perspective, we can only aspire to make sense of time when studying it beyond the artificial modulations conceived to harness it from a purely physical perspective.

In close agreement with Lefebvre's ideas on time, Tim Ingold (2000) also rejects its reduction to an abstract measure disconnected from the experiences of everyday life. In his work '*The Temporality of the Landscape*', he explores the dimension of time from the "*dwelling perspective*" – a view that sees the landscape as an enduring record of the transformative agency of its inhabitants, who day after day and generation after generation leave their mark in the physical and intangible historical record. For Ingold, human inhabitation becomes imprinted in the landscape, as testimonial

evidence of the complex grid of tasks that people do every day as they move along with their “*business of life*”. The task, thus, defined as “*any practical operation, carried out by a skilled agent in an environment*”, becomes “*the constitutive acts of dwelling*” (Ingold, 2000, p. 195); a layer of interaction with the environment that Ingold defines as the “*taskscape*”. From this perspective, the passage of time cannot be seen from outside, on the contrary, its understanding demands us to study it as a lived dimension in intimate connection with the incessant flow of human activity in close interaction with the landscape.⁷ In Ingold’s words:

Whereas both the landscape and the taskscape presuppose the presence of an agent who watches and listens, the taskscape must be populated with beings who are themselves agents, and who reciprocally “act back” in the process of their own dwelling. In other words, the taskscape exists not just as activity but as interactivity (p. 199).

2.3.5 Historical game analytical frameworks

To date, analytical frameworks for the evaluation historical games are almost absent from the academic literature. One exception to this is the *History-Game Relations* (HGR) framework produced by Cassone & Thibault (2016) intended to assist the analysis of the “*the presence, use and meaning of history in digital games*” (p. 157). This framework is structured by two axis—“*proccess*” and “*translations*”—resulting in an analytical grid to evaluate the “*the coherences and incoherences of the game and its design*” (p. 167).

In the first axis, game-history relations are deconstructed into three aspects:

- 1) **Settings:** encompasses all the elements included in the game to bring a sense of the historical context, both at a macro (buildings, places, etc.) and micro (appearance, clothing, etc.) levels.
- 2) **Modelling:** defines the functioning of the game simulation, where history is encapsulated in algorithmic structures.
- 3) **Representation:** comprises the “*specific forms of visual and textual narration in order to tell the historical events*”(p. 161).

⁷ In the conference ‘The Middle Ages in the Modern World III’ held in Manchester in 2017, I raised the argument that compared with previous non-interactive media, video games are better suited to communicate the defining concepts and relationships from human inhabitation, that Ingold deconstructs in his analysis taskscape. With their capacity to generate worlds able to recognise and change upon the actions from players, non-player agents and environmental forces, video games can “bring to life” taskscape, allowing players to become virtual inhabitants of simulated worlds. This conference paper is included in the Appendix J⁶

The second axis focuses on the translation of history into digital games. In the same way as with the first part, Cassone & Thibault distinguish three different aspects to take into consideration:

- 1) **Perspectival**: the projection of present value systems and ideologies that always accompanies the translation of the past into a media form developed in the present.
- 2) **Digital**: indicates the transition from written and non-written historical sources into digital form, recognising the technological constraints of hardware and software.
- 3) **Ludic**: this level implies the implementation of “*models that translate the ineffable complexity of reality into a precise set of rules that can be mastered by the players*” (p. 164).

While certainly a useful resource to deconstruct existing historical games, the model also brings insightful reference points for the design of new game-based historical experiences. In this regard, the most useful part of this model resides on its emphasis on digital historical games as *translations* of historical information, a conceptualisation that will continue to be explored further in this thesis.

2.3.6 Summary of the literature about digital historical games

In the last sections, the academic works analysing digital games as a form of history were revised. As noted, the notion of games as a valid form of historical representation is still an open debate to which this investigation aims to contribute (research question 1). Contrasting the arguments posed by some authors who identify games as inherently ahistorical (Galloway, 2006; Ferguson, 2006), other scholars have raised strong reasons to regard them as a new and valid form of history, both from the perspective of the consumer who *plays history* and from the producer who encodes or *writes history* using the medium affordances and conventions (Uricchio, 2005; Chapman, 2013b; Bogost, 2006). These arguments are certainly relevant for this investigation, and will be referenced to as the project moves forward to the next stages.

This review continued by examining the specific properties of games as historical mediums. In this regard, the spatial and temporal properties of digital games were viewed as specially relevant (research question 2). The emphasis on these dimensions follows from an interest in exploring the ways in which digital games can be used to understand the life in the past, not as a form of representation built to be passively

observed, but actively *lived*. This concern will continue to be explored through iterative cycles of design, development and evaluation of historical game prototypes.

Finally, I have included a brief section revising the literature on analytical frameworks produced to understand the relationship between games and history (Cassone & Thibault, 2016). Also highly relevant to this research (research question 3), this aspect will continue to be explored as the project moves to the next stages.

2.4 Using games as historical learning contexts

2.4.1 Historical thinking and understanding

For over four decades, both historians and history teachers have claimed, at different times, that history in schools is "*in danger*" (Ofsted, 2011). On the one hand, the field has been greatly influenced by the discussions on the nature of history (which were briefly discussed in the previous sections). On the other hand, it has also been affected by the multiple shifts of paradigms in cognitive science. In the light of the advances in the understanding of how humans learn, the traditional methods that dominated the field of historical education for more than a century nowadays seem nothing but insufficient. One of the main criticisms that has been formulated to the old tell and test methods is the lack of understanding of the cognitive processes of learners when they attempt to make sense of historical information and the complete lack of interest in the multiple ways in which students connect with the past outside of school. For Wineburg (2000) a good part of these problems is a direct legacy of behaviourism; the educational model that became prevalent in history classrooms for the most of the last century. For behaviourists, "*assessing [historical] learning was straightforward. If the proper behaviour was 'emitted', the children 'knew'*" (p. 309) but on the contrary, if the expected response was not produced, the behaviourist model had no valid methods – or even the intention for that matter – to understand what kind of processes were taking place in the children's mind.

During the last decades, the "*cognitive revolution*", as psychologist Howard Gardner (1985) called it, provided a new lens to further the understanding of how children relate to the past both in formal and informal educational settings. At the base of the critique of the behaviourist model, stands the inefficacy of its learning and teaching methodologies to achieve disciplinary mastery, an achievement that in most cases requires to overcome extraordinarily persistent pre-disciplinary representations acquired during early childhood. Under this view, the concept of understanding

becomes redefined. According to Gardner & Boix-Mansilla (1997), understanding is interpreted as “*the capacity to use current knowledge, concepts, and skills to illuminate new problems or unanticipated issues*” (p. 79). In the context of historical education this concept not only implies the capacity to recall specific information about “*a given object, issue, event or person but also knowledge of components, causes, or underlying operations that pertain the issue in question*” (Voss & Wiley, 2000, p. 376).

There is general agreement among educational researchers that historical understanding is a complex and challenging achievement.⁸ The process of constructing the necessary cognitive structures involved in historical disciplinary mastery need to overcome a series of impediments that have proved difficult to eradicate. First, it is fundamental to identify and challenge anachronistic modes of historical thinking, realising that although characters from the past could appear to be close to us, they were unlike us in countless important ways (Lowenthal, 2000). Seixas (1996) elaborates that this mode of thinking involves the development of hard-to-master abilities to negotiate between affinity and distance, with an enhanced ability to identify our assumptions as culturally grounded, and hence not fundamentally transhistorical. A second obstacle that students of history need to overcome is the role of *presentism* – the “*intuitive inclinations to interpret the past through the lens of their everyday contemporary experience*” (Boix-Mansilla, 2000, p. 391). Presentism in historical interpretation often drives students to make comparative assessments between people from the present and past times, judging their actions according to present-day moral codes, ethics or common sense. Finally, historical understanding often is obstructed by its sacralisation or reduction to the form of a *myth*, more directed towards emotions, veneration and preservation than arguments and critical examination. According to Lowenthal (1998), this form of engagement with the past belongs to heritage rather than history. He asserts:

Heritage should not be confused with history. History seeks to convince by truth, and succumbs to falsehood. Heritage exaggerates and omits, candidly invents and frankly forgets, and thrives on ignorance and error. Time and hindsight alter history, too. But historians’ revisions must conform with accepted tenets of evidence. Heritage is more flexibly amended. Historians ignore at professional peril the whole corpus of past knowledge that heritage can airily transgress (p. 7)

⁸ Wineburg (2001) in fact calls this process ‘unnatural.’ Although through our lives we engage quite naturally in a myriad of historical engagements, such as “*placing stones on graves or charting genealogies on Google*” (Wineburg, 2007), historical thinking “*requires an orientation to the past informed by disciplinary canons of evidence and rules of argument*” (ibid.) that requires a high level of training and critical skills.

As an important part of the cultural landscape with which children relate in their everyday lives, TV shows, documentaries, movies, the internet and certainly video games play an important part on the transmission and preservation of historical heritage. As Lowenthal suggests, this encountering is prone to fall into fallacious arguments, and to some extent can be held responsible for the engraving of incomplete and often grossly inaccurate versions of the past in young minds. In the current contemporary media saturated environment, the role of the school thus is not to compete with these historical narratives, but to help students to approach them critically instead of being passively absorbed (Seixas & Peck, 2004). Recognisably, this is a difficult undertaking; fostering a reflective attitude towards history as opposed to a non-critical adherence to mythical accounts is considered to be a primary objective of history curriculums. In an attempt to instil the necessary skills to judge critically the past, scholars Peter Seixas and Carla Peck (2008) propose a number of benchmarks of historical thinking. These elements are worth including in this review:

a) Significance

This element refers to the capability to distinguish between the significant and the trivial from an historical perspective. The formation of this skill is recognisably a difficult endeavour; even teachers who have been working on historical significance for many years at times struggle designing tasks for their students to hone these skills (Seixas & Peck, 2008, p. 1026). One important part in developing this skill resides on the ability to differentiate between *everyday significance* (i.e. fire) and *historical significance* (i.e. the invention of fire). As such, historical significance involves events, persons or developments that had deep consequences for many people, over a long period of time or shed light on enduring or emerging issues in history and contemporary life. In contrast, everyday significance refers to elements that, although undeniably important, lack the adequate level of relevance under these terms.

b) Continuity and change

For many students, history does not get more complex than a list describing a succession of events, and the gaps between these elements are simply explained as periods of time where “*nothing happened*”. Historical thinking involves the capacity to see the past beyond this simplistic representation, conceptualising it as a complex mix of continuity and change, where a foreground of tightly interconnected events is laid over a backdrop of things that remained relatively

unaltered for short or long periods of time. As students start thinking of the past as a complex web of interrelations and degrees of change, their understanding becomes more sophisticated, ultimately reaching a “*fundamentally different sense of the past*” (The Historical Thinking Project, n.d).

c) Progress and decline

This element adds an evaluative dimension to the notions of continuity and change. The traditional view – sustained by many academic historians until recently – assumed that history moved through a framework of progress, where human society in the long term moves in a positive direction of change. In more recent times this view is subjected to questioning, with many historians pointing at things that show more of a regressive pattern in comparison to the past. Helping students to become more aware of the underlying narratives of progress implicit in historical accounts, in historical writings, films and indeed video games, urges them to frame their historical knowledge and orient themselves in the present.

d) Empathy and moral judgement

People from the past not only lived in a completely different world than the one we live today, but the whole structure of their feelings and thoughts was fundamentally different from ours. For Ranke, who defined the fundamental elements of history as a discipline, “*it was the job of the historian to understand the past as it was understood by the people who experienced it*” (Taylor, 2003). Although this view has been questioned in more recent times, we still can argue that a key ability to make sense of history is to imagine ourselves as someone from the past, exploring the complexities of their time through their eyes. In order for this exercise of imagination to be any useful it requires to be grounded in historical evidence, and in complete awareness of the anachronistic interpretations and judgements that we so easily impose over past realities.

e) Historical agency

Understanding the relationships of power from past social structures is a key part of historical thinking. A fundamental part of this is the identification of the individual or group of individuals who made historical change possible, and to what extent their efforts were facilitated or constrained by social, political or economic structures of their time. In this respect Sowell (2007) makes a useful distinction between the *constrained* and the *unconstrained* views of

historical agency. The constrained version posits that individuals are always restricted in their efforts to influence change either by their individual limitations, contingencies out of their control and/or insurmountable complexity of social and cultural processes. In contrast, the unconstrained version claims that humans are fully capable of changing the course of history, altering the structural functioning of their societies by their individual action (Carvalho, 2016 p. 110).

2.4.2 Game-based historical pedagogies

Ultimately, the ability of students to make sense of the world they inhabit relies to a large extent upon their ability to create meaningful links between their knowledge of the past and their understanding of present day events (Boix-Mansilla, 2000; Shelmit, 2000; Seixas, 1996). By acknowledging the significance that these abilities play in society Seixas (2000) proposes three different pedagogical orientations for historical education:

- 1) **Collective memory:** An orientation that supports the idea that is possible to have a single, unified version of the past and thus concentrate much of the efforts in providing students with the means to recall the contents of the *best possible version*.
- 2) **Disciplinary history:** Provides the student with the ways to follow the same processes and modes of thinking that historians do when building their versions of the past. Instead of bringing prescriptive narratives, this orientation lets the student develop the most plausible interpretation by critically assessing the different sources of evidence.
- 3) **Postmodern history:** Designed to make students aware of the several critiques that postmodern thought does to authoritative versions of the past, building their skills and confidence to find their way through multiple interpretations of past realities.

Taking the division of historical epistemologies proposed by Seixas as a frame of reference, Kee (2008) suggested three corresponding forms of ludic and narrative interaction as ideal models to achieve the pedagogical goals of each orientation. The first epistemological approach, *collective memory*, is coupled with action games, a genre in which players assume the role of a historical figure, and are encouraged to fulfil a set of goals designed to mirror specific historical events. The second orientation, *disciplinary history*, is implemented through strategy game mechanics by allowing players

to explore different paths to reach desired outcomes. Finally, *postmodern history*, is achieved by using sandbox type games with a focus on the creative modification of the game world. In games of this sort, players are allowed to define their goals and write their narratives, sharing their experiences and points of view with extended communities of practice.

Even though Kee's exercise of mirroring pedagogical orientations with game genres seems useful as starting point, it remains at a very embryonic state as he also recognises. Ultimately, the scheme that he proposes (rigidly mapping historical epistemologies with corresponding game genres) fails to acknowledge the malleability of the medium and its capacity to expand the limits of gameplay beyond existing game stereotypes.

Champion (2008a, 2015) presents a different classification of games with a potential for historical or cultural understanding. Compared to the previous authors, Champion's selection of game genres is more extensive, comprising of eleven types. His final list included: Tourist games, Puzzle games, Resource management games, Historical battle games, Historical combat games, Historical shooter games, Role-playing games, Control-games, Social-mashup games, and Games that allow classroom role-playing of history through in-game camera capture. This author recognises that his classification is nor extensive or definitive, but nevertheless a valid exercise to further the understanding of the connections between game mechanics and historical learning.

Although the definitions of historical game genres proposed by these authors offer interesting insights and can be used productively for analytical purposes, it also invites criticism. The main problem derives from the rigid mapping that these authors make between historical epistemologies and game typologies largely defined by the game industry, depending on an ontology simply too volatile to be used systematically as a form of analysis (Björk & Holopainen, 2003). Also, if applied rigidly, the mapping of game genres fails to acknowledge the design flexibility of the medium, capable of expanding the number of game forms that result from innovative gameplay design. Moreover, all the visited schemes seem to consider games reductively as only one primary form of gameplay, overlooking the fact that many games present a combination of gameplay structures, making it difficult to be associated with only one particular genre.

2.4.3 Using games in history classrooms

Digital historical games made their entry to schools classrooms at a very early stage in the adoption of educational technology, however, their documentation in academic literature is scattered (McCall, 2016). Most commonly, the use of digital games in formal environments has concentrated on secondary education, with commercial titles, most notably Sid Meier's '*Civilization*' (Meier & Shelley, 1991) in its different versions, being integrated into the history curriculum. As mentioned, the educational use of commercial games in history classrooms can be problematic. As these titles are primarily developed for entertainment, their relationship with historical content in many cases is at odds with their pedagogical application.

Among the documented experiences, Taylor's (2003) implementation of *Civilization I* and *II* into the modern history curriculum of a secondary school yielded interesting insights. Despite his self-recognised inexperience and limited knowledge of video games, Taylor became interested in using *Civilization* after becoming aware of the developer's use of Paul Kennedy's macro historical ideas in the procedural structuring of the game's logic. Taylor's interest in implementing the game was to use it as an interactive simulation of Kennedy's model, which could be critically assessed by students in terms of its closeness to the referential framework.

After six years delivering the course, the students' feedback was overwhelmingly positive and the experience brought interesting insights with regard to game-based historical teaching. Taylor summarises the contribution of video games to history education into three main points. First, he mentions *interactivity* as one of the main advantages of the medium over traditional means of representation. Instead of just reading about Kennedy's ideas of historical change, '*Civilization*' allowed students to "*see and experience*" the model, and to understand the ways in which geography, leadership, economy and technology become all interwoven in its dynamic representation. Second, this author refers to the students' *active participation* as another strong point for bringing the game into the classroom. As participants of the simulation, students became keen on trying different options in order to progress. Initially by trial and error, their interaction with the game became increasingly more sophisticated as they gained a better understanding of the causality laws embedded in the simulation. Finally, the game also drove students to *experience* the past as those who lived it. Through their interfacing with the game simulation, students did not just acquire a sense of a complex system at work, but also gained an understanding of the multiple forces (i.e. environment, the press of

time, the uncertainty of outcomes and so on) affecting the actions and decisions of characters from the past.

A year later, scholars Squire & Barab (2004a) explored the pedagogical utilisation of *'Civilization III'* (Meier, 2001) in formal urban learning environments. Through three case studies, these authors examined how game engagement, social interactions and understanding evolved in the classroom, drawing conclusions about the role of the game's mediation in the development of the students' understanding. Remarkably, Squire & Barab found that the game itself was not the most important aspect in the learning experience, but rather the social dynamics that surrounded or emerged from its implementation in the classroom. The game became a central element of a community of learning, where its educational value heightened as students and teachers played, discussed, analysed, critiqued and expanded the original game.

While Taylor (2003) and Squire & Barab (2004a) conducted their research using different versions of the *'Civilisation'* game franchise, Corbeil and Laveault (2008) followed the alternative approach of designing and evaluating a custom-made game in a college level *'History of International Relations'* course. By following an experimental approach and using Piaget's constructivism as one of the main theoretical frameworks, their project aimed to study the validity of a simulation game for fostering historical reasoning skills. Their results demonstrated that, compared to traditional teaching methods, the game was more efficient in reaching the learning outcomes but, perhaps most importantly, it highlighted some of the problems in using game-based methods in history curriculums. More specifically, the study showed that for some students *"the game is only a game until they have understood the symbolic import of the material"* (p. 465). In other words, unless purposely driven to build historical meanings from gameplay, the interaction with the game remained in an abstract space, where it was played without significant educational gains. To overcome this problem, Corbeil and Laveault recommend to *"give students mobile and tactile instruments, which they can manipulate themselves as tools to study and understand ideas and abstract concepts"* (p. 474). In addition, and coinciding with Squire & Barab, the authors emphasised the importance of social dynamics: *"[g]ames must also allow participants to discuss among themselves hypotheses, methods, and lines of approach in terms of situation analysis and choice of strategy"* (p. 474).

Lastly, Jeremiah McCall (2011, 2016), a history teacher and researcher with extensive experience in high school education, warns about the need to understand the *"conventional wisdom concerning history education"* (i.e. the type of history students are expected

to learn) and *“the role and objectives of the history teacher”* (p. 8). From this perspective, video games may have a very limited utility if passive learning and memorisation of facts are the only expected learning outcomes, which McCall regards as *“unhelpful”* and *“incorrect”*. For this author, historical knowledge does not consist of recalling already-given narrative accounts, but is about *“the act of constructing meaningful, critically researched and validated interpretations of the past, interpretations focused on human motivations, actions, and the effects of these actions”* (p. 9). According to this view, the most important role of the history teacher is to motivate students to think as historians, develop skills to judge the available evidence, draw conclusions and construct *“defensible explanations and interpretations of past human actions, their causes, and their effects”* (p. 9). By using this argument as a starting point, and after conducting an extensive review of games in history education, McCall proposes to structure game-based history classrooms in at least three distinct phases: 1) the *“Learn to Play”* phase, where students get familiarised with the educational game, 2) the *“Play, Observe, Analyse”* phase, where students play and establish a meaningful relationship with the historical content being taught and finally 3) the *“Discuss, Evaluate, Debrief (Assess)”* phase, where the game experience is reflected upon the wider context of the classroom.

In a further extension of this framework, McCall also provides a number of best practices to consider when implementing game-based methods in formal history education settings:

- ❖ ***Do not expect every student to welcome gaming in history class.*** Although the prospect of playing games is commonly met with enthusiasm, some students can be hesitant and even opposed to the idea of using video games inside the class.
- ❖ ***Devote time and resources to learning to play.*** Some games can be meaningfully played in almost no time, but others require a big commitment to get to that point. In consequence, educators “must assess whether the learning curve of a game is steep or shallow and plan accordingly” (McCall, 2016, p. 533).
- ❖ ***Encourage active, reflective play: observe, log and analyse, and debrief along the way.*** Playing games with a learning goal in this sense is different from just playing a game. The educator must organise the playing sessions with the goal of promoting inquiry and analysis, not simply to play.
- ❖ ***The teacher serves as an active facilitator, taking advantage of teachable moments.*** While students play, the teacher should be attentively observing and listening to what

students do and say. Important lessons can be taught as the students' interest is prompted by their gaming experiences.

- ❖ ***Explicitly connect the game to course instruction.*** Instruction should be prepared to link the game and its mechanics to the historical concepts planned to be explored in the course.
- ❖ ***Treat the game critically as one interpretation out of multiple interpretations considered; integrate the game into a whole learning experience.*** The game should be regarded as one more interpretation of the past, carrying the same epistemological problems found in other means of representation and interpretation. Students should be driven to work with varied historical accounts, developing a strong, evidence-based and always provisional interpretation of the past.
- ❖ ***Discuss, debrief and evaluate.*** The role of the educator is to drive the students' attention to aspects that they gladly breeze past. Time must be devoted to build the connections between the game and the historical topics explored, pinpointing the underlying arguments embedded in the representation.

2.4.4 Review of digital historical educational games

This section provides a brief revision of the state of the art in the field of historical educational games. In this review, I have purposely excluded commercial game titles, already discussed in the previous sections, focusing on games developed with the explicit intent of supporting the teaching of history in educational settings.

1. The Oregon Trail (Rawitsch, Heinemann & Dillenberger, 1971)

Arguably, any examination of educational historical games necessarily needs to start with *'The Oregon Trail'*, the first-ever educational digital game produced for a school classroom. Developed in 1971 by Don Rawitsch, Bill Heinemann, and Paul Dillenberger, at that time student teachers from Carlton College in Northfield, Minnesota, the game is based on the 19th century wheeled wagon journey to the West connecting the Missouri River to the valleys of Oregon. Originally developed in a computer terminal, the game was pure text-based and paper-based, and gameplay consisted on a series of decisions—when to leave, what to buy as supplies, what path to follow, etc.—that students had to decide while playing as one out of the three available characters: a banker from Boston, a carpenter from Ohio or a farmer from Illinois. In the original version, all these decisions were typed in and sent via phone line to a large mainframe computer, which processed the the response according the the player's choices.

Implemented in history classrooms, the game proved to be amazingly fun and engaging, prompting students to work collaboratively to overcome the never-ending challenges and hazards of the trip (Lussenhop, 2011). After its first incarnation, the game was acquired by *The Minnesota Educational Computing Consortium* (MECC), an organisation which provided computer services to schools in the state of Minnesota. The company's generous software licensing permitting schools to make unlimited copies from the software undoubtedly contributed to making the game hugely popular not just in the state of Minnesota, but around the World. More than 65 million copies of the game would go on to be sold, making it the most used educational video game of all time (Pepple, 2016).

2. Revolution (The Education Arcade, 2001)

As game technology became more sophisticated and accessible, small studios and academic research teams could use state of the art technology for the creation of bespoke game based learning experiences. An interesting aspect of this trend is *modding*, the modification of existing games to extend or generate completely different game experiences. A good example of this was the game 'Revolution', a historical game produced by *Massachusetts Institute of Technology* (MIT) *The Education Arcade* and *The University of Wisconsin Madison*. Developed as a total conversion of the popular commercial game 'Neverwinter Nights' (Bioware, 2002), this game was based on the 1775 events that led to a violent revolt of the colonial town of Williamsburg. The social, economic and political factors that led to the rebellion can be explored from the perspective of one of seven available characters ranging from an upper-class lawyer to an African America house slave.

Designed to be played in the 45 minutes duration of a typical classroom session, the team of developers took advantage of the powerful game engine and editor developed by Bioware to create a populated three-dimensional world where players could immerse themselves in "a living, functioning simulation of colonial America" (Jenkins, 2007, para. 4). One of the main goals of this development was to "get away from the drill-and-test model of public education and to challenge the master narrative of history" by focusing on "the choices historical agents made and the conditions under which they made them" (Ibid., para. 5).

3. Global Conflicts Series (Serious Games Interactive, 2007)

With this series of educational games, the Danish studio *Serious Games Interactive* (SGI) intended to leverage the affordances of game technology to explore a range of problems occurring in different parts of the World. Designed for a target age group over thirteen years old, the games encouraged players to take the part in a series of missions (e.g. a freelance journalist investigating the Israel/Palestine conflict) where they have to witness difficult situations and take controversial decisions, often challenging their assumptions and previous knowledge about World's current affairs.

In a period of two years, SGI released two titles: '*Global Conflicts: Palestine*' (2007) and '*Global Conflicts: Latin-America*' (2008). An important design goal of both games was to connect players with the personal problems and stories of the people from these contexts. As Egenfeldt-Nielsen (2006), a games researcher and part of the development team, remarked, "[t]he game is much more about the personal experience; the emotional experience" (para. 4). Accompanying the games, the company also provided a pack of classroom materials consisting of teacher manuals, mission sheets, an overview of the topics and student worksheets.

4. Outbreak (Kee, Bachynski, McNiven & Peric, 2009)

This small online Flash game was developed by *The Simulating History Research Lab* at *Brock University*. Originally conceived to be a marketing tool for the promotion of a documentary film broadcasted on *Discovery Channel* and *Radio-Canada*, the game intent was to educate about Montreal's 1885 smallpox epidemic; a tragic part of Canada's history where over three thousand people died, mostly children under the age of five.

The game consists of a simplified simulation of the epidemic outbreak, which players have to stop using the means available in the nineteenth century. For this, players interact with a stylised isometric map of the city of Montreal, where quick decisions had to be taken as more and more people get infected. To know how to proceed, the player can ask "*advisers*" based on actual historical characters, who offer advice on what to do. Their advice, however, is often contradictory and in some cases completely ineffective, reflecting the political and social forces that contributed to the plague to be so difficult to stop. This game was distributed online through the project's website (still available at <http://>

www.outbreak1885.com/teachers.html), which also provided links to the documentary film and resources for teachers to use it in history lessons.

5. **Mission US series (Public Broadcast Service Learning Media, 2010)**

'Mission US' features a series of educational games published by the *Corporation for Public Broadcasting* (PBS) with funding from the *National Endowment for the Humanities*. Covering different periods from the United States history, from the 1770 Boston Massacre to the Great Depression, all the games can be played for free on the project's website (<https://www.mission-us.org/>).

All the games were developed using Adobe Flash technology, and follow a similar approach based on adventure-type gameplay. On each one of them, the player takes the role of a fictional character who has to accomplish a series of goals, leading to difficult decisions. In this way, the game experience foster the players' critical understanding of historical contexts and events, while also developing and empathic understanding of the particular situations and problems that people had to face.

Along with the games, the project's website also provided a complete set of high-quality resources and guidelines for teachers to use in their history lessons. Moreover, the site also provides links to research studies measuring the educational impact and effectiveness of the games in educational settings.

6. **BBC Interactive History Page (British Broadcasting Company, 2011)**

Through their website, the *British Broadcasting Company* (BBC) released a series of interactive educational resources for historical education, featuring games, animations, timelines and virtual tours. In general, the games consist of small Flash-based applications focused on specific aspects of British, European and World history.

Unfortunately, the interactive content was last updated on August 2011, and, since then, most of the access to all these content was made unavailable.

7. **Never Alone - Kisima Inŋitchuŋa (Upper One Games, 2014)**

The game 'Never Alone' or 'Kisima Inŋitchuŋa' as it translates to the Alaskan indigenous Iñupiaq language, can be positioned in the domain of cultural history, combining anthropological and historical dimensions to convey cultural and historical meanings.

Developed as collaborative effort between the Cook Inlet Tribal Council (a non-profit organisation working with Alaskan indigenous communities), the educational video game company *E-Line Media* and the writer Ishmael Hope, a storyteller and poet of Iñupiaq and Tlingit heritage, the game overarching goal to share, celebrate and educate about indigenous worldview, traditions and myths.

This game uses platform game mechanics to convey the myth of Kunuuksaayuka, a traditional Iñupiat tale of a girl that saves her community by finding and fighting with the source of a great blizzard. As the player progresses through the game's levels, cultural elements such as language, objects, landscapes, spiritual values are presented in connection to the game challenges and narratives. To help players contextualise the game experiences, a short piece of documentary video is offered at the end of each level, with further insights about Iñupiaq culture.

Along with the game, the developers also provided an extensive guide to integrate the game into the Middle and High school classrooms.

8. *Attentat 1942* (Charles Games, 2017)

The last game in this revision is '*Attentat 1942*', developed by Charles University and the Czech Academy of Sciences. Based on real experiences of survivors from the Nazi occupation of Czechoslovakia, the game focuses on the events that followed the assassination by Czechoslovak paratroopers of Reinhard Heydrich—a primary agent driving the Holocaust—which resulted in brutal mass executions and deportations to concentration camps.

These events were thoroughly researched by a team of professional historians, and are conveyed in game-form by a combination of gameplay mechanics including dialogues, interactive comics, mini-games, digitised film footage and cinematic-style interviews. All these elements are combined to create a rich historical setting, where the player gradually unveils the historical contexts and intricate stories that followed the assassination. More than any of the previous games in this review, this one makes a very good effort in capturing the inherent complexities of the work of a historian.

As part of the game's distribution strategy, the developers offer "*Seminar*", "*Classroom*" and "*Lecture*" packages, where a teacher's guide is sold accompanying the game.

2.4.5 Conclusions from the review of historical educational games

In this review, I have briefly presented a selection of games representative of the work that has been done in the field of historical game-based learning. These works span from the early stages of educational computing to recent times, where gaming technology has become available to small studios and research teams at academic institutions to develop historical games. Still, the creation of bespoke educational games is a very time-consuming and specialised process, typically requiring a team of developers with a specialised range of skills. This level of development is commonly out of reach for the teams developing educational game projects, limiting the scale and complexity of the games produced. A first general look to the historical games reviewed shows that most of them feature two-dimensional worlds and relatively simple game mechanics. From all the revised projects, the production of three-dimensional games has only been produced by commercial studios (e.g. *'Global conflicts'*, *'Never Alone'*), with dedicated teams to produce 3D interactive content. An exception to this is the game *'Revolution'*, which, by modding instead of developing a game from scratch, managed to cut down the production cost while still being able to create an immersive three-dimensional game. A first conclusion to be made, therefore, is that economic factors, and not just pedagogical goals play a decisive role in selecting the type of game to be developed.

In regards to historical gameplay, the games reviewed show a striking alignment. Most of the projects adopted a similar approach, implementing role-playing mechanics, with the player becoming a historical character situated within a determined historical context. The only exception to this pattern is the game *'Outbreak'*, where a God-like perspective is preferred to interact with characters within the historical simulation. Within these contexts, all of the games rely on simulated social interactions and decision making over performative challenges (i.e. shooting, fighting, etc.) to gain a better historical understanding.

In accordance with their educational goals, most of the games revised provide accompanying materials for teachers to use them in their educational settings. These materials, however, vary considerably from project to project, with *'Mission US'* being the one project providing the biggest amount of extra-game support. Academic research following up the implementation of these projects in educational settings, or giving an understanding of their production process is generally scarce and difficult to find. While *'Mission US'* provides a good amount of

research material about this project, and academic papers can also be found for some of the other games reviewed, there is a general lack of information about the games' design and development process. This conforms an important argument for the conducting of the present study, which, along with the explorative production of a game artefact, will document and critically reflect on the design, development and evaluation processes to contribute to the theoretical understanding of this subject area.

2.4.6 Summary of the literature about game-based historical learning

In this final section of this chapter, the academic works on historical game-based learning were discussed. This examination began by studying the role, purpose, and inherent difficulties of teaching history in educational environments (Gardner & Boix-Mansilla, 1997; Wineburg, 2000, 2007; Lowenthal, 1998, 2000; Seixas, 1996). Beyond the mere recalling of factual information, historical learning should aim to develop the high-order cognitive skills to *think historically*, helping students to distinguish between history and heritage (Lowenthal, 1998) and making sense not just of the distant but also the immediate past. This conceptualisation of historical learning is highly pertinent to the goals of this investigation (research questions 1, 2 and 3), in particular, the explorative design of a historical game: How can we design a game that leads or help players to think historically?

Following, this section proceeded to examine historical game-based learning pedagogies, revising previous experiences using commercial games in history classrooms (Taylor, 2003; Squire & Barab, 2004a; Corbeil & Laveault, 2008; McCall, 2011, 2016) and the development of bespoke educational historical games. This revision of past experiences highlighted the importance of a systematic process of inquiry accompanying the development of game projects and brought to light potential design goals and research paths to explore in the next stages of this investigation. These can be summarised as: the capacity of games to reveal abstract historical models through players's active participation (Taylor, 2003), the player's symbolic engagement with in-game experiences (Corbeil & Laveault, 2008; Squire & Barab, 2004a), the role of social interaction and formation of communities of learning (Squire & Barab, 2004a) and the importance of the teacher in structuring game-based learning experiences (McCall, 2011, 2016).

2.5 Chapter summary

This chapter has reviewed the key themes, concepts, and theoretical perspectives situated in the intersections between the research fields involved in this investigation, namely, games, history and education. This review began with the academic literature on play, games, and serious gaming. An important part of this revision was dedicated to the understanding of the properties of digital games. Unlike other media forms, digital games are simulations (Frasca, 2003; Salen & Zimmerman, 2004; Nitsche, 2008; Koster, 2004), a form of expression where historical meanings are transcoded into mathematical algorithms, open to the player's intervention and interpretation through play.

The engagement with historical knowledge through play, however, is regarded as problematic by authors such as Galloway (2006). The main criticism of this form of engagement resides on a concept of history as the factual account of the past, which becomes subverted by the player agency and participation. Countering this argument, other authors highlight games as an advantageous medium for the experiential understanding of the underlying social, environmental and cultural processes determining the course of events (Chapman, 2013b; Taylor, 2003), the alternative or counterfactual historical scenarios (Jenkins, 2003), and, more generally, the postmodern idea of history (Uricchio, 2005).

As historical mediums, another important capacity of digital games is their ability to generate navigable virtual worlds, within which players are presented with the opportunity of embodying a different identity. To understand these affordances, the literature on games and philosophies of space and time was reviewed. The translation of history to ideas of space and time, generating environments where the past is *inhabited* can be considered as one of the main concerns of this investigation, which will continue to be explored by the means of creative practice.

Following, the review focused on the academic literature on the use of games as historical learning contexts. First, the key scholarship on historical education was revised, analysing the importance and problems of turning students into *historical thinkers* (Seixas & Peck, 2004), capable of using high-level cognitive skills to make sense of the past (Wineburg, 2007). For this, different authors have used commercial games into their history classrooms, and, beginning with '*The Oregon Trail*' (Rawitsch, Heinemann & Dillenberger, 1971), varied game companies and research groups have produced bespoke digital games specifically designed to teach history. The review of

these experiences revealed relevant paths of inquiry, with a clear potential for further investigation.

In the next chapter, the methodological model of this investigation will be presented. This presentation will move from the philosophical positioning of this research to the granular detail of the selected methods for the collection and analysis of research data.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the research model adopted in this project. Two distinct methodological approaches were applied in two successive stages. During the first stage the research was framed as action research through practitioner action, relying on the iterative development and critical analysis of historical game prototypes as a means to better understand the theoretical and practical implications of designing historical game-based learning experiences. In the second phase, the research adopted a design-based research approach, implementing and testing the final version of the game prototype in a real context of a primary school classroom. The specific details of each phase, research approach, collection and analysis of data are discussed in detail in this chapter.

3.2 Research philosophy and strategy

The definition of an appropriate methodological approach to investigate the multilayered relationships between history, education and digital games is a challenging task. This research problem cannot be engaged with by looking at existing historical games, in isolation to the processes involved in their construction and the multiple perceptions, behaviours and attitudes of the audiences who interact with them. Understanding these relationships demands the researcher to be an observer as well as a participant because both forms of relation with the social contexts in which this research takes place depend on, and mutually reinforce each other (Ingold, 2013). In attention to this, I identify the ontological approach of this research as *social constructivist*, conceptualising the world as a social construct culturally derived and historically situated, which cannot be understood unless is interpreted. Consequently, I identify the philosophical paradigms guiding this research as *subjective* and *interpretive*; a way of “*knowing from the inside*” (Ibid.), not as an independent agent extracting “*data*” for the analysis of a certain object or process, but as one that participates with an awareness of the ways in which personal bias, beliefs and cultural values affect the research’s process and outcomes.

Following the definition of a philosophical stance, an appropriate research strategy, or a combination of strategies capable of addressing the research questions, must be selected. For this project, the strategy that better identifies the specific demands of this project, and, in particular, the need for bridging the gap between practice and theory is *action-research*.

This form of research is defined by three conditions. First, the project has to be framed as a way of changing a determined social practice. In this regard, this research does not just aims to contribute to the better understanding of the intersections between games, history and education, but also to generate and implement more effective historical game-based learning environments. Second, action-research is defined as a collaborative effort, where the researchers work closely with practitioners in all the phases of the investigation. Here as well, this is a key requirement in this research project, which relies on incorporating and articulating the theoretical approaches and practices from multiple disciplines. Finally, action-research operates in cycles of planning, acting, observing and reflecting, closely mirroring the iterative structuring of a design project.

While action-research seems in line and presents clear advantages to answer this project research questions, it is important to consider and to review alternative approaches. Within these, *case-study* appears also aligned with the goals of this investigation. Generally defined, a case-study is an in-depth examination of a particular contemporary phenomenon, which often becomes difficult to separate from the context where it occurs (Yin, 2009). It shares with action-research the concern of gaining an understanding of the object of study in real-world settings while keeping a focus on “*the world of action*” (Blichfeldt & Andersen, 2006). For some authors, the connection between these two approaches is even more definite, arguing that every action-research project should be structured as one or multiple case studies (Gray, 2004), or adopt the specific guidelines of case study research (Cunningham, 1993; Blichfeldt & Andersen, 2006).

Despite the similitudes, there are important differences between these two approaches. A first distinction to be made concerns the emphasis on changing or solving practical situations. While case-study does not seek to provide a solution to a particular problem, action-researchers are commonly confronted with the dilemma of conducting research that both attempts to answer a question and fulfil a practical need (Rapoport, 1970). Secondly, the involvement with collaborators also tends to differ. While case researchers rely mostly on participants as sources of evidence to

investigate a situation defined by the researcher prior to conducting the study, action-researchers tend to establish a more collaborative relationship with participants, who are generally considered to be more critical to the success of the action-research endeavour (Blichfeldt & Andersen, 2006). Finally, the nature of the researcher involvement also differentiates action-research from case-studies. Whereas action-research is characterised by “*the active and deliberate self-involvement of the researcher in the context of his/her investigation*” (McKay & Marshall, 2001, p. 49), this not necessarily the case with case researchers, who usually do not get involved as participants within the context of the study.

In consideration to these differences, the selection of action-research over case-study for this project is justified. As already mentioned, this research aims to gain a better understanding of games as historical educational tools, but also to find solutions, guidelines and frameworks with a practical application in similar projects. To do this, the project relies on establishing a close collaboration with professionals from relevant disciplines, who participate in all the stages of the research process. Finally, the researcher’s participation “*from the inside*” (Ingold, 2013), as we previously discussed is regarded a key part of this process.

In the following sections, the specifics of the action-research process in relevant contexts of investigation—creative practice, game studies and education—will be covered in greater detail.

3.3 Action-research through creative practice

Action-research in creative disciplinary practices can be associated to the approach known as *practice as research* (Barret & Bolt, 2010), a form of inquiry which has gradually gained acceptance in academia, in spite of prevailing confusions and discrepancies regarding its epistemological assumptions, logical outcomes, methods of study and forms of presentation.

In one of the first systematic reviews of this type of research, Frayling (1993) distinguishes between three different approaches. The first type, identified as *research into practice*, involves the study of the work of artists and designers and appears as the most straightforward to be recognised as *proper* research. The second type, *research through practice*, consists of the study of materials, development processes and other forms of action research that contribute in advancing the work of the practitioner.

Finally, *research for practice* involves the inquiries carried out to serve as a basis for the development of a creative piece and is singled as the most problematic to be presented as academic research.

A few years later, Archer (1995) published another piece of work furthering the comprehension of research through practitioner action. This author emphasises the need to confront any research effort with his definition of academic research, which he outlines as “*systematic enquiry whose goal is communicable knowledge*” (p. 10). Based on this definition, Archer dismisses investigations that, although relevant to the development of a defined piece of work, do not generate new knowledge that has been systematically acquired and possible to be shared among members of a particular disciplinary domain. Along with the categories of *research about practice* and *for the purpose of practice*, which closely mirror Frayling’s first two definitions, Archer introduces a new category, *research through practice*, which is designed to embody, test or explore an individual problem through its concretisation in a tangible form. As Archer explains, this type of research is reserved to circumstances in which “*the best or only way to shed light on a proposition, a principle, a material, a process or a function is to attempt to construct something, or to enact something, calculated to explore, embody or test it*” (p. 12).

At this point it is useful to compare the *practice as research* framework with its equivalent in the French academic tradition, known as *research-creation* (Chapman & Sawchuk, 2012). Within this framework, Archer’s category of *research through practice* can be matched with the approach described as *research from creation*, where a creative piece or pieces of work are used as means to generate research data that can be used to understand different dynamics. It is worthy to note that the gathered data do not simply come at the end when assessing the effectiveness of the work produced, but the work itself can be used to generate information that sheds light into the research problem. From a more practical point of view, the method usually involves iterative design and testing with the participation of individuals or groups representative of the intended product’s audience.

Therefore, I consider the present study as *action-research through creative practice*, a methodology that can be broadly defined as the “*systematic enquiry conducted through the medium of practical action; calculated to devise, test new or newly imported information, ideas, forms or procedures and generating communicable knowledge*” (Archer, 1995, p. 11).

3.4 Action research in game studies

Game studies (defined as the critical study of ludic systems) is an academic field still in the process of defining its epistemological boundaries and valid methods of study. Eladhari & Ollila (2012), in this respect, claims that:

It is vital for the future of the field of game research that methods from other fields of study are adapted to the nature and essence of games, and that new methods are developed for this research field. It is important to discuss the methodological challenges in the field of research, where it is not uncommon that success criteria are imported from other fields, sometimes not considering the profound aesthetic nature of games (p. 392)

As this novel area of study first appeared in already established departments, such as media studies, literary studies, sociology or computer science, it promptly borrowed the analytical frameworks and research methodologies from these fields, and only in recent years a serious effort has been made to develop methods of its own (Björk & Holopainen, 2003). A result of this is the relative lack of systematic methodologies to research games as ludic systems, a fact that has been stressed by different scholars within game studies (Aarseth, 2003; Konzack, 2002; Consalvo, 2006; Björk & Holopainen, 2003).

In an early effort to address this problem, game scholar Espen Aarseth (2003) proposed three possible methods to study games. The first method focuses on the design, rules, mechanics and other structural components and is carried out by analysing the game's code and by interviewing the developers responsible for implementing systems and making design decisions. The second method concentrates on the experience of players, relying on the observation of people playing the games, along with the examination of reviews, forums and other manifestations produced by gamer communities. Finally, this author mentions the alternative of researchers playing the game themselves; a method that he regards as the most effective among all three. Independently of the method chosen to collect information, Aarseth stresses the importance of having a conceptual model to guide the researcher in defining *what to see* (the superficial or inner structure of games) and *how to look at it* (specifying the epistemological perspective applied to the object of study). Aarseth proposes a three-part model in which gameplay, game-structure and game-world are defined as separate systems, each one with its own identifiable components and disciplinary approaches to studying them. Undoubtedly, Aarseth's model significantly contributes to the effort of constructing frameworks for a more systematic study of

games but by following its reductionist approach of dissecting games into separate components, it also risks overlooking their functioning as a whole.

Further, Aarseth's exclusive focus in researching existent games, studied either by revealing their inner algorithmic structures or by watching people playing them in testing sessions, renders problematic the study of research areas for which specific game referents have not yet been produced. In spite of the myriad of existent commercial games, we can argue that many problems still lie in *terra incognita*. This particular problem is acknowledged by game researchers Mateas and Stern (2005) who propose an alternative methodology, complementary to the study of existing games, driven by the development of experimental game prototypes as a way to research new design problems and context of use. In their words:

Building games that explore new regions of design space helps uncover game forms that commercial developers have not yet ventured into, and allows us to directly experiment with some of the most vexing questions in game studies, helping the field avoid making taxonomic and prescriptive errors (Mateas & Stern, 2005, p.2).

According to game scholar Erick Zimmerman (2003), the key to successfully integrating research into a design process, relies on the existence of “*an ongoing dialogue between the designers, the design, and the testing audience*” (p. 176), in order to expand the research beyond the limited scope of the specific product being produced.

Despite the large amount of commercially published games that in one way or another deal with historical subjects, and the comparatively small number of games produced in academic circles for research purposes, the study of games as a historical medium still remains largely unexplored. Although some researchers have raised interesting points after examining existent games, still many important aspects remain unclear. To further the understanding of these ill-defined areas, the systematic enquiry on historical games needs to go beyond the study of existent products in order to explore new design hypotheses and test the validity of provisional theories and models of game-based historical learning. To do this, *experimental game prototyping* and *play-testing* methods have been selected as the central approaches to guide this doctoral research.

Experimental game prototypes, also known as *demonstrators* or *sketches* (Buxton, 2007) can be generally defined as “*anything that can be interacted with and demonstrate how a system works*” (Eladhari & Ollila, 2012, p. 395). Within a research context, prototypes are not built with the intent to represent finished, polished products that contain all the elements normally found in commercially published games, but rather consist of

relatively inexpensive applications designed to gain an insight on one or more aspects of the design problem. As such, research prototypes can be produced to test complete hour-long or day-long gaming experiences, or to concentrate on very specific parts of the research problem through small demonstrations. Moreover, as an integral part of an action-research process, prototypes must be conceptualised as *thinking tools*, not just capable of putting design hypotheses to the test, but also as tools to discover aspects not initially thought. In this sense, prototypes should be constructed in a way that mimics the fluidity and freedom of movement provided by a pencil and drawing board, where ideas not yet fully formed find their way of becoming concretised in the free and creative juxtaposition of lines.⁹ For this reason, prototypes should also be “*quick, timely, inexpensive, disposable and plentiful*” (Buxton, 2007, n.p.), ideally liberating the researcher from the pain of discarding parts or systems that are costly and time-consuming to build. Inscribed within a process of iterative development, prototypes are designed to be used in play-testing sessions, where they are “*played, evaluated, adjusted and played again, allowing the designer or design team to base decisions on the successive iterations or versions of the game*” (Salen & Zimmerman, 2004, p. 11).

Depending on the stage of the project and the specific aspects to be tested, the type and structure of the play-testing sessions may vary. Eladhari & Ollila (2012) distinguishes between eight different types of sessions, summarised in the following table (Table 3.1).

Table 3.1: Play-testing methods more commonly used in games development.

PLAY-TEST TYPE	DESCRIPTION	STAGE
Ad-hoc test	Quick and informal test done with minimal organisation. This type of test is very commonly done during development by asking a colleague not working in the project to test a certain aspect of the prototype.	Early
Focus test	A group of participants from the intended audience are asked about their perceptions, attitudes, beliefs and opinions towards a prototype. Follows a typical focus-group structure.	Early
Expert evaluation	The prototype is played and evaluated by someone with a professional training or experience to make informed judgements about the systems in place.	Early

⁹ Donald Schön (1992) refers to drawing or sketching as as a reflective practice where the designer engages in a process of ‘*knowing-in-action*’ where he or she works not just with the mind but also with the body and senses. In this creative process, the designer sees, draws, and sees again, discovering what is in ‘*there*’. In the representation that is organically formed, the designer not just registers information, but also constructs meaning.

Participatory design workshop	Conducted by the production team and a number of invited guests, including potential players and/or experts. Active involvement of participants in guiding the design efforts.	Early
Functional test (QA)	Conducted by the production team or QA experts. The purpose is to identify functionality problems and balance gameplay experience.	Along the process, later stages
Guided scenarios	A member of the development team assumes the role of a leader, simulating user interaction. The particular scenario is ‘played’ using a variety of representational means (maps, spreadsheets, etc.)	Along the process
Game mastered playing sessions	Several participants interact with a prototype or specific scenarios designed for the prototype. Interaction is guided by a game master, with expert knowledge of the rules and systems functioning.	Along the process
Free-form playing sessions	Participants interact with the prototype unaided by test-leaders or game-masters. Sessions are recorded or observed in real time by key members of the development team.	Along the process

Manifestly, Eladhari & Ollila's play-test categorisation effectively summarises the most common methods used in the games industry to evaluate prototypes and guide the subsequent design efforts, but the specifics of their implementation had to be reviewed and adapted to be used in this research project, where the goals of play-testing were not focused in the development of a polished product, but on answering a set of predefined research questions. The way in which this project used play-testing as a research method will be detailed in the following sections.

3.5 Action research in education

Action research in education has a young but well-documented tradition in academia, and can be closely associated with the method known as *design-based research*. First outlined by Brown (1992) and Collins (1992), this approach aims to study learning processes in the real setting of classrooms and appears as an alternative to experimental laboratory-based research methods, which are often criticised for paying little or no attention to the multiple and uncontrollable variables that characterise authentic educational settings. In contrast, design-based research is carried within the *messiness* of real school/university settings, when a new educational design, product or methodology is implemented, tested and iteratively refined from the data collected. In terms of research outcomes, this methodology aims to produce new theories, artefacts and practices with the potential to impact learning and teaching in naturalistic educational settings (Cobb, diSessa, Lehrer & Schauble, 2003 in Squire & Barab, 2004c).

Iterative design, understood in this context as the progressive evolution of the chosen intervention in cycles of design, testing and refinement, constitutes one of the most crucial aspects of action research. Every time a new design is implemented and put to the test, qualitative and quantitative data is gathered through a variety of methods. This data is then used to evaluate the design, detecting problems and eventually discovering new design directions. As the process continues in new cycles of design, evaluation and refinement, the intervention is perfected, resulting in a better design along with theoretical insights arising from the validation or contradiction of its design hypothesis.

Determinant for the successful implementation of this approach is its framing as a way of generating new knowledge about the teaching practice, and not just the development of a unique teaching experience. For this to happen, the researcher(s) involved are required to “*generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field*” (Squire & Barab, 2004c). Although this research does not have the resources of a large-scale study, it nevertheless needs to be designed to gain an understanding of the research problem beyond the limits of a particular educational intervention, using the design and contextual implementation of a game-based historical learning experience to further the understanding of this particular field.

3.6 Research strategy

Succinctly, this research project was designed to explore, reflect and evaluate, through the establishment of an ongoing dialogue between practice and theory, the effectiveness of video games as educational instruments for learning and teaching history. This process was divided into two stages. The first phase (*Design and development process*) involved the construction of provisional theories of historical game-based learning through the iterative development and expert evaluation of a series of game prototypes. The second phase (*School pilot implementation*) consisted of the pilot implementation and evaluation of a final digital game prototype in the authentic setting of a primary school classroom.

3.6.1 Relation to research questions

Although both the first and second phase of this study were directly related to the stated research questions, the contribution of each stage in answering them varied considerably. In what follows, I will briefly outline the ways in which each stage was aligned with the project's research goals.

1. **Research question 1:** *Can digital games be considered a suitable medium for historical representation?*

Although this question was formulated in a binary fashion, its exploration intended to move the discussion beyond a simplistic *yes* or *no* answer. To gain a better understanding of video games as historical mediums, with an emphasis on the advantages and drawbacks of using them in educational settings, a thorough review of the relevant literature was undertaken. Special attention was given in identifying the most important discussions and debates raised by authors from different fields. As the project advanced through the creative iterative production and testing of game prototypes, these discussions were revisited and reflected upon in the light of the critical reflections and situated experience acquired through the engagement with the creative practice.

2. **Research question 2:** *Which defining characteristics of digital games are relevant and advantageous for producing a historical representation?*

Through exploring the defining properties of digital games, this question intended to lead to the construction of conceptual models and frameworks describing the ways in which games can act as mediators of historical content. In the same way as with the previous question, this inquiry finds its steppingstone in the review of the existing literature, which was critically analysed vis-a-vis the experience acquired by constructing and implementing historical game prototypes into authentic educational settings.

3. **Research question 3:** *How can historical digital games be designed to foster the meaningful understanding of history in formal educational settings?*

Deliberately composed to be prescriptive, this question aimed to identify the most important factors to take into consideration when designing historical game-based learning experiences. While this research focuses in gathering data from the pilot implementation of the game prototypes in the formal space of a primary classroom, the project was also committed to the identification of design principles, guidelines and methodologies originating from formal learning contexts with the potential of being effectively translated to environments outside schools. During the first phase, the reflective engagement with the design and production of playable prototypes, along with their reviewing by experts from related disciplines, has been sketched out as a means to form provisional theories of historical game design. These theories, in the second phase of the project are

interrogated in the light of the conclusions reached by the analysis of the data obtained in the school classrooms.

3.6.2 Design and development process

At a fundamental level, *design* is a process that seeks to solve a problem and, in this respect, presents striking similarities with the traditional research process. Every time a designer engages in applying their professional skills to propose a solution, their work relies on understanding the context of the problem, which could also be seen as a form of inquiry. However, this process is neither linear nor systematic (as we normally find in scientific research), but it is rather messy, non-linear, emergent and unpredictable. Most commonly, designers find themselves in cycles rotating between understanding the problem and attempting possible solutions, testing, gathering data, refining and experimenting. The process of reaching a conclusion from all these actions appears messy as “*it calls for a divergent thinking approach to creativity, it is emergent and appears to be very improvisational*” (Munro, 2011, p. 160). From the perspective of design as research, the task of aligning the conclusions obtained by designing and testing prototypes with the paradigms behind *good research* – a process capable of producing evidence to support conclusions and of generating new knowledge or epistemological gain – becomes ever more challenging. How can we frame the design, development and testing of historical game prototypes as a valid research process?

According to Maher, Poon & Boulanger (1996) the reflective conversation established between the designer and the design situation can be better described as a *co-evolutionary process*, where an initial definition of a design problem is interrogated and re-formulated in the light of the discoveries emerging from the reflective analysis of the attempted solutions. In this way, the design process can be conceived as a parallel evolution of two interdependent dimensions: the *problem space* (where the design goals and requirements of the situation become more focused) and the *solution space* (where possible answers emerge from the creative engagement with the problem).

An initial definition of the problem space was formulated by outlining the experimental design process of this research according to this scheme. From this initial definition, a series of game prototypes were produced. Each one of these prototypes embodied a number of design decisions in a playable or testable form that could be communicated and assessed with the help of experts from different related disciplines (historians, archaeologists and educators). With each new cycle of prototype development, the problem space was assessed and re-formulated based on

the critical reflection of the knowledge and experiences gained through development, testing and expert review. This rationale can be visualised in the following diagram (Fig. 3.1, adapted from Maher et al. 1996).

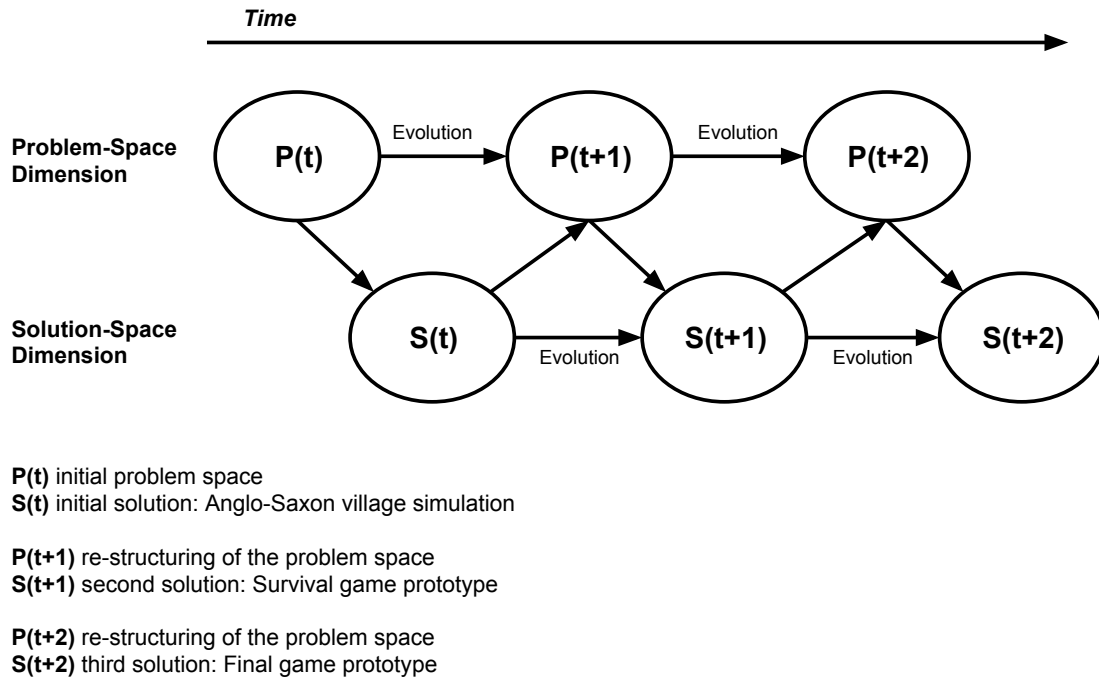


Figure 3.1: Design as a co-evolutionary process, adapted from Maher et al. 1996.

3.6.2.1 Iterative game prototyping

During this phase, this research project relied on the iterative development and reflective/reflexive analysis of a series of game prototypes, which were produced with the intention of materialising design ideas and provisional models of game-based historical learning.¹⁰ Throughout this creative exploration, each one of the prototypes produced constituted in itself an *experiment*: the materialisation of design ideas, models and metaphors in a testable form. This phase provided valuable insights not just as a *process* (i.e. analysing in retrospect the design decisions taken during development) but also as a *product*. As complex artefacts composed of a myriad of digital files, games can also be studied by looking at their constitutive elements. Game code, 2D and 3D art, narratives and systems, are all elements that carry the relationships and demands from the “*cultural idiosyncrasy*” of their creator, the “*modes of doing things*” from the domain and the theoretical, philosophical, technical and aesthetic paradigms of the discipline involved in their design (Sawyer, 2006).

¹⁰ During this phase, ad-hoc tests (Eladhari & Ollila, 2012) were used extensively during the development to find and correct problems with the prototype’s functionality. See section 3.3 for more information.

Hence, the design of historical game prototypes provided two different albeit interrelated sources of research data: *testing data* and *production files*. While these sources were certainly capable of providing valuable insights into the design process, they revealed little about the mental processes, conscious and subconscious, that accompanied the often convoluted process of bringing design concepts to a concrete form. For Munro (2011), these moments can be *reflective*, occurring “*moment to moment*” as the designer ponders what just happened and spontaneously tries out new directions in the design, or *reflexive* as the designer retrospectively looks at his work in a much more conscious, deliberate and ponderous fashion. To gain access to these moments, a third form of data collection was needed. The data source chosen for this purpose were *design diaries*, as series of notebooks set to capture “*the events that occur during the development of the design, as these events unfold. These events can be visual, inspirational, theoretical, cognitive, comparative, theoretical or simply anecdotal*” (p. 162).

By establishing a dialogical relationship between the creative artefacts, their production files and design diaries, the study intended to bridge the epistemological pitfalls resulting from the separation between theory and practice. By linking experience, practice and theory in the production of something tangible, the study aimed to produce “*knowledge that operates in relation to established knowledge and thus has the capacity to extend or alter what is known*” (Barret, 2010, p. 145). Also useful for the conceptualisation of this process is Schön’s concept (1985) of “*reflection in practice*”. As Schön stated: “*doing and thinking are complementary. Doing extends thinking in the tests, moves, and probes of experimental action, and reflection feeds on doing and its results. Each feeds the other, and each sets boundaries for the other*” (p. 280).

3.6.2.2 Expert reviews

At different stages of the development of the game prototypes, the project was presented to and reviewed by historians, archaeologists and history teachers in evaluation sessions and participatory design workshops (Eladhari & Ollila, 2012). This evaluation was considered necessary due to the interdisciplinary nature of this work, which depended on establishing a productive dialogue between all involved subject areas. In the same way that creative research results in emergent approaches, it also becomes transgressive of the boundaries between disciplinary knowledge, trespassing borderlines and reinventing social relationships between domains (Barret & Bolt, 2010). Far from being an impediment, these transgressions are a necessary condition for the

emergence of new analogies, metaphors and models not readily available within the bounds of one specific domain.

As an exploratory method, expert interviews have long been regarded as a productive and efficient way to obtain useful insights, especially during the first stages of the research (Bogner, Littig & Menz, 2009). Within the context of this study, the reviewing sessions with experts served different purposes. First, it ensured the game's content accuracy from a historical perspective. With this in mind, the project was presented to archaeologists who specialise in the chosen historical period (which is described in the next chapter). A second function of these evaluations was to stimulate – through conversations with researchers within historical game studies – critiques and alternative points of view in regard to the design decisions taken, eventually resulting in new directions to explore. A third function of this process concerned the comparison of this project with other initiatives of historical game-based learning. Finally, but by no means of less importance, the discussions and evaluations with experts served the purpose of establishing links with researchers and research groups studying games as historical mediums.

3.6.3 School pilot implementation

During this stage, the research was transferred into the formal educational setting of a primary school classroom, Key Stage 2 (8 – 11 years old). Defined as a pilot test, the primary goal of this stage was to investigate the ways in which the digital game prototype could be successfully integrated and used within a formal educational context, studying the limitations and constraints of this particular setting. Following the guiding principles of design-based research, an array of qualitative and quantitative methods were employed to evaluate the game prototype.

The pilot test adopted a pre-test and post-test design. This methodological approach, commonly used in educational research, is employed to provide evidence of changes caused by a particular educational intervention. In general terms, it involves gathering data concerning an outcome of interest before the administration of the intervention, followed by a post-test studying the changes that occurred on the same measure(s) of interest (Bell, 2010). Pretest-posttest designs are commonly employed in both experimental and quasi-experimental research and can be implemented with or without control groups.

3.6.3.1 Preparation

During this phase, preparatory meetings with the school teacher were conducted. In these meetings the details of the implementation were discussed, along with the previous game-based learning experiences carried out by the school. Also, the potential problems (e.g. ethical, technical, methodological, etc.) foreseen by the teacher were considered important to be reviewed. Additionally, a visit to the classroom space was conducted, along with the documentation of some of the activities already done by the pupils in the history class.

3.6.3.2 Pre-playtest

At this phase, two methods were combined: children were asked to communicate their ideas through drawings, and while they were drawing, semi-structured interviews were conducted with them. This “*talk and draw*” (Prosser, 2007, p. 22) approach was selected primarily due to the age of the target group. Between 8 and 11 years old, many children have not yet developed the ability to use abstract linguistic expressions, but commonly feel comfortable resorting to symbolic means of communication, such as drawing, to express themselves. Visual research methods such as this are recommended by different scholars as an advantageous method to study children’s perceptions, knowledge, attitudes and beliefs. Kitahara and Matsuishi (2006), for example, state that drawing “*tends to recount far more things to the reader than language*” (p. 10).

The semi-structured interviews conducted while children worked in their drawings adopted the form of informal conversations where they were encouraged to talk about their creations. Through this method, researchers are able to “*access young children’s views and experiences by listening to children as they draw and paying attention to their narratives and interpretations*” (Einarsdottir, Dockett & Perry, 2009, p. 217). Talking about their drawings, children can expand on their ideas, narratives, and mental processes, providing information that is not so evident while studying their drawings alone.

3.6.3.3 Playtest

At this phase, the historical game prototype was played by children in a free-form play-testing session (Eladhari & Ollila, 2012), and their performance was recorded through the game’s inbuilt tracking systems. In this way, useful data, such as player’s navigation, actions, behaviours and strategies was collected for later analysis. At this session, the teacher’s active involvement was considered vital; she provided support

with structuring the session and ensured that the planned activities remained aligned with the curriculum goals.

3.6.3.4 Post-playtest

In this final session, the set of activities and data collection methods used during the pre-playtest phase were repeated, with the aim to collect data to compare with the first session. In the same way as before, children were asked to draw a subjective representation of the historical world, and informal semi-structured interviews were used to further investigate their ideas and assumptions.

3.6.4 Data analysis

This research project relied on the collection and analysis of a variety of data, obtained through various sources and techniques. This made the task of finding and implementing methods capable of aligning the analysis with the stated research questions challenging. The adoption of a mixed-method approach was considered beneficial, as it allowed the application of triangulation to strengthen the interpretation of the collected data. Holtzhausen (2001), citing multiple authors, states that triangulation within research:

involves the conscious combination of quantitative and qualitative methodologies as a powerful solution to strengthen a research design where the logic is based on the fact that a single method can never adequately solve the problem of rival causal factors (n.p.)

This process can be focused on *data*, which entails the cross-checking of consistency between data obtained from multiple sources, and/or be directed to the selected research *methods*, combining qualitative and quantitative methods in adherence to the argument that a “*single data collection method is insufficient to provide adequate and accurate research results*” (Holtzhausen, 2001, para. 22).

As the first phase of the project focussed on the creative production of game prototypes, the data consisted of game binaries and assets (i.e. game coding files, 2D and 3D game art, etc.), as well as a collection of development diaries and notes documenting different aspects of their design process. The presentation of the project to experts from relevant fields yielded data from the discussions, suggestions and general feedback received during these sessions. All these sources of data were used to critically reflect on the game prototypes at different stages in the development. In the second phase, the project adopted a design-based research

approach and was organised following a *pre-test/post-test* design. The specifics of the research methods and type of data collected during each phase are presented in the following table (Table 3.2).

Table 3.2: Research methods, data and analysis frameworks for each phase of the project.

PHASE / SUB-PHASE	RESEARCH METHOD	RESEARCH DATA	ANALYSIS
Phase 1. Design process (Action research through practitioner action)			
Iterative game prototyping	<ul style="list-style-type: none"> Experimental game prototyping 	<ul style="list-style-type: none"> Game playable demos and demonstration videos (Appendix A) Development diaries (Appendix C) Game production files (code, assets) 	Auto-ethnographic methods
Expert evaluation	<ul style="list-style-type: none"> Expert evaluation testing Focus test 	<ul style="list-style-type: none"> Interview data 	Thematic analysis
Phase 2. School implementation (Design-based research)			
Preparation	<ul style="list-style-type: none"> Semi-structured interviews 	<ul style="list-style-type: none"> Interview data (Appendix E) 	Thematic analysis
Pre-playtest	<ul style="list-style-type: none"> Visual research Semi-structured interviews 	<ul style="list-style-type: none"> Children's drawings and interviews (Appendix F) 	Grounded theory
Play-test	<ul style="list-style-type: none"> Visual analytics 	<ul style="list-style-type: none"> In-game data (Appendix G) 	Player dossier (Medler, 2012)
Post-playtest	<ul style="list-style-type: none"> Visual research Semi-structured interviews 	<ul style="list-style-type: none"> Children's drawings and interviews (Appendix H) 	Grounded theory
Wrapping-up	<ul style="list-style-type: none"> Expert evaluation testing Focus test 	<ul style="list-style-type: none"> Interview data (Appendix E) 	Thematic analysis

In summary, three main approaches were selected for the collection and analysis of data:

1. *Auto-ethnographic methods* were used to evaluate the subjective process of designing the game prototypes
2. The methods from *grounded theory* and *thematic analysis* were used to analyse qualitative data obtained from interviews and play-testing sessions; and finally
3. *Player dossier* (Medler, 2012) techniques were used for the quantitative analysis of the data collected via the in-game systems.

Each one of these methods is described in more detail below.

3.6.4.1 Auto-ethnographies

Auto-ethnographic methods were chosen to analyse the process of designing and developing historical game artefacts. As Chang (2016) explains, auto-ethnography is a method that shares common storytelling attributes with other genres of self-narrative, but focuses on the cultural analysis and interpretation of the material rather than its mere construction as a succession of events. This method provides an advantageous way of gaining the necessary distance from the personal involvement in the process described, so it can be analysed and communicated in a more objective fashion.

As explained, design is an emergent process, where in the gradual concretisation of ideas in tangible forms, the designer fluctuates continuously between understanding the conceptual space defined by the problem they attempt to solve and the movements that stack-up in their proposed solutions. This process, as Munro (2011) explains, is emergent, therefore “*the very act of emergence becomes important*” (p. 162). According to this author, the design process can be seen as integrated by defining moments; first, there is a *reflective moment*, where the designer quickly and spontaneously ponders what they have done and transfers the analysis of the design situation to new movements in a way that, when conducted with proficiency, appears to flow. In a second *reflexive moment*, the designer, in a more conscious and deliberate way, attempts to find the rationality in their production, seeking to justify the decisions taken in a way that can be communicated, hopefully with a good level of persuasion, to other people involved.

In the case of applying these methods to the design of digital games, a further complication emerges from the dissimilar type of files involved in their creation. During a pre-production phase, game design typically involves the production of definitions for the aesthetic, ludic and narrative experiences brought by the product, which in a production phase will translate to two and three dimensional art, virtual environments, and thousands of lines of computer code. How can all these separate elements be captured and analysed without losing the perspective of the design decisions that connect them all together? For Munro (2011), one of the best tools to keep track of the narrative of a project is a *design diary or journal*, a medium that allows to “*capture the events that occur during the development of the design, as these events unfold. These events can be visual, inspirational, theoretical, cognitive, comparative, theoretical or simply anecdotal*” (p. 162).

By integrating the design diary with the design process, both the reflective and reflexive moments involved in the “*move experiments*” (Schön, 1992) of each one of the prototypes are captured and used as research information. While the reflective analysis provides the data to understand the decision making-thoughts “*as they unfold in the time that they unfold*” (Munro, 2011, p. 162), the reflexive analysis of the design diaries and production files provides the grounds to systematise all these sources of information with the perspectival distance acquired from seeing the design artefact after its completion. This allows the designer-researcher to draw theoretical connections between the design ideas and the consulted literature, producing new models, principles and explanations in relation to the project’s research questions.

3.6.4.2 Grounded theory

Grounded theory has been adopted as the preferred method for the analysis of the quantitative information obtained in play-testing sessions. This method is credited to the collaborative effort of researchers Barney Glaser and Anselm Strauss¹¹ (1967). In general terms,

[g]rounded theory is an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data” (Glaser & Strauss, 1967 in Martin & Turner, 1986, p. 141)

An important characteristic of grounded theory is that it does not require the researcher to begin the study with the precise definition of a set of hypotheses, a requirement often difficult or impossible to achieve when dealing with social contexts. As such, the method provided greater freedom to explore a research domain, allowing issues to emerge from the data (Jones & Alony, 2011).

Described in more practical terms, this methodology is led by the combined implementation of two methods: *coding* and *memoing*. Coding involves the iterative process of “*organising a large amount of data into smaller segments that, when needed, can be retrieved easily*” (Bailey, 2007, p. 127). In other words, the data is initially labelled with the goal of defining categories; then, these labels are gradually refined in search of concepts or terms that better describe the information at hand. According to Jones and Alony (2011), the process of coding can be organised into three stages. First, the analysis starts with an *open or initial coding*, where the researcher reads and re-reads the data and

¹¹ Although this research method originated from the combined efforts of Glaser and Strauss, at an early point both authors diverged in their approaches, resulting in two distinct methodological strands with minor differences (Jones & Alony, 2011, p. 99).

codes as much as possible. During this process, constant comparison between the data and memoing (taking tentative notes attempting to explain the labels and linking between concepts) is used to make a first organisation of the data. The general goal is to obtain as many categories as possible, resulting in themes, sub-categories and core categories from constant comparison between codes. In the following phase, *selective coding*, the researcher continues comparing and memoing, but instead of seeking to code as much as possible, more emphasis is given on identifying dense, saturated, core categories. Finally, in the phase known as *theoretical coding*, the core categories are sorted and cross-referenced with the literature, with the intention of building theoretical models explaining the phenomena being researched.

3.6.4.3 Thematic analysis

Thematic analysis is a widely used method in qualitative research and, in the context of this research, has been selected for the analysis of the data obtained from expert evaluation sessions and participatory design workshops (see 3.5.2.2). According to Braun & Clarke (2006), this method generally consist of “*identifying, analysing, and reporting patterns (themes) within data*” (p. 82). The main goal of this analytical process is to identify the patterns in the data that are relevant to the subject of study, establishing themes to further its understanding. Braun & Clarke distinguish between two levels of themes: *semantic* and *latent*. Semantic themes emerge from the analysis of data without making inferences beyond what a participant has said or what has been written. In contrast, latent themes are developed by moving the analysis beyond the surface level of the data, focusing on interpreting and explaining what has been said. At this level the researcher “*starts to identify or examine the underlying ideas, assumptions, and conceptualisations—and ideologies—that are theorised as shaping or informing the semantic content of the data*” (p.84).

3.6.4.4 Player dossier

This method was adopted to analyse the data obtained in the second phase of the project, where the final game prototype was implemented and tested in the real setting of a school classroom. The collection of in-game data (the record of the participant’s/player’s movements, actions and decisions) was considered of critical importance. For this purpose, the research framework described by Medler (2012) under the name “*player dossier*” was followed. This data-driven method comprises of the player’s gameplay data in a report that “*presents a player’s past gameplay by using statistical and*

visualisation methods” (para. 1), allowing the researcher to gain valuable insights into the past playing session.

According to Medler, player dossiers are composed of two main components: *data-driven reports* and *player’s gameplay data*. The first component comprises of general information about the gameplay session that can be compared to other players’ gameplay performance or with sessions from the same player at a different moment in time. Depending on the complexity of the game, this component may include a few numerical points describing the player’s session (length of play, win and loss ratios, etc.), or thousands of data points in the case of big triple A titles. The second component includes data from telemetric software built into the game code itself, and consists of records of player actions and related game events (Medler, John & Lane, 2011).

Taking the model of game-player interaction proposed by Galloway (2006) as reference (described in section 2.2.2.2), Medler et al. argues that player actions can be broken down into diegetic and non-diegetic, depending on the extent to which they belong or not to the fictional world of the game. In the specific context of this research, the emphasis is set on tracking the diegetic player actions.

3.7 Chapter summary

This chapter described the methodological model defined for this research. This model followed a *social constructivist* ontology, aligning the investigation with *subjective* and *interpretive* research philosophies. In line with these ontological and philosophical definitions, the method known as *action-research through creative practice* was selected as the most appropriate way to explore the problems posed by this project’s research questions. These method-specific characteristics were revised according to its application to the research contexts related to this project: arts and design, game studies and education. Following this method’s principles, the research design was structured into two phases. In the first phase, the research focused on the iterative design, development and critical analysis of historical game prototypes. In the second phase, the final game prototype emerging from this process was integrated and tested within the history curriculum of a primary school.

One of the most important challenges in defining a methodological approach for this investigation concerned the need for systematically generate “*communicable knowledge*” (Archer, 1995) from design, a process inherently messy, non-linear, emergent

and improvisational (Munro, 2011). For this, and following the model proposed by Maher, Poon & Boulanger (1996), the methodology was conceptualised as a dialogue between the *problem* and *solution* spaces. As the project advanced through iterative steps of design and critical reflection, both dimensions were set to communicate with each other, becoming both progressively more complex and defined. In recognition of the multidisciplinary nature of this investigation, historians, archaeologists and educators were incorporated into this process as expert reviewers, establishing connections with research fields beyond researcher's areas of expertise.

In the next chapters, this research design will be put into action. Chapter 4 will cover the design and development phase, guiding the reader through the different design iterations developed during this research. Following, Chapter 5 will focus on the pilot implementation of the final game within a primary school, putting into practice design-based research (Brown, 1992; Collins, 1992) methods for the evaluation of the game prototype in a classroom setting.

CHAPTER 4: DESIGN AND DEVELOPMENT PROCESS

4.1 Introduction

This section describes and analyses the different stages in the design and development process of a historical game. In what follows, I will present a systematic description of the design and development process, outlining the rationale behind the decisions that guided the design of the historical game prototypes. While in some cases the theoretical basis for the design decisions came from frameworks already discussed in the literature review, in other cases it required to expand the consulted bibliography with research works not originally included in the initial stages of this project.

4.2 Initial problem space

The initial definition of the problem space, which in the professional design practice is commonly known as *design brief*, constitutes the first stage in most design projects. In general, this document is written with the aim of defining “*the opportunities and limitations of a project, both of which are equally important in discovering the best solution*” (Skolos & Wedell, 2012). When working in teams, the design brief also reduces ambiguity among the people involved in the project, along with increasing their willingness to take risks in the subsequent phases of design (Luchs, Scott & Griffin, 2016). In this case, this initial definition provided a starting point for the project, and was purposely written in broad terms, leaving enough space for the emergence of new design ideas and directions.¹²

4.2.1 Audience and context of use

According to the aims of this research, the primary goal of the historical game prototypes was to gain a better understanding of the aspects that determine the effective implementation of historical games within formal learning environments. In addition, the historical game prototypes targeted primary school pupils from Key stage 2 (8 – 11 years old). At this level, the Department of Education in the United Kingdom [DfE] (2013) suggests that the history programme should inspire the “*pupil’s*

¹² The design brief is similar to the first sketches that a designer starts making when making sense of the design problem at hand. Buxton (2007) claims that these first approaches to the problem need to be ambiguous, leaving “*big enough holes*” so it can be “*interpreted in different ways, even by the person who created it*” (p. 115)

curiosity to know more about the past”, think critically and “*understand the complexity of people’s lives, the process of change, the diversity of societies and relationships between different groups, as well as their own identity and the challenges of their time*” (p. 1). More specifically, the programme states that students at this level should:

- ✧ Continue to develop a chronologically secure knowledge and understanding of British, local and world history, establishing clear narratives within and across the periods they study.
- ✧ Note connections, contrasts and trends over time and develop the appropriate use of historical terms.
- ✧ Regularly address and sometimes devise historically valid questions about change, cause, similarity and difference, and significance.
- ✧ Construct informed responses that involve thoughtful selection and organisation of relevant historical information.
- ✧ Understand how our knowledge of the past is constructed from a range of sources.

In terms of the content expected to be revised by pupils at this stage, the programme states that teachers should combine general and in-depth studies of both British and World history, helping pupils to “*understand both the long arc of development and the complexity of specific aspects of the content*” (p. 3). In particular, the curriculum comprises of changes in Britain from the Stone Age to the time of Edward the Confessor, the achievement of earliest civilisations, and the comparative study of a non-European society that provides contrasts with British history.

The chosen historical content for the game prototypes was the early stage of the Anglo-Saxon era; the time when Germanic tribes arrived and settled in Britain after the departure of the Romans around AD 410. This period was selected due to the lack of importance given to medieval and ancient history in comparison to more recent periods of British history, resulting in many students leaving school with little or no knowledge of this period.¹³ The DfE suggests a list of possible topics to work with pupils of key stage 2:

- ✧ Roman withdrawal from Britain in c. AD 410 and the fall of the western Roman Empire

¹³ Houghton (2016), for example, claims that undergraduate students of ancient and medieval history often are only introduced to this period after entering the university. This claim is in accordance with independent reports about the History curriculum currently taught, which argue that “*hardly any*’ GCSE courses cover subjects prior to 1870”. Likewise, the late Middle Ages appear to be missing from A-levels. This is reported in news articles such as <https://www.telegraph.co.uk/education/educationnews/9229379/Pupils-failing-to-study-British-history-at-school.html>.

- ✧ Scots invasions from Ireland to north Britain (now Scotland)
- ✧ Anglo-Saxon invasions, settlements and kingdoms: place names and village life
- ✧ Anglo-Saxon art and culture
- ✧ Christian conversion

As the game prototypes were planned to be used as part of the learning resources of a primary school History curriculum, some initial requirements were also considered:

- ✧ *Level of complexity.* According to McCall's (2016) recommended practices (discussed in section 2.4.3), the game prototypes needed to take into account the time that potentially takes for a pupil to learn how to play. To this effect, it was considered important to design a game that could be played quickly after a short introduction, learning new aspects of its interface and functioning as players progress through it.
- ✧ *Duration of playing sessions.* Each playing session should act as a self-contained learning unit and not exceed the duration of a school period. Typically, periods last between 40 and 60 minutes, with around 3 to 8 periods per school day.
- ✧ *Content.* McCall recommends to “*explicitly connect the game to course instruction*” (p. 534). Ideally, the game should not just be constructed with consideration of the concepts explored in the course, but also allow the introduction of new content following its classroom implementation.
- ✧ *Technology.* Taking into consideration the varied specifications of computers available in primary schools, the game should still be playable in machines with low processor and graphics specs.¹⁴

4.2.2 Historical content overview

As it is possible to discern from historical and archaeological sources, the Anglo-Saxon period was a time of great change in Britain, where the physical character of the people, language, social and cultural institutions were radically transformed. Due to the lack of primary historical sources documenting this period, it is still unclear how this process, in which a significant part of the Celtic British population was replaced by German invaders, took place. For most part of the 20th century it was assumed

¹⁴ For the sake of example, in this research the game prototype was installed in Toshiba 15.4" Laptops with a RAM of 0.5GB of Memory and processor speed of 1.86 GHz. Further information about these computers and the way they were used can be read in section 5.5.

that this was the result of a violent invasion, in which great hordes of Germanic invaders arrived and pushed the native population out of their lands. This account, however, has been called into question in the light of more recent historical and archaeological interpretations.

One of the first primary sources documenting the events of this time is *'The Exidio Britannae'*, the account of the mid-sixth century British monk Gildas (no date), in which he condemns in the strongest terms the events that led to the arrival of the Saxons. In this work Gildas, using an aggressive language, relates how the “proud king” Vortigen [Gurthrigerno] and his councillors brought “fierce and impious” Saxon mercenaries to the country for protection from “the invasions of the northern nations”, the unruly Picts and Scots on the north of Adrian’s wall. The first Saxons arrived on the Eastern shores and worked initially as soldiers in exchange for an allowance in provision supplies. This arrangement however, soon failed to meet their expectations, turning the newcomers against their contractors. Once the conflict was declared, the Saxons brought more troops from their country and started a large scale invasion of the British Isles.

A second account of events of this time is found in *'Historia ecclesiastica gentis Anglorum'*, written in 731 BC by the venerable Bede, a monk from Northumbria (translated in 1898 by Miller, T.). In the first of five books, Bede narrates the history of England, starting with Caesar’s invasion in 55 BC. For the beginning of the Anglo-Saxon period, Bede refers to Gildas, adhering to his account of a large scale invasion of “barbarous conquerors” taking control of every part of the British island. In Bede’s words:

Public as well as private structures were overturned; the priests were everywhere slain before the altars; the prelates and the people, without any respect of persons, were destroyed with fire and sword; nor was there any to bury those who had been thus cruelly slaughtered. Some of the miserable remainder, being taken in the mountains, were butchered in heaps; others, spent with hunger, came forth and submitted themselves to the enemy for food, being destined to undergo perpetual servitude, if they were not killed even upon the spot some, with sorrowful hearts, fled beyond the seas. Others, continuing in their own country, led a miserable life among the woods, rocks, and mountains, with scarcely enough food to support life, and expecting every moment to be their last. (p. 26)

Inasmuch as this narrative of a rapid and violent invasion went almost unchallenged for a good part of the 20th century, more recent archaeological research paints a more complex picture of the nature of the Saxon migration and integration

process. In particular, the evidence calls into question the ethnic cleansing narrative sustained by Gildas and Bede, presenting the process not as a single invasion, but as *“a series of intrusions and migrations over a considerable period, differing from region to region, and changing over time even within regions”* (Härke, 2011, p. 19).

In this alternative perspective, the native population interacted with the Saxon arrivers in non-uniform patterns. The analysis of archaeological data shows that during the 5th and 6th centuries, most Anglo-Saxon communities had different proportions of Germanic immigrants and their descendants, and native Britons, making an overall of roughly equal numbers. The social relationships between both groups and their effects in the genetic pool of the resulting population, also appears to differ greatly from site to site. In this respect, Härke (2011) distinguishes between three different patterns of integration. The first pattern corresponds to settlements in which members of both groups live together in households, but with almost no intermarriage between different cultural groups. The second case corresponds to mostly male warband communities in which intermarriage with native females appears to be more common. Finally, a number of Britons subsisted in villages outside the Anglo-Saxon settlements, becoming soon acculturated with the Germanic arrivers.

4.2.3 Initial design goals

Following the definition of pedagogical goals (as stated by the DfE), and the historical content to be translated into video game form, a number of initial design goals were defined. As mentioned, these goals were purposely phrased in general terms, serving as broad guidelines for the next phases of the project.

1. Design goal 1: To give players access to a historically accurate representation of the Anglo-Saxon world.

Players should be able to explore the physical landscape of early medieval England, visiting representative buildings and interacting with objects and tools of cultural significance.

2. Design goal 2: To understand the processes of historical change.

The game should communicate how people lived in Anglo-Saxon time, encouraging players to analyse everyday life from multiple perspectives, gaining insights into historical significance, change and continuity, and cause and effect.

3. Design goal 3: To interact with the people from the past.

The game should be capable of bringing players inside the social environment of Anglo-Saxon Britain, displaying a world populated by agents capable of expressing social and cultural patterns of interaction with other agents and the environment.

4. Design goal 4: To convey historically based narratives of the chosen period.

To communicate narrative layers conveying factual and evidence-based historical information while also allowing players to participate in the construction of a non-linear storyline.

5. Design goal 5: To motivate pupils to play.

The game needs to be engaging and fun, setting into motion all the mechanisms that make games intrinsically motivating (see section 2.2.3).

6. Design goal 6: To encourage a critical reading of the game as a historical source.

The game needs to be considered as another interpretation of the past, not necessarily more valid than other representations of the same period.

4.3 Solution space: game prototyping

A series of digital game prototypes were produced in iterative cycles of design, critical evaluation and refinement. Through this process, the design goals initially defined were in some cases extended with sub-goals, providing evidence of the dynamic reconfiguration of the problem space taking place as the project moved along. Each one of the prototypes will be described and critically analysed and emphasis will be given to the key ideas and theoretical frameworks that guided the decision-making process.

4.3.1 Solution 1: Anglo-Saxon village simulation

This first application was developed as a *first sketch* or as a mean to conduct an initial exploration of the problems involved in building a procedural representation of a historical world. To this end, an interactive simulation of an Anglo-Saxon village was defined as the first prototype to build. This simulation had to reproduce, with a certain level of fidelity albeit in simplified terms, how people lived in an early medieval English settlement. Since the prototype focussed on the procedural systems and techniques to simulate everyday life, no ludic interaction was implemented at this point.

4.3.1.1 Design description

The village simulation was constructed with Flash Builder 4 (development application) and Actionscript 3.0 (programming language), and followed an Agent-Based Modelling¹⁵ (ABM) approach. An environment constructed by a hexagonal grid¹⁶ was developed and populated by a series of agents, representative of the human and non-human inhabitants of a typical Anglo-Saxon village. Each one of these agents were designed to exhibit individual behavioural patterns, responsive to changes in the simulated environment (Fig. 4.1).

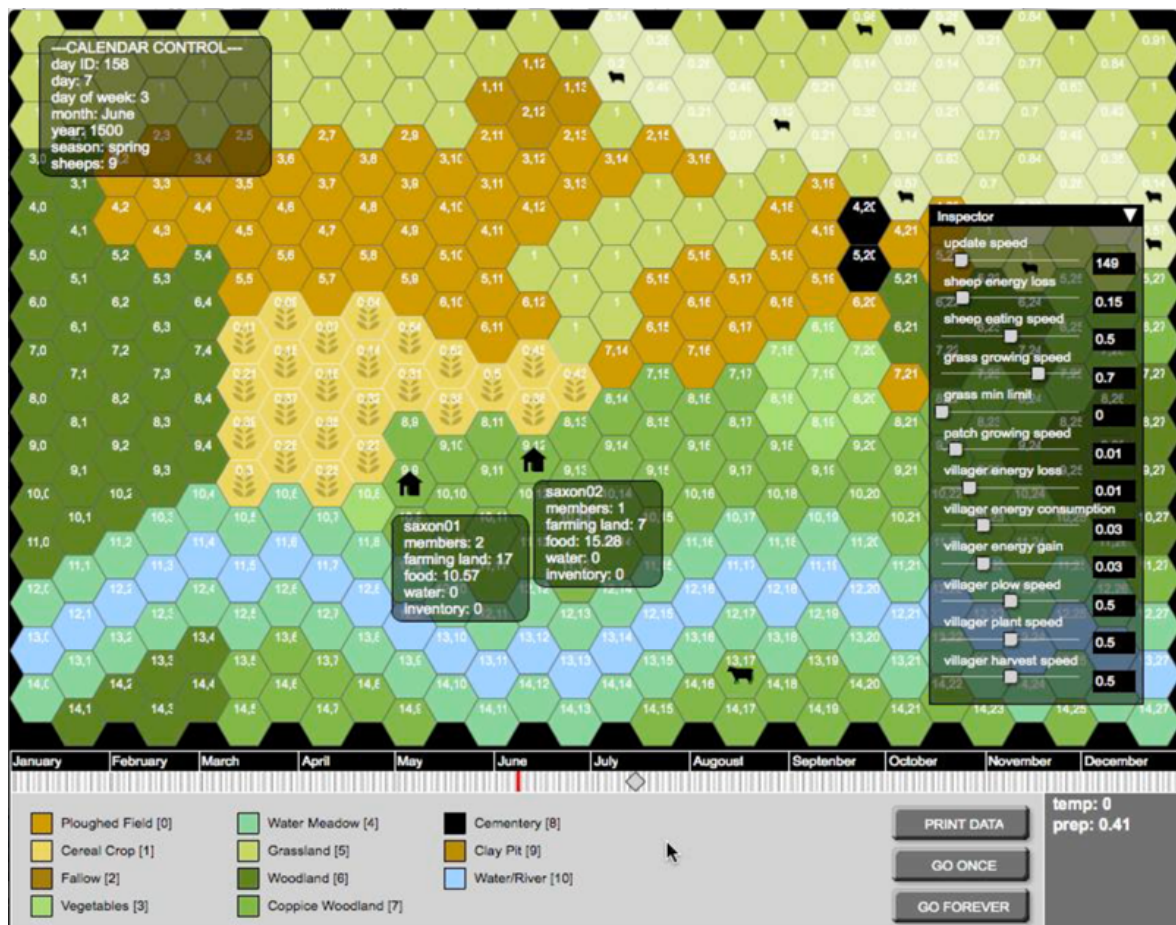


Figure 4.1: The Anglo-Saxon village simulation.

4.3.1.1.1 Historical references

This first simulation was based on the site of West Stow, in West Suffolk. The archaeological research conducted in this site gives evidence of early Anglo-Saxon

¹⁵ Agent-based modelling is a computational methodology widely used in many research fields. The method allows to model complex dynamics from the interactions between individual agents, programmed with individual decentralised behaviours, and a simulated environment.

¹⁶ Although a grid of squares is significantly simpler to implement, hexagons were chosen because of their advantages to simulate agent's movement through the world. In square grids, agents can move the same distance in only four directions, while in hexagonal grids the number of directions grows to six.

occupation from AD420 to AD650, and has been thoroughly researched since 1976, combining the excavation of the site with experimental archaeological methods including the reconstruction of buildings (using the tools and materials available in early medieval time) and the scientific re-enactment of agricultural and productive processes. In this first attempt to build a digital simulation of an Anglo-Saxon village, the site of West Stow provided the information needed at this stage to implement its systems with an adequate level of fidelity. Apart from the possibility of visiting the reconstructed village, acquiring a situated understanding of the settlement's general configuration and buildings, it was also possible to gain access to a wealth of published material that have been made available through the years this archaeological project has been running.

4.3.1.1.2 World representation

Using the information from West Stow as a main reference, an interactive map of the village was produced. As the focus of this application was to explore the complexities of representing the life from a historical site through procedural technologies, its visual development was kept to a minimum by representing all the elements from the scene abstractly, with no specific references to the Anglo-Saxon period. The village map was implemented through a hexagonal grid map, where each element of the grid (or hexe) acted as a discrete unit from the world, holding a set of variables¹⁷ capable of registering the changes in the environment. In this way, the application could be used as a testbed for the exploration of different hypothetical scenarios, made available in the real time unfolding chain of events triggered by the subtle changes operating on the internal variables of the system.

For the simulation of everyday life, a series of agents (e.g. villagers, sheep and cattle) were added to the system. Following an Agent-Based Modelling approach, all these agents were programmed to exhibit decentralised behaviours, taking independent decisions according to a defined set of rules. In the case of the agents representing villagers, their programming also considered the routines of conducting daily agricultural and productive tasks, the outcomes of which were delivered to a *family unit* system. These units, built with the purpose of representing

¹⁷ In this simulation, different types of terrain were assigned to each hex. For example, patches identified as “grassland” held a numerical variable for “grass”, which grew at different speeds depending on the current season. Other hexes defined as crop land were programmed with different states according to the agricultural work conducted by agents (plow, plant, grow, harvest, etc.).

the social clusters of agents related by consanguinity bonds, acted as independent micro-economic systems, distributed in isolation from each other.¹⁸

As this prototype did not have any form of ludic interface, and hence cannot be considered a game, all the interaction with the system was implemented through more conventional user interface components, such as sliders and buttons. Through these components, the internal variables governing the system could be set before starting the simulation or while it was running, making it possible to observe in real time the changes both at the level of individual agents as well as on the system as a whole.

4.3.1.2 Expert reviews

In February 2014, the village simulation was presented and discussed with students from the MA in Creative Education at the University of Salford. At this stage, the conversation with the students (a cohort of seven where many of them had a background and experience in education), drifted to the educational potential of the application, with many suggestions regarding its implementation in school classrooms.

In December 2014, the project was also presented and discussed at the doctoral course '*Historical Representation in Games: Informal and Formal Learning about History Through Games*' organised by Dr. Adam Chapman and Dr. Jonas Linderöth at the University of Gothenburg. Given the course's focus, the presentation of the project to the course leaders, participants and invited academics allowed not only to obtain valuable feedback about the current state of the project and future design directions, but also to gain direct access to a range of research projects from around the world focused on similar topics.

The feedback obtained in both sessions was registered in written notes, and was incorporated and developed further in the critical reflection that accompanied the development of the game prototypes.

¹⁸ I decided to implement the family units independent from each other for the sake of simplification, although this is not historically correct. Families lived tightly connected in Anglo-Saxon settlements.

4.3.1.3 Critical reflection

4.3.1.3.1 The perception of an historical world

A first line of criticism can be made in regard to the application's top-down structuring of the historical world. Although the distant, top-down perspective of the village map provided a good point of view for understanding its macro-historical processes (see 2.3.3.3), at the same time it reduced dramatically the capacity of the observer to relate with the environment from the perspective of its inhabitants. The perspective of *being-in-the-world*, as an agent capable of perceiving and acting in the environment through an embodied presence, can be considered a key part of establishing a meaningful relationship with the landscape, real or virtual, present or historical. The body, according to Merleau-Ponty (1962), "*is the vehicle of being in the world, and having a body is, for a living creature, to be involved in a definite environment, to identify oneself with certain projects and be continually committed to them*" (p. 82). In this sense, the positioning of the observer as *reading a map*, detached from the perceptions and subjective experiences of the historical agents, provides a type of encounter that communicates little about the experiences of everyday life.

Video games are media technologies equipped to combine multiple modes of spatial representation, which, although related, are not necessarily equal (Zagal, Mateas, Fernández-Vara & Hochhalter, 2005). Very often, game worlds are presented through a combination of immersive and non-immersive visualisations, with specific functions in the gaming experience. We are typically able to navigate detailed virtual environments while interacting with two-dimensional maps sometimes on the same screen. These multiple forms of representation can be used productively to integrate different forms of historical meanings. Drawing from this observation, the stated first design goal (*To give players access to a historically accurate representation of the Anglo-Saxon world*) can be extended with the following subgoal:

Subgoal 1-1: To grant the perception of and interaction with the world through multiple perspectives, thus making it possible for players to acquire a sense of being-in-the-world.

4.3.1.3.2 Beyond microworlds

As the application runs, small icons representing Anglo-Saxon villagers move busily through the hexagonal environment carrying on with their everyday tasks. At the same time, a frenzy of numbers on the screen shows the variables of the system being written and rewritten as they are re-calculated with each time frame. As a representation of the past, the simulation is an interactive animation of a mathematical model, a form of history that appears in alignment with the precepts from the structuralist movement, as delineated by French historians Lucien Febre and Fernand Braudel. In this algorithmic presentation of the past, historical events are reduced to equations (i.e. this equals this) and functions (i.e. this is determined by this), reflecting a “*social mathematics though which modelling can be conceptualised*” (Skodo, 2010, p. 723). The value of this application, thus, can be pinned down to its capacity to make the models come to life, bringing the opportunity to explore different hypothetical scenarios.

Both in its structuralist approach and its explorative mode of interaction, the village simulation constitutes a microworld – the constructivist use of educational technology developed by the educational theorist Seymour Papert (see 2.2.5). Microworlds present learners with a conceptual model of some aspect of the real world so they can “*explore or manipulate the logic, rules, or relationships of the modelled concept, as determined by the designer*” (Hogle, 1995, p. 4). While the Anglo-Saxon microworld of the village simulation undoubtedly opens many opportunities for its educational use, it also exposes some problems. As discussed in the literature review, microworlds and simulations provide an ideal educational framework for disciplines where the educational content can be niftily presented in mathematical formulas, but does not lend itself so well to situations where this translation ends up reducing complexity to the level of a caricature, no matter how seductive it may be to accept this simplicity as a faithful image of the past.¹⁹ Arguably, history exceeds the simulation’s representational capacity. As Skodo (2010) eloquently argues, even for Braudel, one of the most prominent structuralist historians, the focus of his scholarship always came back to the effort of understanding persons, not structures. To make justice to the complex nature of historical agents, it is necessary to explore ways to communicate their personal struggles, motivations, values and modes of thought beyond their algorithmic encoding. Therefore, the application’s

¹⁹ Sherry Turkle (2009) in her book ‘*Simulation and Its Discontents*’ takes a critical stance towards the pervasive use of procedural simulations in science, engineering and design. For her, simulations are certainly seductive, but the complete reliance and uncritical acceptance of the reality generated by code as a substitute of other forms of knowledge acquisition raise many questions that need to be addressed.

next development steps needed to expand design goal 3 (*To interact with the people from the past*) with the following sub-goal:

Sub-goal 3-1: To represent historical agents as complex human beings, revealing their personal identities, stories and thoughts.

4.3.1.3.3 Environmental and cultural determinism

Notwithstanding its simplified construction, this first prototype can be considered successful as an exploration of everyday medieval life through procedural mechanics. By giving access to the variables controlling the system, the application allowed its users to play with its internal model, visualising in real time the consequences of changing any of the exposed variables. In this way, the simulation allowed its users to put to the test hypothetical scenarios and to draw conclusions, such as the minimum amount of land that an Anglo-Saxon community would need to survive, or the consequences that sudden environmental changes would have for the village. Seen as a form of procedural rhetoric (see 2.2.2.1), the application builds a strong case for a deterministic interpretation of history and the fragility of life in Anglo-Saxon time, illustrated by the fact that even a slight deviation of an ideal setup in the simulation most of the times ended up having catastrophic effects.

Despite the educational potential of simulation for history classrooms, as commented by the experts that participated in its evaluation, it is only fair to acknowledge its limitations to meaningfully engage with the past. While the top-level structuring and god-like agency provides a privilege standpoint for understanding macro-historical processes, it also introduces serious limitations for the empathic connection with the people from the past, and the understanding of the role that cultural factors played in historical change. This problem brings to the fore the contrasts between two opposing traditions in historical interpretation: *environmental and cultural determinism*.

While *environmental determinism*, also known as geographic or climatic determinism, emphasises the role of the physical environment as a major force of change in development trajectories, cultural determinism highlights the importance of culture as a key factor in the processes of historical change. Although both forms can easily be seen as opposing each other, they should be understood as complementary. This, however, is not often understood in scholarly environments, where historians too

rigidly aligned with one approach or the other tend to reject alternative ways of addressing historical questions. Jarred Diamond (n.d.), in a blog post foregrounds this situation:

[H]istorians have a tradition, in their discipline, of stressing the role of contingency [...] based on individual decisions and chance. Often that view is warranted, as in the case of the bomb attempt against Hitler on July 20, 1944. But often, too, that view is unwarranted. The development of warm fur clothes among the Inuit living north of the Arctic Circle was not because one influential Inuit leader persuaded other Inuit in 1783 to adopt warm fur clothes, for no good environmental reason (para. 7).

Despite the differences between environmental and cultural interpretations, both approaches should be regarded as valid paths to construct historical sense. A historical game should facilitate a multi-dimensional encounter with the past, opening up narrow explanations of change to their scrutiny and negotiation with alternative perspectives. In this light, the initial formulation of design goal 2 (*To understand the processes of historical change*) should be expanded to accommodate the following subgoal:

Subgoal 2-1: To explore possible ways to represent processes of historical change as a result of both environmental and cultural dynamics to drive the player to draw comparisons between both perspectives.

4.3.2 Solution 2: Survival Game Prototype

After building and testing the Anglo-Saxon village simulation, a second prototype was built. At this stage, one of the most important aims of the prototype was to study the ways in which the simulation could be accessed through gameplay interaction. In other words, this second prototype had to work as a game. The simulation model had to be rebuilt within a game development platform with the necessary technology to develop a functional, playable game artefact.

A second aim of this iteration regarded its representational level, which in the first prototype remained fairly abstract. This prototype had to offer a realistic representation of an early Anglo-Saxon settlement, capable of communicating with a good degree of authenticity how people lived in early medieval England.

4.3.2.1 Design description

This prototype was constructed with the Unity3D game engine²⁰ (Fig. 4.2); a development environment that has become increasingly popular in the last years. This engine and editor offer significant advantages when trying to find creative solutions to complex game design problems. With this technology, every game entity can be shaped by the addition of components, very much like adding blocks of new functionality like playing with Lego bricks. This component-based system greatly facilitated the quick implementation and evaluation of new design ideas, introducing changes or removing functionality without seriously compromising other systems already working in the game.



Figure 4.2: The survival game prototype.

4.3.2.1.1 Micro or macro history?

At this point during the development, the critical decision of what type of game interaction the game should implement had to be taken. As discussed in the literature review (see 2.3.3.3), historical games tend to lean towards one out of two approaches. The macro-historical approach favours the understanding of long-term developments and typically engages players in controlling multiple characters from a top-down distant perspective, whereas the micro-historical approach emphasises the lives and

²⁰ For further information about this game engine, see <https://unity3d.com>

experiences of one or a few characters, commonly controlling them from a first and/or third person perspective. After thoroughly considering both approaches in regard to the project's goals and sub-goals formulated at this stage, it was decided to focus the development efforts on a micro-historical game, developed to understand everyday life in early medieval England by the embodiment of a single character: a middle-age peasant²¹ (Ceorl), who upon arriving to the British shores, has to find the means to survive in this new land.

4.3.2.1.2 The representation of everyday life

According to historical and archaeological interpretations, much of life in early Anglo-Saxon time centred on finding the means to survive in the challenging environment of post-Roman Britain. To sustain themselves, early Anglo-Saxons had to dedicate most of their time in finding and/or producing food and drink, a time-consuming occupation that determined their lives “*both at the basic level of survival and at the level of everyday social interaction*” (Crawford, 2009, p. 93). Central to this process was the intimate understanding of their environment. As Crawford explains:

A detailed knowledge of the resources of the landscape, and an understanding of how to exploit these resources, was crucial to the survival of the early Anglo-Saxons [...] Integral to that process was the knowledge of how the landscape worked – where the best soils were, where the water could be found (and whether the source of water was reliable), what the best crops to grow were, where the land would not support farming and where the best hunting was. (p. 93)

Under these terms, the gameplay and narrative context of the game seemed naturally aligned with the conventions of the survival game genre,²² a form that puts the player in a challenging environment in which the ultimate goal is to live for as long as possible. Subsistence depends on the decisions taken, demanding an intimate knowledge of the virtual environment's functioning and resources.

²¹ The social hierarchy in Anglo-Saxon time was complex, with many distinctions between wealth, rights and responsibilities between citizens. As in most Western societies, the king ruled at the top of the ladder. Beneath him, the aeldormen ruled in the name of the king, organised the fighting forces (fyrd) when needed, enforced the law and oversaw local disputes. Below them, thanes were free-men owning at least five hides of land, considered the minimum to support a family. Ceorls were free-men from no aristocratic lineage who worked the land and provided services or trade. Geneatas, Kotsetlas and Geburas were other distinctions of free-men with different levels of wealth and dependency to their Lords. Finally, the bottom of the ladder consisted of slaves, who owned no land, could not fight on the militia and were formed to serve their owners.

²² The survival game genre is credited to Sami Maaranen, a Finnish game developer who in the early 90's developed, almost entirely on its own, a groundbreaking game that set the foundations of the genre. The game, named *Unreal World* (Maaranen, 1992), enabled players to take the role of a solitary iron-age man in his attempt to survive the severe environment of ancient Finland. In basic terms, the survival genre puts the player in a threatening environment in which the ultimate goal is to survive for as long as possible. Subsistence depends on the decisions he/she takes, and how intimately he/she gets to know his or her world. This type of games emphasises player's freedom, setting to that effect large worlds open for exploration.

From this initial definition, the core gameplay of the Anglo-Saxon game was phrased as:

Keep the player character alive. Using the tools and practices available at the time, find the way to survive, preventing any biological state (e.g. hunger, thirst, cold, etc.) to reach a life-threatening level. In the event of any of these stats fall to zero, the game is lost.

In this version, the player is led to establish an interactive relationship with an environment constructed to truthfully resemble the landscape at Anglo-Saxon time, both from a representational perspective capable of depicting how things looked and as a procedural simulation communicating how things worked. To build such an environment, a game structure composed by a series of interrelated systems was designed. The general layout of this structure can be seen in the following scheme (Fig. 4.3).

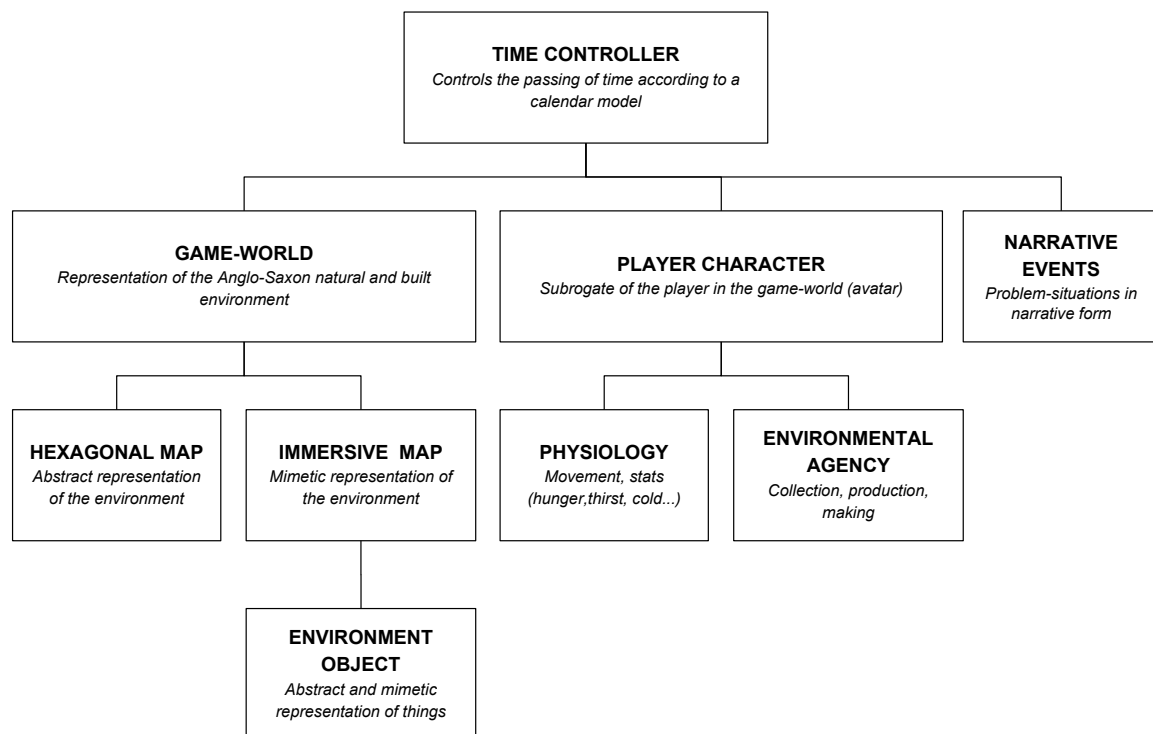


Figure 4.3: Diagram with the game's main systems.

Each one of the systems developed in the game structure is described in more detail below.

❖ **Time controller**

The purpose of this system was to bring a historically grounded representation of the passing of time, communicating how people perceived, measured and organised their lives in the Anglo-Saxon period. To this end, the system implemented an Anglo-Saxon calendar, constructed in reference to Bede's work *'The Reckoning of Time'*, one of the few available sources describing how early Anglo-Saxons modulated their activities throughout the year. Bede's calendar, although focused on Christian festivals and ceremonies, provides an important source of information about the distribution of agricultural tasks and occupations throughout the year. In addition, two late Anglo-Saxon manuscripts from the British Library Cotton collection,²³ containing details and illustrations of agricultural tasks associated with particular months of the year, were also considered for the construction of the application's calendar. The final visualisation of the calendar in the prototype consisted of a simple GUI interface displayed at all times at the bottom of the game screen (see Fig. 4.2), which incorporated the divisions of the year from the Heathen calendar. Further information about time was also made accessible through a text-based interface in the character menu.

With a first iteration of the Anglo-Saxon calendar in place, this system was programmed to track the passing of time, moving from day to day and messaging all the dependent systems (Game-world, Player character, etc.) the need to update according to the time passed. Also, this system controlled a basic weather class, which changed environmental variables (e.g. temperature) and triggered seasonal events in the environment (snow, droughts, etc.) as the game was played. Following temporal conventions found in most games, the prototype's game-time was not designed to operate symmetrically aligned with real-time (see 2.3.4). A key decision in this regard concerned the definition of the duration of one day within the game. As this prototype was projected to be used within the tight constraints of a school classroom session (see 4.2.1), the duration of the day was provisionally defined in five seconds, a measure that would grant playing a full game-time year in about thirty minutes of real-time gameplay.

²³ The manuscripts can be accessed online through the following link: http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Cotton_MS_Tiberius_B_V/1.

❖ Narrative events

At pre-defined (hardcoded) moments during gameplay, challenging situations were presented to the player, asking him or her to decide how to proceed. This system follows the conventions of early text-based adventure games, where the interface was limited to only text rendered on the computer screen, and which has continued to this day in releases such as *'Kings of Dragon Pass'* (Dunham, Stafford & Laws, 1999) and *'The Banner Saga'* (Thomas, 2018). In this iteration of the Anglo-Saxon game, this system was constructed to present text-based pre-scripted problem-situations built from historical or archaeological interpretations of early medieval life, accompanied by a grid of selectable buttons displaying possible ways to act upon (Fig. 4.4).

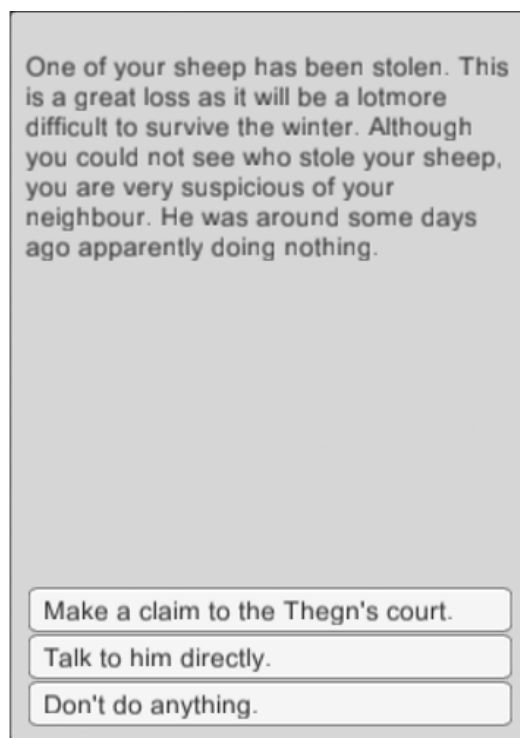


Figure 4.4: Narrative event.

❖ Game-world

According to game scholar Espen Aarseth (2012), “[g]ameworlds are physical or pseudo-physical (virtual) structures that are clearly delimited and which can be described by geometry or topology” (p. 3). In this version of the historical game prototype, it was considered important to create a game-world able to describe, with a good degree of historical accuracy, the environment in which early Anglo-Saxons lived. With this intention, an abstract *high-level* representation of the world was implemented through a

hexagonal map, akin to the one built in the first prototype, where each one of the constitutive hexes acted as a discrete virtual unit of the landscape, registering the changes in the environment (i.e. weather, change of seasons) by the variation of the hex unit internal variables (i.e. humidity, erosion, etc.). In a second layer, this abstract hexagonal map is mirrored by a second, *low-level* immersive and navigable interface, where the landscape was modelled through three-dimensional geometry and texture maps. This immersive level was linked to the abstract high-level representation of the world, so the environmental changes of the high-level representation were made explicit by changes in the appearance of the immersive interface (Fig. 4.5).



Figure 4.5: Gameworld at two different moments in time. The hexagonal map, visible at the top, projects environmental changes in the immersive game interface.

❖ Environment objects

The immersive interface of the Anglo-Saxon world could not be complete without the inclusion of all the objects, natural or artificially produced, that give a recognisable identity to the virtual place. To achieve this, a range of historically relevant objects were produced in production pipelines combining a range of game asset production tools and processes, which made the final implementation of game-objects possible with an identifiable physical appearance and virtual behaviours. As all these game-objects varied greatly, both

in terms of their physical and behavioural characteristics, a common interface (implemented through Unity components) was developed to ensure that the player could interact with all the objects in the same manner. The unique characteristics of every object were procedurally represented by a list of variables determining the type and current state of the object (EnvironmentObject Class), and the possible actions the player could do with or through them (EnvironmentObjectAction Class) (Table 4.1).

Table 4.1: Variables and functions of the Environment Object component.

ENVIRONMENT OBJECT	ENVIRONMENT OBJECT ACTION
<p>ID Each object is assigned a unique identifier.</p> <p>Type Category the object belongs to (Food, Drink, Material, Tool, Weapon, Clothing, etc.)</p> <p>Name Name the object is displayed in the game interface.</p> <p>Description Brief description of the type of object.</p> <p>Icon/Prefab 2D and 3D representation of the object in the game.</p> <p>Energy The amount of energy provides upon consumption (for consumables only).</p> <p>Termination age Determines the time when perishable objects go rotten or cease to exist.</p> <p>Storage factor Determines how termination age changes upon using preserving methods.</p> <p>Crafting time The time that one object takes to be crafted.</p>	<p>ID Each action is assigned a unique identifier.</p> <p>Name Name the action as displayed in the game interface.</p> <p>Description Brief description of the action.</p> <p>Duration Time that an action takes to be finished.</p> <p>Requisites Resources that the player has to have in their inventory for the action to take place.</p> <p>Linked Object or Terrain patch Some actions affect particular environment objects or sections of the terrain.</p> <p>TimeToBeDone Some actions require to be done at particular times of the year.</p>

❖ Player character

As in most micro-historical games, the player interaction within the computer simulated world is mediated by an *avatar*, which becomes his or her surrogate in

the navigable game-world. For this prototype, an avatar representing a free Anglo-Saxon peasant, or *ceorl*, was produced. The development of this character involved industry-standard stages of production, moving from initial concept art to the development of low and high poly meshes, different texture maps, animations and scripts to enable it to navigate and interact with the simulated environment (Fig. 4.6).



Figure 4.6: Concept art and final 3D model of the player's avatar.

Additional systems, accessible through the graphic user interface of the game (GUI) were developed to communicate background information, internal character states (physiology) and character skills. The same menu was used to allow the player access to the character inventory, where all the objects in the player's possession were available, and the crafting interface, where more elaborate objects could be produced (Fig. 4.7).

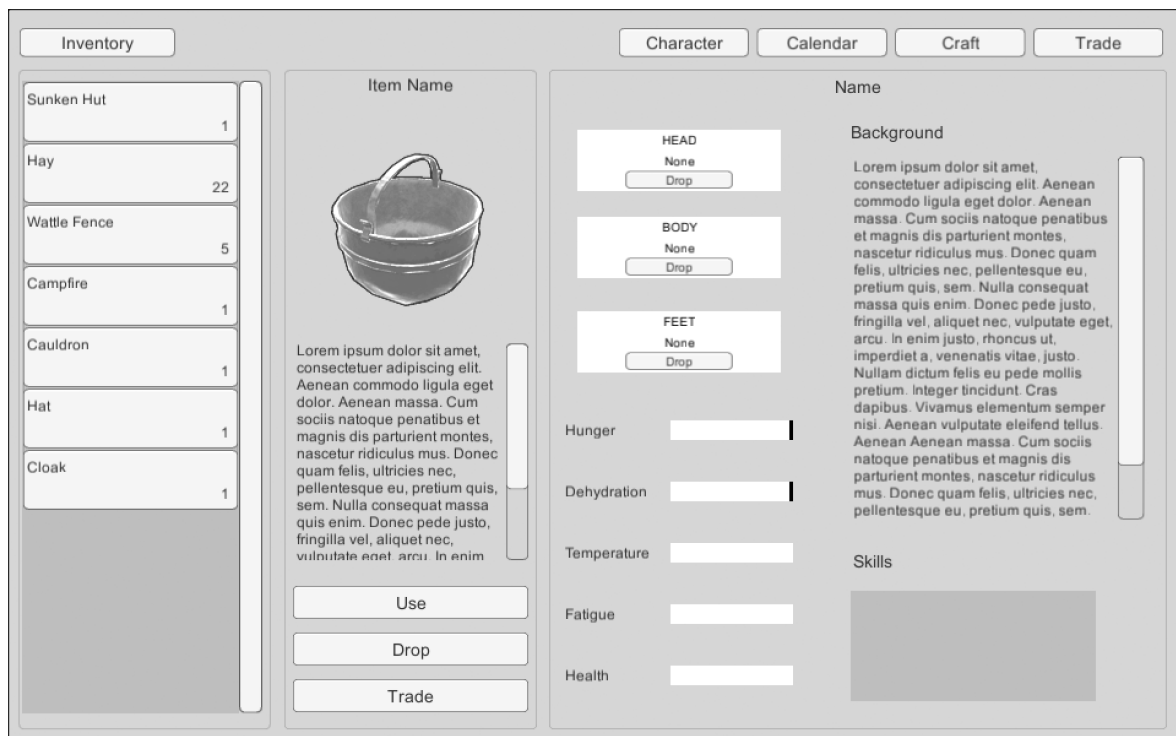


Figure 4.7: Character inventory.

4.3.2.1.3 The relationship with the environment

The translation of historical interpretations into the computer world, where complex processes from inhabited worlds ultimately have to be condensed in computer text code, always involves a high degree of simplification (see 2.2.2.1). In order to design this abstraction, a theoretical approach able to help in the translation of human processes and relationships into algorithmic signifiers was very much needed. Ingold's (2000) analysis of inhabitation provided useful perspectives as he sees the relationship between people and environment as twofold:

According to the received categories of archaeological and anthropological thought, there are basically just two ways of procuring a livelihood from the natural environment, conventionally denoted by the terms collection and production (p. 77)

While the *collection* of resources from the environment seemed relatively straightforward to implement in the game, the *production* of resources required further thought. As Ingold explains, the process of production, or “*growing things*” (p. 85), should not be misunderstood as *making*, where humans are set to transform nature instead of following its ways.

The farmer, and for that matter the raiser of livestock, submits to a productive dynamic that is immanent in the natural world itself, rather than converting nature into an instrument to his own purpose [...] in clearing fields, turning the soil, sowing,

weeding, reaping, pasturing their flocks and herds, or feeding animals in their stalls – are assisting in the reproduction of nature, and derivatively of their own kind. (Ingold, 2000, p. 80–81)

Conceiving the relationship with the environment under these terms, the game had to implement mechanics for the procedural representation of the processes of collecting, producing and making (Fig. 4.8). For the representation of these processes, where a mutually dependent relationship with the environment needed to be established, the game relied on a system where the representation of game-objects upon collection changed from their concrete visualisation in the game-world interface to an abstract representation in the player inventory. Upon collection from the environment, the object ceased to have a physical presence in the game world and became just textual and numerical data in the player's possession. In most cases, however, this process could be reversed; an object in the player's possession, in the same state as it was collected or upon being used or transformed in the making of new objects, could be re-introduced into the game-world, disappearing this time from the player inventory.

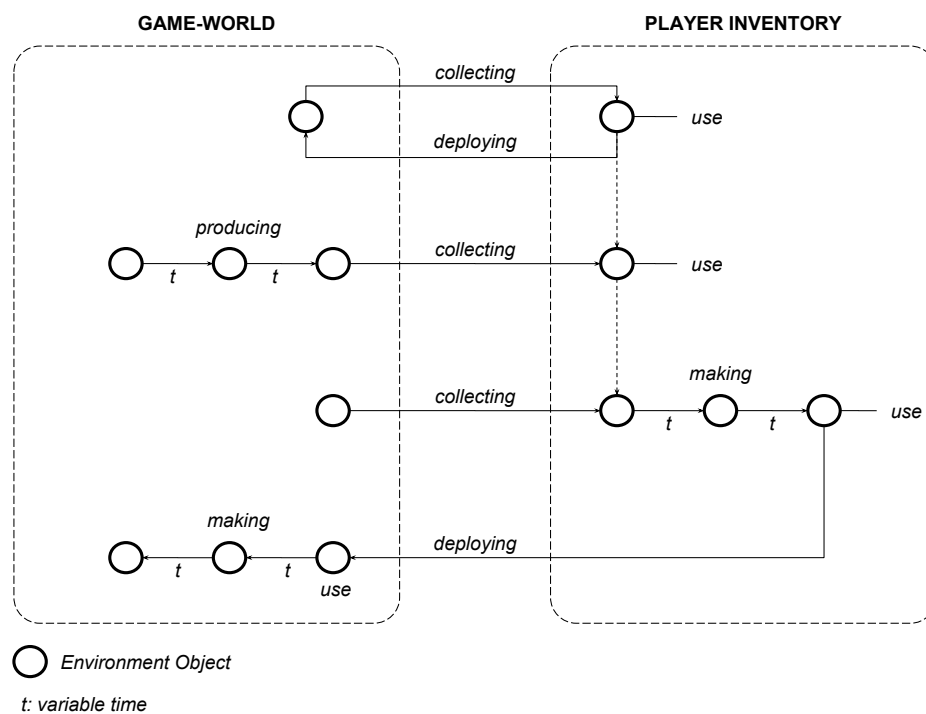


Figure 4.8: Implementation of material culture within the in-game world and player inventory.

It is worth to note that in this version of the game the processes involved in the collection, production and making of things were programmed to take place immediately, with no time involved between states. However, at a later stage during

the development of the prototype, it was considered important from an educational perspective to communicate the processes involved in the production and making of things, and not just their presentation as end products. This design decision is visible in the process of building (Fig. 4.9), where the construction of the *Grubenhäuser*, the characteristic Anglo-Saxon building found in many archaeological sites, could be followed as the different construction stages were completed.²⁴

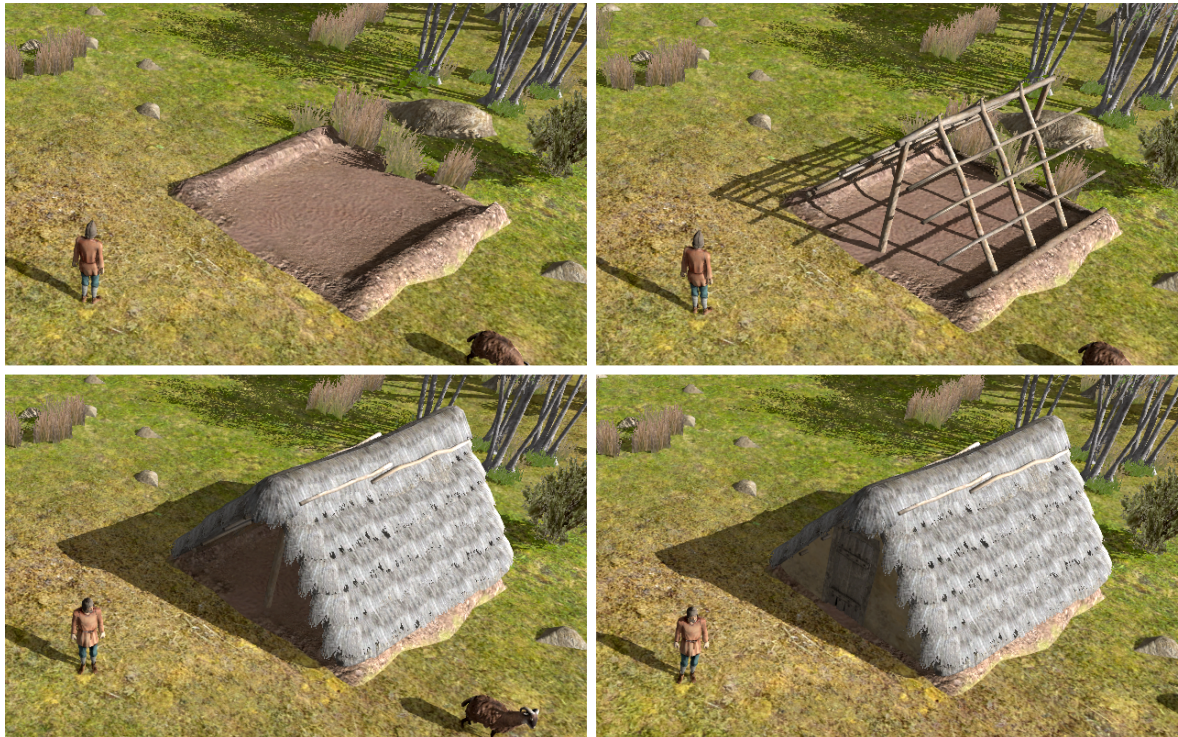


Figure 4.9: In-game visualisation of different stages in the construction of an Anglo-Saxon Grubenhäuser.

4.3.2.1.4 The representation of violent conflict

In line with the current archaeological research and critical interpretations of historical sources, an important goal of the game was to represent the drastic social and cultural changes of the time, communicating the different patterns of integration between the Anglo-Saxons and the native Britons. As discussed, although historical sources eloquently indicate that this process was at times a violent one, archaeological research provide evidence of a more subtle and complex process of integration, where Anglo-Saxons and Britons related in contrasting ways depending on location and time (see 4.2.2). However, the depiction of this period in popular culture has been predominantly represented as violent – a time of epic battles, swords and blood. Again, archaeological research carried out on sites from this period

²⁴ For the representation of the process of construction, I based the model and steps in its construction on reconstructions made by re-enactment groups, available on internet (<http://www.millennia.fzs.com/building.htm>).

challenges this view. According to Crawford (2011), the evidence found in early Anglo-Saxon skeletons shows that weapon injury was rare. Crawford summarises these findings in the following paragraph:

The documentary sources give the impression that the early Anglo-Saxon settlers in England were warlike and engaged in constant battles with their neighbours, and the emphasis on the male adult burial ritual on weaponry reinforces the impression of a military society. But the skeletons offer a different story [...] Gift exchange, negotiations, hostage taking, feasting and marriage agreements would have been important stages before hostilities were engaged in, and, judging from the ostentatious gold and garnet decoration on the sword pommels, shields and other weaponry associated with the elite seventh-century burials, bravado and posturing were also key aspects of any disagreements between rival tribes and kingdoms. (p. 66-67)

In attention to these interpretations and the more general goal of centring the attention on the representation of everyday life, it was decided to remove combat mechanics completely from the game. We have to recognise that the prototype was in contrast with most of the historical games based in this period, in which combat is designed to be the most important form of interaction. The reasons for this are not difficult to understand; as Salen and Zimmerman (2004) and Crawford (1984) stated, games are primarily systems of conflict, naturally inclined to represent any determined situation as an opposition between forces (see 2.2.1.3). This representational bias tends to antagonise playing sides (player vs computer, player vs player) in zero-sum schemes of competition for one or more winning conditions. As a result, games naturally lend themselves to the simulation of violent conflict, overshadowing other forms of interaction. As Stuart (2013) comments: *“in games, violence is often the core feedback loop, the defining mechanism. Everything gets swallowed up into this dysfunctional vortex”* (para. 10). Even first year archaeology students, as Champion (2008a, 2015) remarks, tend to relate with virtual game-like archaeological reconstructions following destructive and violent patterns of interaction.²⁵ I will not claim here that combat and historical learning are mutually exclusive categories, but considering the potential negative impact this could have on the research goals of this project, the decision of avoiding violent gameplay mechanics seemed justified.

²⁵ Champion identifies this as *“game baggage”*. When interacting with new games, players typically use the experience from previous games they had contact with. In some cases, when games present a novel form of gameplay but resemble the ‘look and feel’ from previous gaming experiences, their perception of the new game can be affected.

4.3.2.2 Expert reviews

On July 22th 2015, this version of the game prototype was presented and reviewed at the Centre for Digital Heritage, at the University of York. The event was organised by the Heritage & Play group, which at the time held regular meetings to “*creatively experiment with cultural heritage and expression*” focusing on “*play as a productive means to engage with heritage in new ways*” (Department of Archaeology at the University of York, n.d, para. 1).

This event had an audience primarily composed of academics and postgraduate students from the Centre, and was structured to evaluate the design of the game prototype at its current state. Copies of the prototype were handed to the participants, who play-tested and discussed it during the meeting.

Given the background and expertise of the session’s participants (some of whom specialised in Anglo-Saxon archaeology), this meeting proved to be very productive, helping to provide a theoretical background to the ideas and leading hypothesis of the game prototype, and opening new design directions and goals for its future development. The most relevant discussions and lines of criticism will be discussed in the following section.

4.3.2.3 Critical reflection

4.3.2.3.1 Environmental and cultural determinism (revisited)

One of the most important design directions explored in this version was the construction of a historical world that could be read from multiple perspectives, leading players to draw comparisons between environmental and cultural explanations of historical change. The prototype’s interaction was conceptualised as a dialogue between two interfaces: a top-level simulation with an abstract simulation of the Anglo-Saxon world, and an immersive navigable interface where the world could be explored and interacted with from a third or first person perspective. By varying the scale and scope of visualisation and interaction with the historical game-world, the prototype could potentially be used to highlight the conflicts and contradictions between environmental and cultural interpretations of historical change, driving the users of the system to gain a more empathic understanding of the simulation-driven events. Reflecting on this, Expert reviewer 1 (Personal communication, 22 July 2015) commented:

It is nice to explore the interface between culture and environment [...] This is very interesting because you get the interplay between the two. I have seen lots of agent-based models in the past, but because they are so high level, without something like this immersive level, you just sort of think: well, he [the agent] did not survive the winter, without giving much thought about it.

By allowing players to switch between visualisation and interaction modes, and in this way driving them to become aware of conflicting lines of historical reasoning, the game prototype was seen as an interesting way of challenging what can be described as dominant disciplinary perspectives. In another comment, the same reviewer summarised this view:

The interesting thing... is to explore the barriers between culture and environment. One of the problems that we always have when doing archaeology is that becomes very environmentally deterministic. [With this game] we have here that you have the option of considering the environment, but you can do other things... you could say: they would never have done it this way, but in this other way is a lot more effective [...]
(Expert Reviewer 1, Personal communication, 22 July 2015)

Although all games, historical or otherwise, can be considered as simulations (see 2.2.2.1) and therefore susceptible to criticism regarding their fidelity to represent real-world phenomena, they are fundamentally different in terms of the way they communicate the meanings that emerge from procedural interactions. While simulations are certainly able to convey complex ideas about how the world functions, games communicate those meanings through play. Arguably, any historical game that fails to give players the freedom to explore alternative ways of doing things will find it difficult to stand for its right to be called a game.

Through a combination of game interactions based on emergence and progression mechanics (Juul, 2005), games can be designed to represent processes of historical change as a result of environmental or cultural dynamics, but each one of these approaches present particular problems. Due to their rule-based quantitative structuring, games seem to be naturally equipped to represent environmental change, but as complexity arises, so does the difficulty in making the system meaningful for the player. Even if players do not achieve a perfect understanding of the internal intricacies of the in-game simulation, they still need to be able to discern the impact of their actions and decisions – a design goal that Salen and Zimmerman (2004) encapsulate as “*meaningful play*” (p. 30). For this reason, complex phenomena often requires to be simplified to be included in a game, becoming the target of criticism from some historians who are overly concerned with the accuracy of the representation.

On the other hand, games can be designed to represent cultural determination by non-emergent systems, hardcoding causality in the basic form of decisional tree-like structures (i.e. if X happens then do Y). In this case the outcomes of the game are a direct result of the player's choices and can be easily understood. This also gives an unprecedented power to the player, representing historical change as a direct result of an individual's actions or decisions at a given moment in time.²⁶ Although this can be defended in many cases, the educational benefit of a system of this type should be driven by gaining a better understanding of the mental processes of that particular individual. Without adequate systems in place to offer an insight into the mindsets of past cultural and social groups, the game risks to overly simplify the characters from the past, reductively aligning their personal, complex, and often contradictory goals to the far more simple goals of the game. This discussion will be expanded in the following section.

4.3.2.3.2 Understanding the people from the past

The narrative system implemented in the prototype was also discussed during the feedback session with the archaeologists. This system, although it comprised of just a few events displayed as text in a pop-up window, was considered important to communicate the dimensions of life that are difficult to bring in by gameplay dynamics. Within these dimensions, an important aspect concerned the ways in which early Anglo-Saxons folk understood their world, which according to historical sources presented similarities but also sharp contrasts with present day world-views. The history of *mentalités*, as defined by the proponents of the French Annales movement, or Collingwood's (1946) famous claim that "*all history is the history of thought*" (p. 215) both agree in their emphasis on understanding the way people made sense of the reality in which they lived. One possible way to express these layers within the game would be by contrasting them to our present-day world-views. As Expert reviewer 2 (Personal communication, 22 July 2015) argued:

I think that the more kind of different narratives we place into [the game], it will work to deconstruct how people thought about things. [For example], we have this [Anglo-Saxon] guy, and he can have an ambition like making sure that everybody remembers him... so his entire ambition is to reach immortality through glory. That is a kind of ambition that we Westerners don't have... so implementing systems or

²⁶ Carvalho (2016) refers to this view as the "*unconstrained view*", where human actors are seen as "*capable of promoting social change and edifying society according to their designs*". On the opposing side, the "*constrained view*" posits that "*humans are always restricted, either by their incapacity of acting rationally and/or altruistically, by uncontrollable contingencies or by the inherent complexity of social processes*" (p.109)

goals based on ambitions that doesn't resonate with us will make us think about the way they thought about things.

Despite the uncertainty of knowing exactly how people from the past understood their world – an argument strongly presented by Jenkins (1991) and Skodo (2010)—and therefore conceding its fictional status as an exercise of imagination (Collingwood, 1946), games can arguably be used to connect empathically with characters from the past, for example, by giving players the same information or putting them in the same situations that historical characters experienced. Thus, the game can be seen as a dramatic re-enactment of the past, integrating cultural meanings into the overall playing experience. If “*the past is a foreign country*”, as Lowenthal (1985) famously stated, one of the main goals of historical games is to show us – beyond the superficial thin representational level – just how different it was. Following this argument, I will extend the initial design goal number 3 (To interact with the people from the past), with a new direction:

Sub-goal 3-3: To provide opportunities for players to become aware of the differences between the way we see the world today and how it could have been conceived in the past.

4.3.2.3.3 Life was more than survival

The gameplay conventions from survival games, where basic human needs require to be satisfied in a periodic basis, offered a good basis for the representation of everyday medieval life, but also presented the risk of giving an excessively narrow view of the historical place and time. The problems of centring the game exclusively on the goal of surviving were raised in the evaluation session with the archaeologists. During the session, Expert reviewer 3 (Personal communication, 22 July 2015) commented:

I wonder if the concentration on surviving is actually a bad analogy for archaeologists. It actually can be more of a trap. I wonder if we should consider that the point of all this is not to put your sheep in the right place, but to have enough resources for, let's say midwinter celebration. That kind of motivation, rather than just survival.

The problem with the survival mechanic is that culture is more than survival, and the exclusive concentration on this goal could potentially lead to a reductive understanding of the Anglo-Saxon time. Cultures are complex and

multidimensional systems, and many times, religious celebrations,²⁷ rituals and other cultural forms took precedence over the satisfaction of basic needs.

Thus, it was decided that the design of the historical game should also include the following sub-goal to extend goal number 2 (*To understand the processes of historical change*):

Subgoal 2-2: To consider different human dimensions into the representation of everyday life in Anglo-Saxon Britain, beyond its reductive description as a surviving challenge.

One possible way to go beyond the simplistic cultural description of the survival game would be to offer a greater degree of choice to the player, presenting the player with different options to solve a problem, linking each option to meaningful consequences. For example, the choice of slaughtering a sheep for food, can be presented in contrast to using the sheep as a sacrifice for the pagan celebration of *Blōtmōnaþ*.

4.3.2.3.4 Representing multicultural relationships

In this version, the player experiences the Britain of 5th century AD through the embodiment of a single character, without representational layers to communicate the scale of the Germanic migration process, and the subsequent social encountering between groups culturally very different from each other. Although it is not completely clear how this process took place, it undoubtedly resulted in striking changes in the environment, material culture, language, and DNA composition of the British population. Influenced by the readings of the historical records from Gildas and Bede, this process was initially depicted as violent and abrupt; the narrative of an epic invasion and ethnic cleansing that can be seen in movies such as *'King Arthur'* (Fuqua, 2004). This theory, however, has been called into question by more recent historical and archaeological interpretations, which present the process rather as a sustained migration of small bands over a long period of time, with multiple patterns of interaction with the native population.

²⁷ In his work *'De temporum ratione'* (The Reckoning of Time), the Anglo-Saxon monk Bede describes the pre-Christian rituals and celebrations according to the time of the year. In accordance with this source, the player is asked to do the actions that each celebration requires. Some examples of pagan celebrations are *Solmonað*, in February, where cakes are produced and offered to the deities, and November's *Blod-Monath*, where animals need to be selected and sacrificed.

Notwithstanding the lack of historical consensus about how the Anglo-Saxon migration occurred, it is clear that the Roman-British native population was culturally very different from the incomers, and very likely tensions between these groups did exist. Expert reviewer 4 (Personal communication, 22 July 2015), an archaeologist specialised in the Anglo-Saxon period, highlighted the social complexity of this period in the discussion that followed the demonstration of the game prototype:

These are sixth century Anglo-Saxons. Different people spoke different languages at that time and had different culturally-based ways to interact with the landscape. People at that time were learning how to live together. There is an extra layer there; that is very specific to that period [...] like, what happens when a British woman marries an Anglo-Saxon and vice versa? And they also started buying things from each other.

In this comment, Expert reviewer 4 highlights the multiple ways in which culturally distant groups could have related. Rather than one single pattern of interaction, different groups or even individuals could have socialised in contrasting ways, not different from the divergent patterns that we find in modern societies facing big influxes of migrants. Plausible historical scenarios such as a “*British woman marrying an Anglo-Saxon*” or “*an Anglo-Saxon buying things from a Roman-Briton*”, can be used in the historical game to foreground the tensions, conflicts and contradictions that characterised intercultural encounters.

After discussing the game prototype with archaeologists, it became apparent that the historical game needed to better represent the multicultural complexities of the early Anglo-Saxon time. This can be phrased in a new sub-goal:

Sub-goal 3-2: To represent the multicultural diversity of 5th century AD Britain, with an emphasis on the diverse patterns of interaction between Romano-British and Anglo-Saxons.

4.3.2.3.5 The need for a historical game design framework

Having developed the second iteration of the Anglo-Saxon game and receiving feedback from the experts reviewers collaborating to this project, it became apparent that a framework capable of facilitating the translation of historical information into game form was very much needed. While the HGR framework proposed by Cassone & Thibault (2016, discussed in section 2.3.5) is certainly useful, it is recognisably an analytical tool more than a design one, capable of assisting and guiding the creative exploration of new

historical game-based experiences. A functional design framework, in this sense, should be able to recognise the iterative nature of the design process, where each new solution not just responds to the problem at hand but also raises unforeseen new questions. Design, thus, always should be laid as an emergent process; a non-scripted dialogue between the designer and the design situation (Schön, 1992). For this to happen, however, designers should always avoid the very natural tendency of finding pre-made solutions to new design problems.

A second aspect where a design framework proves to be of key importance is in the recognition of historical game-based learning as an inherently multidisciplinary design space. As it has become evident throughout this research, the incorporation of historians, archaeologists and educators to the project have brought new and important perspectives, however, the involvement of these experts has always been in the role of evaluators, not as creative collaborators in the design stages preceding the concretisation of ideas into game-form. A design framework, thus, should serve as a tool to promote and to articulate the important discussions that need to take place while translating historical knowledge, data or interpretations into game-forms.

4.3.3 Solution 3: Final Game



Figure 4.10: Final game prototype.

This final game prototype was a complete re-make of the previous one (Fig. 4.10). While some of the changes and new systems that were planned to be implemented could have been done without the need of starting a new project – almost from scratch – other implementations entailed a major alteration to the systems already functioning in the game. Therefore the decision to start a new project was justified.

4.3.3.1 Design description

4.3.3.1.1 Reconstructing the Anglo-Saxon world

In this last version of the historical game, it was considered important to better align the representation of the Anglo-Saxon game world with the more accurate historical and archaeological interpretations of this period, hence a better understanding of the Anglo-Saxon world was needed. In order to achieve this, a number of tasks were carried out. First, I conducted a more thorough review of academic sources describing how the early Anglo-Saxons lived. Although there is an abundance of material in archaeological records, many of these papers are evidently written for archaeologists specialised on the subject, and thus involved a technical level of writing that was difficult to put into context for a neophyte. Fortunately, more introductory texts such as Dr. Sally Crawford's (2009) *'Daily Life in Anglo-Saxon England'* provided a wealth of information for building the virtual Anglo-Saxon world. Also, and perhaps unconventionally, I decided to revise historical fiction, such as Bernard Cornwell's *'The Saxon Stories'* (2004-2016). Although this information needed to be read bearing in mind the author's creative licence, it offered vivid and certainly useful descriptions of the Anglo-Saxon living spaces and way of life. For instance, this paragraph was extracted from Cornwell's (2004) first book:

We waited in the hall. It was, indeed is still is, a great wooden hall, strongly thatched and stout beamed, with a harp on a dais and a stone hearth in the centre of the floor. It took a dozen slaves a day to keep that great fire going, dragging the wood along the causeway and up through the gates, and at summer's end we would make a log pile bigger than the church just as winter store. At the edges of the floor were timber platforms, filled with rammed earth and layered with swollen rugs, and it was on those platforms that we lived, up above the draughts. The hounds stayed on the bracken-strewn floor below, where lesser men could eat at the year's four great feasts (n.p.).

Secondly, I decided to visit and document photographically archaeological reconstructions of the Anglo-Saxon world, and thereafter produce a number of concept art visualisations (Fig. 4.11, 4.12).



Figure 4.11: Concept art of an Anglo-Saxon house, based on archaeological reconstructions from West Stow in Suffolk.



Figure 4.12: Concept art of an early Anglo-Saxon settlement.

According to findings from archaeological sites such as West Stow in Suffolk and Mucking in Essex, early Anglo-Saxon villages generally lacked the sophisticated organisation found in later medieval towns, typically structured around churches and connected through roads. In contrast, typical settlements from the pre-conversion period (5th-6th centuries) were rather small and dispersed (Crawford, 2011). They were unenclosed homesteads consisting of a collection of farmsteads inhabited by small family units.

Most of everyday life in early Anglo-Saxon settlements revolved around the neighbouring fields, woodlands, rivers and water sources (Crawford, 2011). The archaeological interpretations of sites from this period show that two characteristic types of buildings were used. Along with the *Grubenhäuser* (the relatively small and primitive type of construction already implemented in the game) archaeological sites from this period also show the construction of timber-built halls, a type of structure described by different historical sources.²⁸ These were rectangular in shape and far more spacious than the *Grubenhäuser*, reaching in some cases 82 feet (25 meters) of length. They were solidly structured by supporting pillars and characteristically presented two opposing doors centrally located on the larger walls.

In regard to the constructions' inhabitation and forms of use, it has been remarkably difficult for archaeologists to reach a definitive conclusion, and the debate very much persists. The stereotypical and simple forms of both the *Grubenhäuser* and *hall* are generally inexpressive, providing very few clues about the sort of activities carried out on inside (Blair, 2018). Despite the lack of agreement, modern interpretations tend to place daily life in the large and more comfortable space of the timber-built halls, rather than in the damp *Grubenhäuser*. Judging from the evidence excavated from their pits, the latter seemed to have been used more as *workshops* for productive activities such as weaving, pottery, making and smithing, rather than living quarters (Crawford, 2009).

Along with the study of scientific articles and publications about Anglo-Saxon archaeology, it was considered important to complement the information from these sources with the more direct approach of visiting and studying in-situ existent re-constructions of both types of constructions. This is not something that can be done for most archaeological projects, but in this case there were a number of reconstructions in the United Kingdom that could be visited, made by archaeologists, historical re-enactment societies and history enthusiasts. To gain a deeper and more immersive insight into the Anglo-Saxon world, the heritage site of Jarrow Hall in Northumbria was considered advantageous. The site, dedicated to the life and work of the 8th century monk Bede, provides a glimpse to the world in which he lived in through a dedicated Museum and the reconstruction of an Anglo-

²⁸ According to the Beowulf story, had a great hall which he called "*Heorot*". The king and his warriors would gather in the hall to eat, plan battles, hear entertainers and drink mead (an alcoholic beverage made from fermented honey and water). Sometimes they would also sleep there.

Saxon farm (Fig. 4.13), demonstrating a range of representative buildings, period-specific animal breeds²⁹ and the demonstration of agricultural activities and crafts.



Figure 4.13: View of the Anglo-Saxon farm at Jarrow Hall, in Northumbria.

At Jarrow Hall, both the replicas of the *hall* and *Grubenhäuser* were extensively documented by photographs and sketches (Figs. 4.14 and 4.15). The documentation focussed on the spatial configuration of the buildings, materials and construction details, which were all very important data for the virtual reconstruction of the buildings within the game. Perhaps more important was the phenomenological understanding gained from walking through the farm and going inside the buildings, gathering a wealth of sensory information from the place. Scale, smells or light conditions were the sort of data that were not readily available by consulting the literature, and contributed to a better reproduction of the Anglo-Saxon world in the game.

²⁹ Selected for their phenotypical proximity to the ones existing at the Anglo-Saxon time.

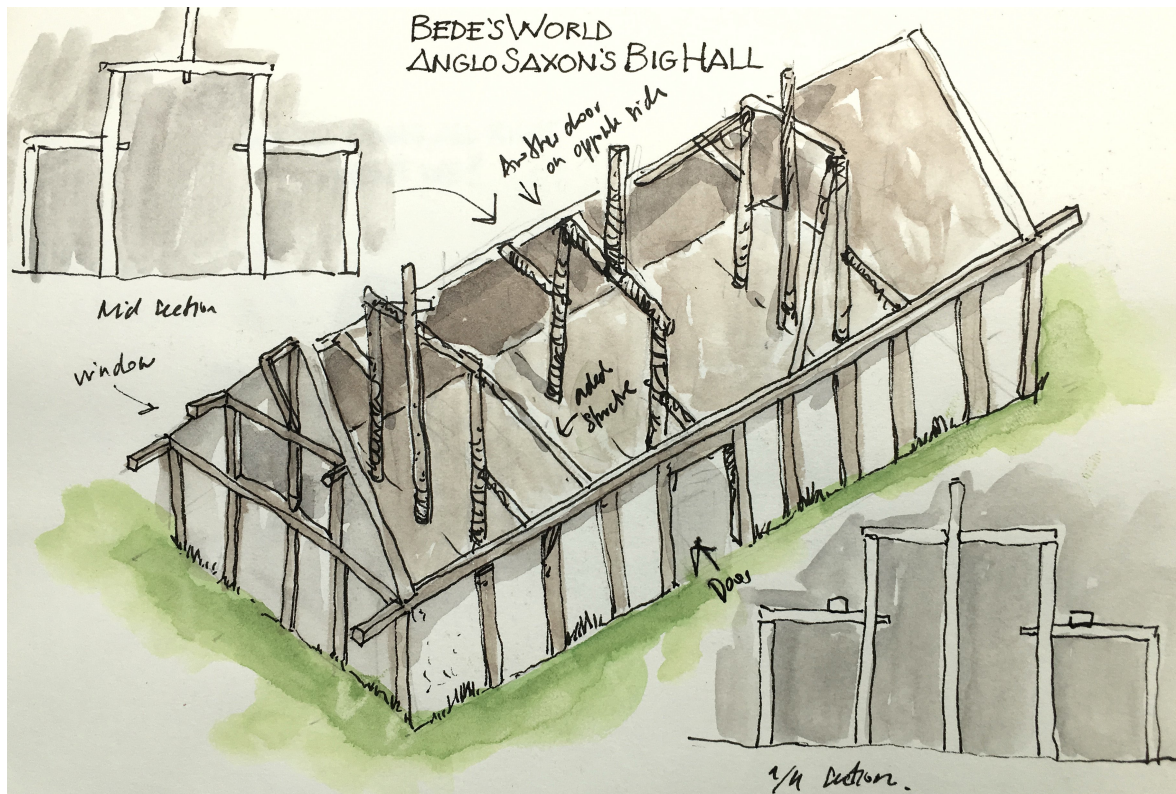


Figure 4.14: Sketch made at Jarrow Hall studying the structural design of the hall.



Figure 4.15: Interior of the hall reconstructed at Jarrow Hall.

Based on the gathered information, it was decided to construct a model of a *hall* to allow the player to visit the building both from outside and inside (Fig. 4.16, 4.17). Also, as a consequence of the better understanding of Anglo-Saxon habitable spaces, it was considered necessary to re-make the model of the *Grubenhäuser* (Fig. 4.18, 4.19), as the previous one did not reflect adequately the existing knowledge and theories about this type of construction. For example, the first model of the *Grubenhäuser* did not have a pit, which is an important characteristic, and indeed source of controversy, on early Anglo-Saxon architecture. How could the new model of this building be made to reflect the

competing theories about the pit floor? At Jarrow Hall, the solution to this puzzle was straightforward; the replica of the building was divided in two, one side presenting the pit covered by planks at ground level, leaving the other side as an open pit. This approach was also followed in the virtual reconstruction of the *Grubenhäuser*.



Figure 4.16: Comparison between the reconstructed Anglo-Saxon wooden hall at Jarrow Hall (left), and the virtual hall developed for the game (right).



Figure 4.17: In-game visualisation of the Anglo-Saxon wooden hall.



Figure 4.18: Comparison between the Grubenhäuser from Jarrow Hall (left), and the virtual version of this building developed for the game (right).



Figure 4.19: In-game visualisation of an Anglo-Saxon Grubenhäuser.

Another important reason why the visit to Jarrow Hall was enlightening regarded the spatial organisation and management of the early Anglo-Saxon farm. At the heritage site, the space is divided by fences of different types (constructed with the materials and techniques available at the time). The site had to negotiate between two conflicting design decisions: the need to provide an accurate

representation of an early medieval farm, and the function as a heritage site, where visitors of different ages have to be guided, informed and kept safe. The staff at Jarrow Hall provided an interesting point of view: fences are very expensive to build and maintain, and therefore were most likely kept to a minimum. While there is little evidence of spatial demarcations within early settlements (Higham, 2010), historical research shows that the construction and maintenance of fences was a matter of communal cooperation, later on regulated in the code of King Ine (688-695). Given the significance of this aspect for the representation of the landscape, a system was implemented to construct fences in the gameworld. Recognising the linear geometry of fence structures, the system uses the metaphor of bezier curve drawing, allowing the player to select and adjust the position of the fences in the landscape (Fig. 4.20).



Figure 4.20: In-game construction of a wattle fence.

4.3.3.1.2 Integrating micro and macro simulations

After the second prototype was played and analysed with expert reviewers (see section 4.3.2.2), it became apparent that one of its main problems was the lack of integration between the abstract, macro-level simulation and the immersive interface of the game. Although the macro simulation was developed to be synchronically updated by representational changes in the navigable surface of the terrain (i.e. changing the texturing of the portion of the ground corresponding to each one of the hexes) the relationship was not obvious enough to be interpreted as changes resulting from macro forces operating in the environment (climatic events, natural disasters,

etc.). According to Bogost (2006) terminology, there was a “*simulation gap*” between the procedural model of the environment, which could be accessed through a 2D map, and the 3D navigable interface of the game. Furthermore, the separation of game interfaces and interaction modes made impossible for the player to interact with the terrain through his or her avatar. While all the game-world objects could be accessed from the immersive interface, the earth belonged to a different form of representation, that could only be interacted with through the game abstract map-like visualisation. This duality of interaction broke the illusion of *being-in-the-world* therefore both forms of representation needed to be brought together.



Figure 4.21: Selection of terrain patches (left) and view of the terrain after a *ploughing* action (right).

The solution was to bring the abstract procedural map *down* into the immersive interface, in a new layer to be laid over the physical representation of the world (Fig. 4.21). While navigating through it or interacting with its constitutive elements, this layer would be invisible, manifesting itself only when the player inputted its intention (by mouse-clicking) to interact with the surface of the earth to perform actions such as ploughing, harrowing, digging, etc. Also, it was decided to change the representation of the terrain’s discrete units from hexagons to square tiles, a shape that better conformed to the patterns of landscape organisation in Anglo-Saxon time.

4.3.3.1.3 Playing with affordances

While the evidence-based virtual reconstruction of an early Anglo-Saxon settlement communicated to a good degree *how things looked*, the project was also committed to represent, with a similar level of authenticity, *how people lived* in their world. In sharp contrast to other forms of historical mediation, this level of representation in video games is conveyed through the active and participatory engagement of the player with the system, commonly known as *gameplay*. The translation of the complex layers of meaning that we come to understand as life – described as a form of “*generative field*” within which organic forms are “*held in place*” (Ingold, 1990 p. 215 in Ingold, 2000) – into game form presented many challenges. As discovered while building the second prototype, one important part in this translation was the representation of human-environment relationships; a layer that was translated to the game interface in the procedural equivalences of the acts of collecting (i.e. taking things from the environment) and producing (i.e. growing or making things) (see 4.3.2.1). Although this distinction was certainly useful, a more abstract definition of the relationship between people and things, as a common denominator between past-inhabitation and game-inhabitation identifiable as *material life wisdom*, was very much needed. The conceptual framework for this definition came from Gibson’s (1979) theory of ecological perception and more specifically the *concept of affordances*.

With the concept of affordances, the psychologist James Gibson came up with a signifier for “*the possibilities of action of a particular animal-environment setting*” (Gibson, 1979, p. 4). Usually described as *-ables*, as in *catch-able*, *clim-able* or *eat-able*, the concept describes the process of perception not in terms of the absolute properties of a part of the environment, but in regard to how it relates to the animal, for good or for ill. Following the same logic, gameplay can be described as a process where players perceive, act and transform the affordances related to game systems or to other players (Linderoth, 2011, p. 1) and forms an extremely useful approach to study historical games (Chapman, 2013a, p. 170).

From this perspective, the interaction between the player and the reconstructed historical world, needs to be conceptualised as a *virtual travel* where players are provided with opportunities to explore and learn from the meaningful integration of artefacts, people and places (Champion, 2011, p.8). Thus, the implementation of the Anglo-Saxon world was structured in a sequence of steps. In a first exploratory phase, the world was constructed to be navigated through the player’s avatar and to be

explored by computer interface conventions where the action of *looking around* was replaced by the simultaneous actions of scanning the screen and displacing the mouse over the objects in proximity. Likewise, the real world action of *focusing the attention*, which in the real world would involve getting closer and in some cases grabbing or testing the object of interest, in the virtual world was replaced by the action of mouse-clicking. Upon doing this, the manifested intention of knowing more about the object was answered by a pop-up window, where the computer gave contextual information and declared the possible actions that the selected object afforded (Fig. 4.22).



Figure 4.22: Mouse roll-over (left) and mouse-click (right) interaction with in-game objects.

4.3.3.1.4 The representation of social life

Even though the representation of social environments has been the focus of many game titles, it is also true that in most of the Non-Player Characters (NPCs) exist only as support of gameplay or as mere decorations put together to create the illusion of an inhabited world. With their repetitive performances and dialogue lines, sooner or later it becomes apparent to the player that there is no actual simulation of social life, but simple theatrical props put in place to (barely) hold the illusion of an inhabited world. However, some titles have implemented more complex social

behaviours by including NPCs with their own individual routines and goals, carrying on with their lives even when they are not in the player's field of view.³⁰

No matter how realistic the behaviours of simulated characters are, I would argue that the main potential of games does not reside on their capacity to accurately simulate social life, but to engage players in a dramatic experience capable of driving them to *care* about the lives of the characters around them. As Heidegger (2010) famously argued, the attitude of care or concern (*Sorge*) lies in the very basis of our existential relationship with the world. There is no such thing as a human being completely indifferent to the happenings in their surroundings and the consequences of their decisions. This primordial attitude of care however, is distorted in worlds devoid of any “*moral physics*”.³¹ Although this makes digital games and simulations ideal platforms for testing hypotheses that would be unthinkable to perform in the real-world, by the same token it converts them into environments where anything can be done and nothing really matters. Any game with an aspiration to foster a meaningful understanding of the past requires altering this practice in order to urge players to reflect on the effect of their decisions with an elevated sense of responsibility (Farrow & Iacovides, 2013; Isbister, 2016).

Fortunately, there are gaming instances that can be used as referents to build this type of worlds. The intriguing gadgets known as *tamagotchis* certainly are noteworthy. Invented by Akihito Yokoi (Wiz Co. Ltda) and Aki Maita (Bandai Co. Ltda.) were first sold in Japan in 1996 and consisted of virtual pets designed to replicate the bond that real owners have with their real pets. In these minimalistic simulations, the representation of a pet was reduced to a few pixels on the screen and the way to interact with it depended almost entirely on the fulfilment of the incessant flow of virtual needs, symbolised as quantitative scales varying from full to zero. If neglected, the consequences were severe. In fact, a pet not properly looked after could effectively die (a condition set to be irreversible in the first versions of the toy). As the philosopher Žižek (1999) notes:

the uncanny enigma of the tamagotchi resides on its power to drive the owner/player to feel the appropriate emotions – responsibility, affective attachment, loss and so on – in spite of the complete awareness that there is nothing beyond the screen and that the

³⁰ The game S.T.A.L.K.E.R.: Clear Sky (Bolshakov, 2008) implemented characters with complex A-Life systems, which enabled them to carry on with their simulated lives at all times during the game.

³¹ This concept was introduced by Janet Murray (1998) in ‘*Hamlet on the Holodeck*’. The argument is that in the same way that physic engines deal objects movement, gravity and so on, game stories have to have systems in place to deal with the consequences of player actions.

representation is a radical reduction of imaginary resemblance to the symbolic level (p. 107).

After their appearance and success, tamagotchis became an influential reference for later simulation games. Will Wright's *The Sims* (2000–2018) appears particularly relevant in this analysis. This game, described as “a cross between a doll house, a Tamagotchi and the television programme *Big Brother*” (Pearce, 2004) simulates an idealised modern suburban environment in which players interact with a group of semi-autonomous agents from a god-like perspective. As with tamagotchis, the player is responsible for satisfying the characters' needs, expressed as a series of bars covering basic and social parameters. Notably, in *The Sims* the single-entity engagement from the classic tamagotchi is extended to a group of characters, generating situations much more difficult to predict and resolve. While with tamagotchis the player requires to keep the flow of needs in check with simple timely performed operations, in *The Sims* the needs and subsequent player actions may vary depending on the relationship of agents between each other and with their environment.

4.3.3.1.5 Family members

Using these examples as references, a series of NPCs were implemented in the game. These characters had no virtual representation in the 3D game world, but interacted with the player through text-based conversation systems accessible through the game's GUI interface. In alignment with the archaeological interpretations about the social composition of early Anglo-Saxon settlements, which regard them as primarily composed by small family units (Crawford, 2011), it was decided to add two characters related to the player avatar by family bond: a small son named *Wilburg* and a teenage daughter named *Eadgyð* (Fig. 4.23). These *family members* were programmed to take care of various everyday tasks (fetch water, cook, etc.), but they had to be looked after by the player, who had to comply with the responsibility of providing them with the basic means of subsistence. This new layer of interaction can be seen as an added challenge to the game's primary survival challenge:

Keep all members of the player's avatar family alive. The player is asked not just to keep his or her biological states in check, but also to provide food regularly to his or her family members. Family members can be assigned tasks within the game, but their working capacity depends on their overall health.

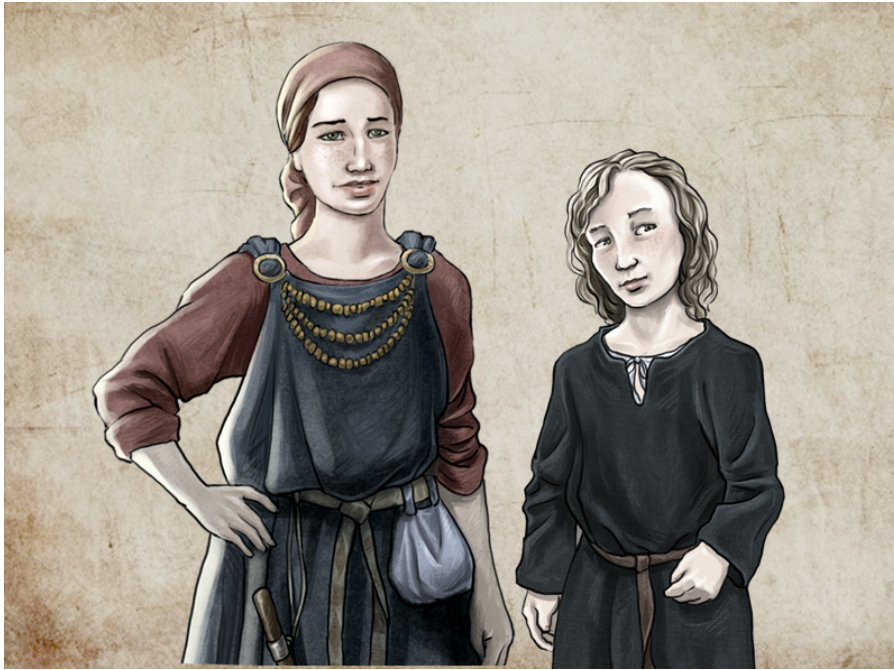


Figure 4.23: Eadgyð and Wilburg, the characters designed to act as *family members* within the game.

As noted by expert reviewers of this work,³² the family member system can be seen as subjective and culturally biased, as it portrays a model of parenting closer to our modern sentiment of family which may not be accurate to the concept of family in Anglo-Saxon age. Indeed, the concept of childhood as we understand it today, may have been very different in Anglo-Saxon time, as it has been suggested by many historians. In this regard, perhaps no quote could be more eloquent than the following from Barbara Greenleaf (1979), extracted from her book *‘Children through the Ages: A History of Childhood’*:

[...] until very recently people considered childhood just a brief, unimportant prelude to adulthood and the real business of living. By and large they either ignored children, beat them, or fondled them carelessly... When they gave serious thought to children at all, people either conceived of them as miniature adults, or as peculiar unformed animals (p. xiii).

This view, as Keufler (1991) comments, has been ascribed by some Anglo-Saxon historians, however, as Crawford (2009) also indicates, ample evidence in historical sources can be found supporting the counterargument that Anglo-Saxons saw their children as psychologically different from adults, and considered that they deserved to be treated kindly, gently and lovingly. Many children’s rights were recognised and

³² The *family member* system was discussed in “*Designing and Using Game Environments as Historical Learning Contexts*” presented at the Computer Applications and Quantitative Methods in Archeology 2017 International Conference. Peer-review comments provided a valuable analysis and feedback about this system.

protected by specific codes of law, and there is also evidence that parents loved their children, and cared for their physical and spiritual well-being. Although the archaeological evidence supporting this view is practically non-existent, Crawford (2011) comments on an unusual artefact found in an infant's grave, a "*mammiform vessel with a pierced base*" (p. 77) that could have been constructed in a desperate attempt to keep alive a baby that was not able to breastfeed.

Despite these indications, there is no doubt that many aspects of childhood were very different in Anglo-Saxon time than they are today in most modern societies. Infanticide was common despite being condemned by the Church, and had to be prohibited by law. Legitimate children had few legal rights, and children born with handicaps were regarded as punished by God for the sins of their parents and hence treated badly. Also, there were many ways in which a child could end up being a slave,³³ a condition in which they lacked of any special protection. In the Anglo-saxon game, these contrasting situations were considered an ideal background to craft meaningful conversations with *family members*. As an example, an interactive dialogue was presented in which *Wilburg*, the player's son, asks not to be sold as a slave in the not so unlikely case of crops failing to produce.

Later on during the development of the prototype a third character, Bryn the Romano-British slave, was added to the game (Fig. 4.24). The purpose of introducing this new character was to provide the context for the exploration of the cultural clashes between the arriving Anglo-Saxons and the original Romano-British population³⁴ (Sub-goal 3-2). Through the establishment of a relationship with the character prompted by text-based dialogues and narrative events, the player would be encouraged to explore the multicultural clashes of the time.

³³ Law codes from Anglo-Saxon time set slavery as a punishment for various offences, functioning as a de facto prison, or parents could sell their children as slaves in times of economic hardship.

³⁴ The mutual relationship between Saxons and the Romano-British population is illustrated by the change in the meaning of the word "*wealh*" from Celt or Welsh to slave (Dutchak, 2001).



Figure 4.24: Bryn the Romano-British slave.

4.3.3.2 Expert reviews

This last version of the Anglo-Saxon prototype was presented and discussed at three different instances.

In March 2017, the game was presented at the 45th Computer Applications and Quantitative Methods in Archaeology (CAA) International Conference, in Atlanta. The project was selected for a workshop called “*Mechanics, Mods and Mashups*”, organised by Dr. Erik Champion and Dr. Michael Nitsche, which invited presenters to demonstrate functional games prototypes and game concepts based on archaeological research. This session provided a unique opportunity to share the final version of the game with archaeologists and other professionals/researchers working in similar subjects. Following a brief introduction to the project, the game was distributed, play-tested and discussed with the participants, who also received a brief form to provide written feedback.

In October 2017, the game was presented and discussed with educators from the History Department of Tytherington High School, in Macclesfield. At this session, the

project was presented and discussed in a focus-group fashion, obtaining valuable feedback about the design concepts and pedagogical application.

Finally, in November 2017, following an invitation from the Department of Archaeology at the University of York, the project was presented to undergraduate and postgraduate archaeology students and the general public. This event followed a more academic format of presentation, but valuable feedback was obtained in the discussion that followed the presentation, and through a questionnaire distributed among participants.

As the historical game prototype reached the level of development adequate for a school classroom evaluation, no further development work was made. The expert feedback obtained through these three instances has been incorporated in the final reflection and evaluation of the project, in Chapter 6.

4.4 Chapter summary

This chapter presented a detailed account of the design and development process of a historical game, for which three functional prototypes were developed. This process started with the definition of a design brief, in which the target audience, context of use, and historical content were determined. From these initial outline, an initial set of design goals were delineated. Following, the design and development of the three game iterations were described. The first interaction consisted on a relatively simple simulation of an Anglo-Saxon settlement, which was used as the basis to add layers of gameplay, narrative and simulation in the following two game prototypes. The production details of each one of these games were presented in detail, as well as the key ideas that emerged from the auto-ethnographical process and the discussions with expert reviewers.

An important challenge in this phase of the project was the systematisation of the dissimilar materials (game assets, code, design diaries, focus-group and interview transcriptions, etc.) emerging from the design process. For this, the initial design goals defined in the design brief were disentangled into sub-goals or sub-themes, guiding the analysis of the generated material. This analysis raised key themes: the perception of historical game-worlds, environmental and cultural determinism, everyday life, society and culture. In addition, a general reflection that raised after engaging in this process was the need for a historical game design framework capable of guiding the complex process of generating meaningful historical game-based learning experiences.

The translation of the historical meanings of Anglo-Saxon life to game-form acquired special relevance at this stage. For the communication of these meanings, the gaming conventions of the survival game genre were used, however, this form of gameplay implied a drastic simplification of medieval life. To address this problem, theoretical approaches about everyday life were incorporated into the project, most notably, the ideas of Henri Lefebvre (1991) on the production of space and time, and Ingold's (2000) ideas on the perception of the environment. These theories were examined in detail and were used as referents to implement new levels of interaction.

In the next chapter, the final game prototype will be tested within a primary school. In this pilot implementation, the design ideas raised in this chapter will continue to be interrogated, in light of the analysis of the data collected in the classroom.

Chapter 5: School Pilot Implementation

5.1 Introduction

This chapter presents and analyses the results of the implementation of the final game prototype in a primary school classroom. This implementation did not occur as an ad-hoc, isolated incident; the game prototype was integrated into the curriculum of the primary school, thus making it possible to gain a better understanding of the potential of using historical games within real school classrooms, as well as assessing the limitations and constraints of these contexts, and the methodological approaches better suited for the use of historical games as pedagogical tools for the targeted group.

For this to happen, the collaboration with the school and class teacher was considered essential. After contacting the primary school, the project was explained to both the class teacher and school directives through a project booklet (see Appendix D1). As the school was keen to collaborate, a series of preparatory meetings with the teacher followed, and the resulting evaluation plan was conducted over a period of approximately a month. As explained in the methodology section, the evaluation followed a pre/post test design, implementing similar data-gathering activities before and after the pupils played the game, and comparing the results obtained from both sessions. In addition, the game itself was programmed to collect and store data from each one of the playing sessions, to further support the comparison between the two sessions.

This chapter is organised as follows: First, the general context of the school evaluation will be described. Second, the data from the pre-playtest, playtest, and post-playtest sessions will be presented and analysed. Lastly, the data from all the sessions will be compared and synthesised.

5.2 Context of the implementation

The educational context chosen to test the game prototype was a primary school³⁵ in the town of Bollington, Cheshire (Fig. 5.1). The group selected to test the game was

³⁵ The name of the school has been removed from this thesis to protect the student's identity.

the Key stage 2 Year 5 class (8 – 11 years old). At the time of the evaluation, this year group had a total of 25 pupils (12 female and 13 male).



Figure 5.1: The primary school Year 5 classroom, where this stage of the research was conducted.

The evaluation activities were integrated in the curriculum planned for Autumn 2016. This period was selected due to the curriculum's main theme titled "*What made Britain great?*" (see Appendix D2) with a focus on Anglo-Saxon and Viking history. As an integrated curriculum, this theme guided the learning activities for all subject areas, to make all subjects mutually reinforcing.

5.2.1 Data protection and ethical considerations

The identification and addressing of the ethical considerations of working with children were a key concern in this stage of the project. These concerns were investigated thoroughly during the project's ethical approval process, approved by the University of Salford Research Ethics panel in May 2014. In the preparation of this document, the main reference used to identify ethical issues was the document '*Ethical Guidelines for Educational Research*', developed by the British Educational Research Association [BERA] (2011). This document provides clear directions to conduct research projects involving children, developed from the legal basis defined in the '*United Nations Convention on the Rights of the Child*' (Unicef UK, 1990), which entered in full

force in September 1990. For the specific purpose of conducting ethical research with children, the Articles 3 and 12 in this document are of special relevance. The Article 3 states that for all actions concerning children, *“the best interests of the child shall be a primary consideration”* (p. 4), therefore the protection and care necessary for the well-being of every child must be ensured while *“taking into account the rights and duties of his or her parents, legal guardians, or other individuals legally responsible for him or her”* (p. 4). The Article 12, in its turn, states that *“the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child”* (p. 5).

Coming to this phase of the project, the primary school was approached first by a contact email (Appendix D5) with a brief explanation of the project. For further information, this email also included a booklet (Appendix D1) where each aspect of the project was explained in greater detail. A facilitating factor of working with this school was the condition of the researcher of being also a parent of three of the school’s pupils, so being familiar to other parents, teachers and directives. A planning meeting with the school’s teacher followed the contact email, where the ethical implications of the research were discussed at length. Three of these aspects deserve a closer look: the consent of all participants, data protection and anonymisation and exposure to distressful or emotionally charged experiences. Following, each one of these aspects will be explained in greater detail.

The first aspect concerned the informed consent of all participants to the project, including children and parents. As the planned activities were integrated within the school curriculum, the teacher explained the research and activities to the children in the class sessions that precluded the beginning of the project’s implementation, emphasising the optional character of their participation. Likewise, parents were also informed and were provided with the necessary channels to demand further information and/or withdraw their children from any of the planned activities. This measures were in line with BERA guidelines, which state that *“researchers must also seek the collaboration and approval of those who act in guardianship (e.g. parents) or as ‘responsible others’ (i.e. those who have responsibility for the welfare and well-being of the participants e.g. social workers)”* (pp. 6-7). Following the school established procedures, this was conducted through an email sent to all parents (Appendix D6), explaining the project and detailing the activities to be carried out with the children. This email emphasised the measures taken for the anonymisation of the children’s identities and highlighted the possibility to withdraw the children from any of the activities.

A second aspect that demanded special attention concerned the data protection and anonymisation of the children's identity. In this regard, the primary school had a strict policy and demanded not to capture any visual records (videos or images) from any of the pupils involved. In consequence, no images or videos of children were recorded at any time. Children were also asked to use a pseudonym instead of their real names in any of the work they produced, and all references made to their real names during their interviews were removed from the interview transcripts.

At last but by no means of less importance, the exposure of children to distressful or emotionally charged experiences was also part of the considerations discussed at the planning meeting. In this regard, the BERA document states that “[r]esearchers must recognize that participants may experience distress or discomfort in the research process and must take all necessary steps to reduce the sense of intrusion and to put them at their ease. They must desist immediately from any actions, ensuing from the research process, that causes emotional or other harm”. (p. 7). To address any potential issues, recognisably difficult to foresee due to the emergent and subjective nature of children's reactions to the game's content, the teacher was presented with the game material before the testing sessions and was completely involved in their planning and conduction.

5.2.2 Limitations of the implementation

As many primary schools in the UK, the primary school where the research was conducted had a tight programme of activities, with a focus on the preparation of subjects measured by the Government tests.³⁶ This made it more difficult for the school to allocate a significant amount of time to the activities originally proposed for the game's evaluation. After discussing these limitations, it was decided to conduct the evaluation of the prototype in a pilot study consisting of three sessions. Although this number represented a considerable reduction of what was originally planned it was nevertheless considered sufficient to evaluate the prototype's design goals and sub-goals.

A second consideration that had to be taken into account was the number of computers available at the school, which at the time of the intervention consisted of nine old laptops, with very low technical specs. This made it impossible to test the

³⁶ Studies conducted during 2017 by the Commons Education Select Committee (Parliament of the United Kingdom) reported that “[t]he close link between primary assessment (SATs) and school accountability creates a high stakes system which can negatively impact children's teaching and learning”. For further information, see <https://www.parliament.uk/business/committees/committees-a-z/commons-select/education-committee/news-parliament-2015/primary-assessment-report-published-16-17/>.

game with all the pupils at the same time, so the play testing session had to be organised by having students taking turns to play the game.

5.2.3 Evaluation strategy

After discussing the goals of the evaluation and the school's available time with the class teacher, a general plan was defined. The specifics of this plan are shown in the following table (Table 5.1).

Table 5.1: Evaluation activities carried out in the primary school.

SESSION	ACTIVITIES	DATE	DURATION	DATA GATHERING
Preparation	Semi-structured interview with the School teacher.	October 6th 2016	30 minutes	Audio recording
Pre-playtest	Talk and draw. Children make drawings responding to the question: How was life in Anglo-Saxon time?	October 14th 2016	60 minutes	Children drawings Audio recording
Playtest	Game brief introduction. Short explanation of the game's goals and how to play. Play-testing the Anglo-Saxon game. Working in groups, children take turns to play the game. Wrapping up. The game experience is discussed in an open conversation with all the children.	November 3rd 2016	120 minutes	Player dossier data
Post-playtest	Talk and draw. Children make a new set of drawings responding to the same question asked in the first session.	November 25th 2016	60 minutes	Children drawings Audio recording
Wrapping-up	Semi-structured interview with the School teacher.	December 2nd 2016	30 minutes	Audio recording

5.3 Preliminary interview

Prior to any game testing sessions, a preliminary meeting was conducted with the school teacher responsible for the Year 5 class. This interview followed a semi-structured approach, had an approximate duration of 30 minutes, and had two main goals:

- ❖ To gain a better understanding of the ways in which history in general and more specifically the Anglo-Saxon topic was taught within the school.
- ❖ To discuss the teacher's previous experiences and attitudes towards video games and game-based learning methods to identify potential problems in implementing the historical game prototype as part of the children's curricular activities.

The complete transcript of the interview can be found in the Appendix E2.

5.3.1 Analysis of the preliminary interview

The preliminary interview was analysed using grounded theory methods. Table 5.2 shows the main themes identified through open coding.

Table 5.2: Themes and examples of coded text for the preliminary interview.

THEME AND CODING INSTRUCTIONS	SAMPLE OF CODED TEXT
Lack of time and resources. References to lack of time or resources to address historical topics in a well manner.	Sometimes time can be a restriction to go into the depth that if you're interested in history you would like to go to because obviously math and literacy [...] those core skills take such a large chunk of time, that history and all the other foundation subjects [...] all those extra can be tricky [to address properly].
Integration of history with other subjects. Comments made in relation to the the integration of history with other subjects.	I think sometimes you feel you're making very tenuous links between subjects just to trying forcing them into your curriculum.
Experiential understanding. Difficulties in connecting historical knowledge with personal experiences from children.	I think they [care about history], but not to the extent where they can apply it completely to [their] current life, so making those links between things that they find interesting to learn about, and they find interesting to think: Oh!, how would be my life if I would live there? [...] some of them just think: they were pagan, [then] they became Christian. I've learnt that fact, Thank you
Competing sources. The school in competition with other sources (films, TV, family, etc.) of historical information	[Students] just want certain bits of the history that for them are exciting and I think that this is because of [...] media seen by the children: films and television. There is so much out there that impresses them, and it's new, that just showing them photographs or just showing them the kind of old youtube clips isn't impressive anymore.

THEME AND CODING INSTRUCTIONS	SAMPLE OF CODED TEXT
Dealing with complicated subjects. Comments about the problems of dealing with topics difficult to address with children at their age.	<p>But then we talk about the British empire, and that things gets tricky, because of [the] British values... you're thinking, we went on invading lots... the world [...] And then you think: I'm with ten years old [...] there are times in which I have to say: look, at your age guys, this is how I would try to understand it, and try to reason with it, because otherwise you can end up trying to get so far into the rights and wrongs of moral behaviour, of which they are not in age to comprehend.</p> <p>I think with most things there is a way to deal with them, because I do think kids are expose so much without our control anyway, that if anything sometimes I think is better that they might expose to something within a classroom, where they have their peers and they feel safer, and they often do feel a lot safer when they are with other children talking about something.</p>

5.4 Pre-playtest

5.4.1 Children's assumptions about the Anglo-Saxon world and way of life

This activity took place in the classroom and lasted for 60 minutes. Students were distributed in groups around tables. After a brief presentation of the researcher and an explanation of the general context of the project the pupils were asked to make a drawing in response to the question *"How was life in Anglo-Saxon time?"*. Drawing materials were provided to each child and as they produced their pieces of artwork, the researcher walked around the tables conducting informal mini-interviews.

As the mini-interviews were led by the children's drawings (i.e. what have you drawn in here?) the conversations were kept purposely open, encouraging the children to propose the topics and lead the discussion. Despite the emergent nature of this research method, a few general themes were defined with the purpose of guiding the dialogues with children (Table 5.3).

Table 5.3: General themes and question examples for the pre playtest session.

THEME	QUESTION EXAMPLES
The Anglo-Saxon world in children's imagination	What is going on in here? (pointing at the drawing or some detail in it)
Continuity and change	Would you like to have lived in Anglo-Saxon time?
Historical significance	Do you think that this (pointing at some part of the drawing) was important for them?

THEME	QUESTION EXAMPLES
Historical influences (Books, TV, Films, etc.)	How do you know all this? (After children explained some aspect of their drawings)

5.4.1.1 Drawings

The pre-playtest pupil's drawings of the Anglo-Saxon world were analysed quantitatively (see Appendix F2). Figure 5.2 shows elements of the landscape that were most commonly drawn (i.e. constructions, artefacts, places). Figure 5.3 displays the tasks and activities that were drawn, and Figure 5.4 provides information about the children's self and social representations recognised in their drawings. These graphs present the number of drawings that included the mentioned features versus the total number of drawings produced by the children³⁷ (N = 23).

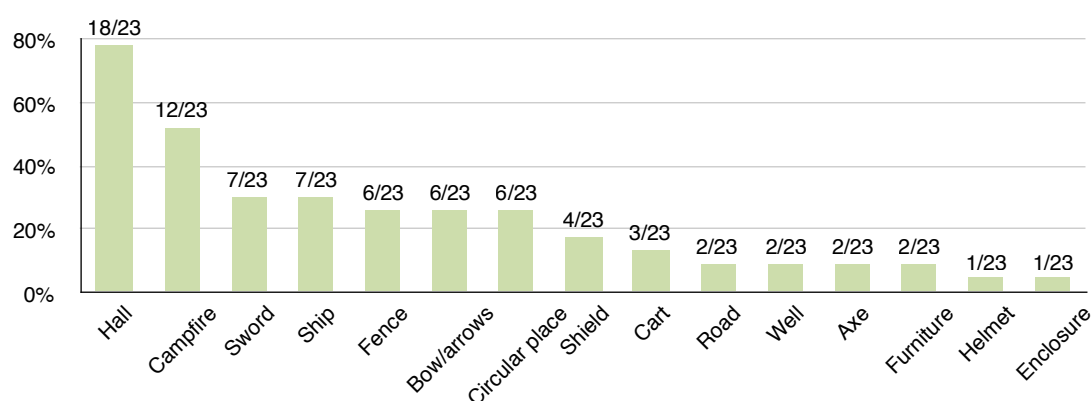


Figure 5.2: Frequency of Anglo-Saxon objects represented in pre-playtest drawings.

³⁷ The inclusion or omission of a determined feature is one of the most common ways in which children's drawings are analysed (Merriman & Guerin 2006). Although other studies also interpret the features being drawn, according for example to the exaggeration or minimisation with respect to the rest of the drawing, in this case it was considered enough to calculate the percentage of occurrences vis-a-vis the total number of drawings produced.

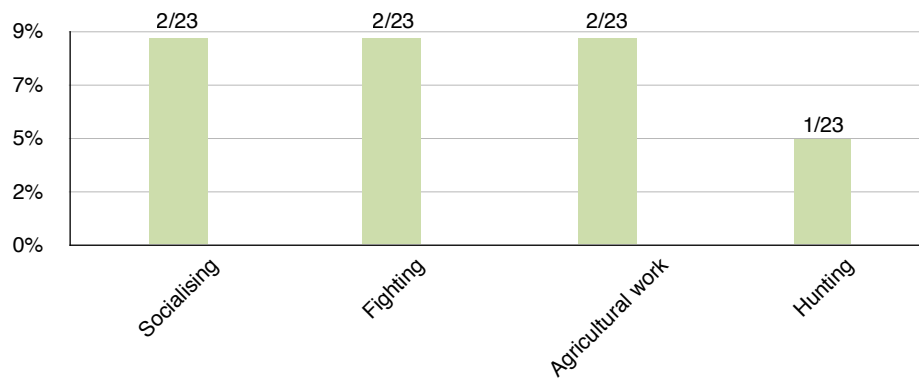


Figure 5.3: Frequency of Anglo-Saxon activities and tasks represented in pre-playtest drawings.

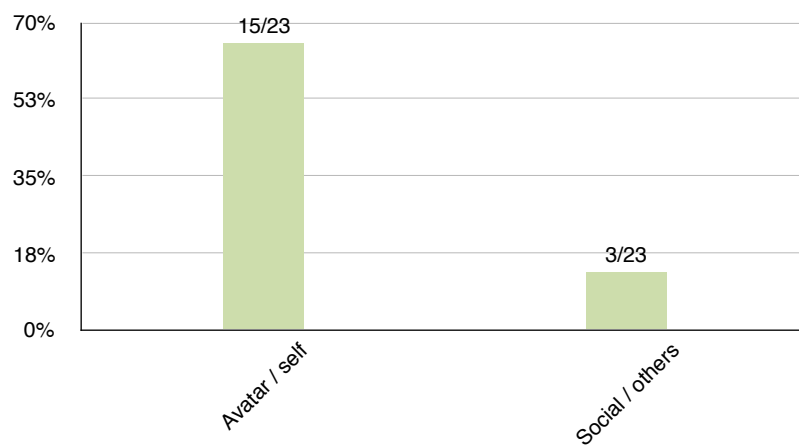


Figure 5.4: Frequency of self and social representations in pre-playtest drawings.

5.4.1.2 Mini-interviews

The audio data obtained from the children's interviews was transcribed (see Appendix F1) and analysed using grounded theory methods. This process started by identifying 81 categories (see Appendix I1). In a later stage these categories were analysed through axial coding to form a set of abstracted categories or sub-themes (selective coding)(see Appendix I2; I3; I4; I5). These sub-themes were arranged into three main themes:

1. *Dramatic engagement*: Comments that show the drawing to represented events from Anglo-Saxon history or way of life. In some cases the drawing's author is included in the representation, assuming an active role in the depicted events.
2. *Life in the past*: Comments where children indicate how they imagine life in Anglo-Saxon time.

3. *Material culture*: Comments where children made reference to the ways in which they imagine the relationship between Anglo-Saxon folk and the elements from their material culture, such as constructions and artefacts.

The sub-themes defined for each one of these categories along with examples of coded text are presented in Tables 5.4, 5.5 and 5.6.

Table 5.4: Sub-themes and samples of coded text for theme 1.

THEME 1: DRAMATIC ENGAGEMENT	
Sub-theme and coding instructions	Sample of coded text
Self-reference. Indication that the character drawn corresponds to the drawing's author.	<p>Researcher: What do you have in there?</p> <p>Participant 7: A house and me.</p> <p>Researcher: Are you there? And what are you doing?</p> <p>Participant 7: Carrying buckets</p>
Narrative description. Comments made by children where the drawing is presented as a narrative.	<p>Researcher: What is going on inside this hall?</p> <p>Participant 21: The meat is cooking. The would have probably do that here when the bonfire was lit, and warriors would attend here, after battle.</p> <p>Researcher: Wow, that's a full story, so why there's blood here [indicating part of the drawing], what happened?</p> <p>Participant 21: They would have came back from war, to have come here to eat... they would have come injured after battle.</p> <p>Researcher: So they are coming from war and they are bleeding, so that's why there's blood?</p> <p>Participant 21: And a bit of mud.</p>

Table 5.5: Sub-themes and samples of coded text for theme 2.

THEME 2: LIFE IN THE PAST	
Sub-theme and coding instructions	Sample of coded text
Life was violent. Evidence that life in Anglo-Saxon time was violent	<p>Researcher: Do you think warriors were important?</p> <p>Participant 1: Yes, they had to fight, to win... to get the country... they wanted England, but the Romans had it</p> <p>Researcher: Do you think it was cool to live in the Anglo-Saxon time?</p> <p>Participant 1: Not really</p> <p>Researcher: Why not?</p> <p>Participant 1: Because, they used to fight a lot</p> <p>Researcher: And that was dangerous...</p> <p>Participant 1: Yeah... people got hurt a lot</p>
Life was boring. Implications that life was tedious in comparison with life in the modern day.	<p>Researcher: What things were not so cool [in Anglo-Saxon time]?</p> <p>Participant 15: Waiting for crops to grow</p>

THEME 2: LIFE IN THE PAST	
Sub-theme and coding instructions	Sample of coded text
Life was a struggle for survival. Indication that life was people had to work hard to sustain themselves and their families.	<p>Participant 17: [...] food was an important thing for the saxons... [...]there was quite a bit but it was hard to get, and if you were a good hunter that means you would have more money from selling the food that you caught and if you had family you were able to keep your family safe</p> <p>Researcher: [Pointing to a part of the drawing] Why they are hunting?</p> <p>Participant 17: Because hunting was quite important. They needed to survive.</p>
Life was social. Comments where children imagine social activities as an important part of Anglo-Saxon life.	<p>Researcher: Is that a house?</p> <p>Participant 21: Yes. It meant to be a hall</p> <p>Researcher: What was the hall?</p> <p>Participant 21: Is where they met to have stories, and meeting people.</p> <p>Researcher: What is that?</p> <p>Participant 21: That's a campfire</p> <p>Researcher: Do you think the campfires were important at that time?</p> <p>Participant 21: Yes, they would meet to tell stories</p>

Table 5.6: Sub-themes and samples of coded text for theme 3.

THEME 3: MATERIAL CULTURE	
Sub-theme and coding instructions	Sample of coding text
Place affordance. Description of determined places being used for specific purposes.	<p>Researcher: What is this?</p> <p>Participant 3: This is a fire</p> <p>Researcher: Why do you have a fire in there?</p> <p>Participant 3: Ehhh... Mmmm, I'm not really sure. They did have these fires in those days</p> <p>Researcher: They have campfires?</p> <p>Participant 3: Yes</p> <p>Researcher: Why they use that; they used that for something, probably? Maybe cooking?</p> <p>Participant 3: Yeah</p> <p>Researcher: And it's outside the house...</p> <p>Participant 3: Some can be outside, and some can be inside</p> <p>Researcher: That's cool. Why do you think they needed them outside?</p> <p>Participant 3: Mmm... I think the outside ones were more for... you know, like singing songs and getting together</p> <p>Researcher: Excellent, yes, I think that's important, and maybe inside for?</p> <p>Participant 3: Cooking things</p>

THEME 3: MATERIAL CULTURE	
Sub-theme and coding instructions	Sample of coding text
Significant things. Descriptions of how things were used in the past, and why they were important for Anglo-Saxons.	<p>Researcher: Were campfires important for the Anglo-Saxons?</p> <p>Participant 14: Mmm... I don't really know... [They were] the only source of light after dawn. They didn't have oil lamps or things like that so it was just campfires.</p> <p>Researcher: And what is that?</p> <p>Participant 14: That's a campfire</p> <p>Researcher: Do you think the campfires were important at that time?</p> <p>Participant 14: Yes, they would meet to tell stories.</p>

5.4.1.3 Analysis of children's assumptions about the Anglo-Saxon world

The review of the children's drawings revealed the use of different representational strategies to communicate their ideas about the past, in line with the spatial drawing techniques expected for their age. Golomb (1992) remarks that children of this age group tend to arrange the items that compose the drawing separate from each other, giving the appearance of a series of elements "*floating in space*" (p. 102) (Fig. 5.5). Many of the pre-playtest drawings followed this pattern, although a significant number of children applied more sophisticated spatial strategies, indicating features of the physical landscape such as mountains and roads, and spatial relationships between the represented elements (Fig. 5.6).



Figure 5.5: Example of "floating" spatial representation.

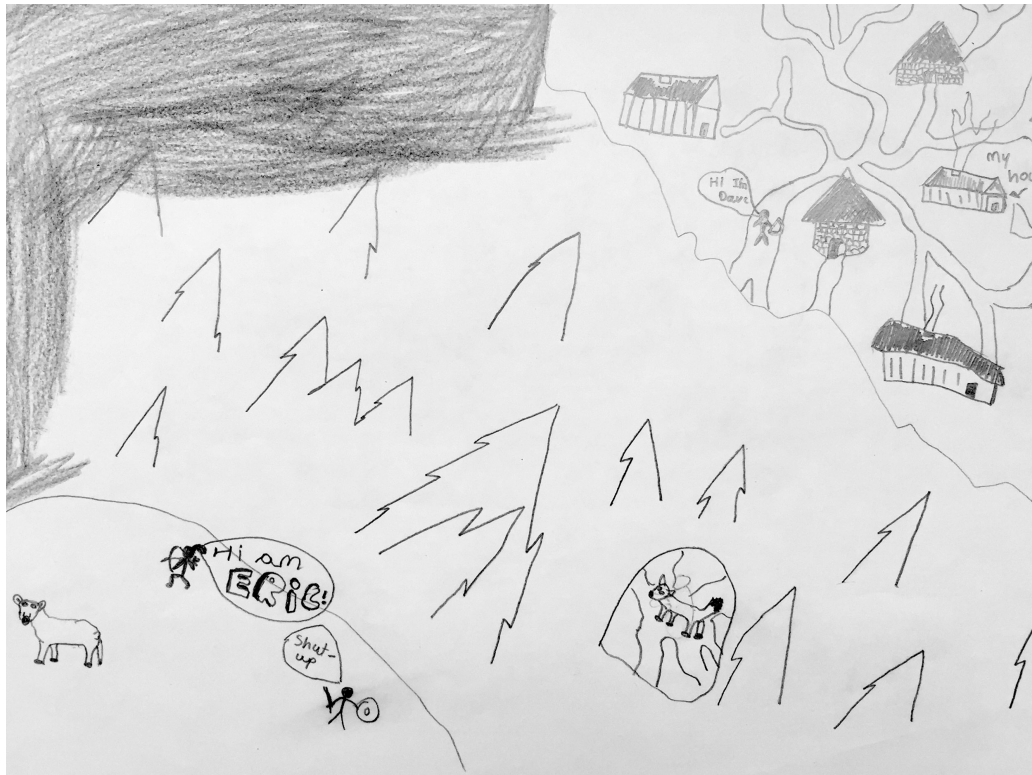


Figure 5.6: Example of a drawing with a more complex landscape representation.

In all the drawings produced ($N = 23$), most of them (78%, $n=18$) depicted wooden halls as the type of construction where the Anglo-Saxons lived, with *Sunken Featured buildings*, or *Grubenhäuser*, absent from all representations. Halls were drawn with a varied level of detail, and in a few cases their depiction included views of the interior – achieved by making the walls transparent. This representational strategy is also described in the literature as typical for this age group; a technique that Piaget defined as “*intellectual realism*” (Golomb, 1992, p. 108).

Children also drew other elements representative of the Anglo-Saxon landscape, such as fences (26%, $n=6$), wells (9%, $n=2$) and village enclosures (4%, $n=1$). Along with these constructive forms, children drew a number of other objects representative of the early medieval world. Among them, the object with the strongest presence was the campfire (52%, $n=12$), which was also repeatedly referred to in the interviews from a functional perspective (i.e. for “*cooking*”, for “*source of light*”), or in connection to social life (i.e. “*tell stories*”, “*singing songs*”, “*getting together*”). Other significant objects included defensive or offensive weapons, such as swords (30%, $n=7$), bows and arrows (26%, $n=6$), shields (17%, $n=4$), axes (9%, $n=2$) and helmets (4%, $n=1$).

In a significant number of drawings (65%, $n=15$), children drew an Anglo-Saxon character. When quizzed about this aspect, many children made it clear that these

characters were in fact their self-representations in the imagined world. In most cases the drawings were associated to narrative accounts of fictional events where children included themselves as participants. Through these narratives, children not only represented and communicated their views about the Anglo-Saxon world, but, as active participants, also revealed aspects of their personal identities, lives and world views.³⁸

From the analysis of children's narratives four sub-themes emerged. First, life in early medieval Britain was perceived as violent. Anglo-Saxon folk, according to the pupils' views, "*used to fight a lot*" (Participant 4, Pre-playtest session). In other cases children made specific references to the historical conflicts of the time (i.e. antagonising Anglo-Saxons against "*the Romans*" or "*the British*" in the fight for land). Non-violent forms of interaction between these or other groups were completely absent both from the drawings and from interview comments.

A second sub-theme to arise from this analysis was that Anglo-Saxon life was perceived as a constant struggle for survival. Children emphasised the productive and agricultural tasks, with the representation of activities, such as "*growing crops*" and "*hunting*", as key for the self-preservation of people in a challenging world.

A third sub-theme to arise in children's drawings was the perception of the Anglo-Saxon world as a highly social place, where people commonly came together to "*have stories*", "*meeting [other] people*", and "*singing songs*". Despite that only 13% (n=3) of the drawings represented more than one character in the scene, in their comments children recurrently indicated the importance that social life had for the Anglo-Saxons. The children's references to the communal activities appeared in strong connection with campfires, either indoors or outdoors, which essentially configured the places where children imagined Anglo-Saxons coming together and enjoying themselves.

Finally, a fourth theme of interest was the perception of Anglo-Saxon life as *boring* in comparison to present day. According to some children this was a direct result of not having access to modern forms of entertainment, such as TVs, computers or iPads, which are nowadays taken for granted. In other comments, the tediousness of the past was seen in connection to long periods of inaction and boredom that

³⁸ Research on children's drawings concurs that narrative is an essential form through which children describe their own experiences and communicate their views of the world. Through their drawings, children are not only able to represent their understanding of the world, but also to make sense of it both factually and emotionally (Nicolopoulou, 1992, p. 157 in Ahn & Filipenko, 2007 p. 279).

children assumed Anglo-Saxons had to endure while waiting for natural processes to happen (i.e. “*growing crops*”).

5.5 Playtest

This activity took place approximately three weeks after the first session. The game was installed the day before on nine school laptops.³⁹ Due to this, the game settings in most computers had to be adjusted to the lowest setting to allow the game to run at a playable frame rate.

During the session, the pupils were organised in groups of two to three; each group used one laptop and took turns to play the game (Table 5.7). As the game had no tutorial, some general instructions on how-to-play were given at the start of the session. These instructions were purposely kept to a minimum, consisting only of general navigation guidance and how to interact with the game world and interface.

Table 5.7: Number of playing sessions on each computer.

COMPUTER USED FOR TESTING	NUMBER OF PLAYING SESSIONS RECORDED
A	3
B	2
C	2
D	1
E	4
F	2
G	1
H	2
I	2

When the play-testing session started, the general excitement of the whole class became evident. For the rest of the session, children took turns to play the game, which, in general, appeared challenging and enjoyable for most of the class (Design goal 5). Although this observation could not be visually documented to protect the participants’ identities, it was afterwards confirmed through their comments in the post-playtest interviews, where they enthusiastically expressed their positive opinions about the game

³⁹ The school laptops were Toshiba 15.4" running a Windows Vista Home Basic operative system with a RAM of 0.5GB of Memory, processor speed of 1.86 GHz, 80GB of hard disk capacity and a ATI Xpress 200M graphics card.

(i.e. “*is a really good game*”; “*I really like it*”). As the main goal of the game was to survive for as long as possible, in most groups children spontaneously decided to switch who was playing every time someone’s avatar died, becoming a motivating factor to be the player who managed to last the longest. Although it was evident that some of the children were more familiar with gaming conventions and interfaces than others, very few of them asked the teacher or the researcher for assistance. In most cases, they were able to find their way through the game’s interface completely independently or with the support from their peers.

While children interacted with the game, all their movements and actions were recorded and stored in an *eXtensive Markup Language* (XML) file on each one of the laptops. As the session finished after approximately two hours of play-testing, all these XML files were collected for further analysis. This was conducted in two ways: First, the XML data was converted to a Comma-Separated Values (CSV) format readable by a spreadsheet program (e.g. Mac Numbers), where it was parsed and displayed graphically. Second, a bespoke software application was built (see Appendix B1) to display the data interactively (Fig. 5.8). This application made it possible to replay all the children’s playing sessions, and to observe and analyse their movements and actions as they progressed through the game.

The collected play-testing data is presented and analysed in the subsequent sections of this chapter. For the sake of clarity, this presentation is divided into two sections; the first one (*Game world inhabitation*), focuses on the players’ movements and surviving strategies in the game environment. The second one (*Empathic play*) looks into the relationship between the player and their family members, analysing the players’ dialogues with them and their degree of success in keeping them alive.

5.5.1 Game world inhabitation

5.5.1.1 Survival time

The total time that players managed to survive on each one of the recorded sessions is shown in Figure 5.7.

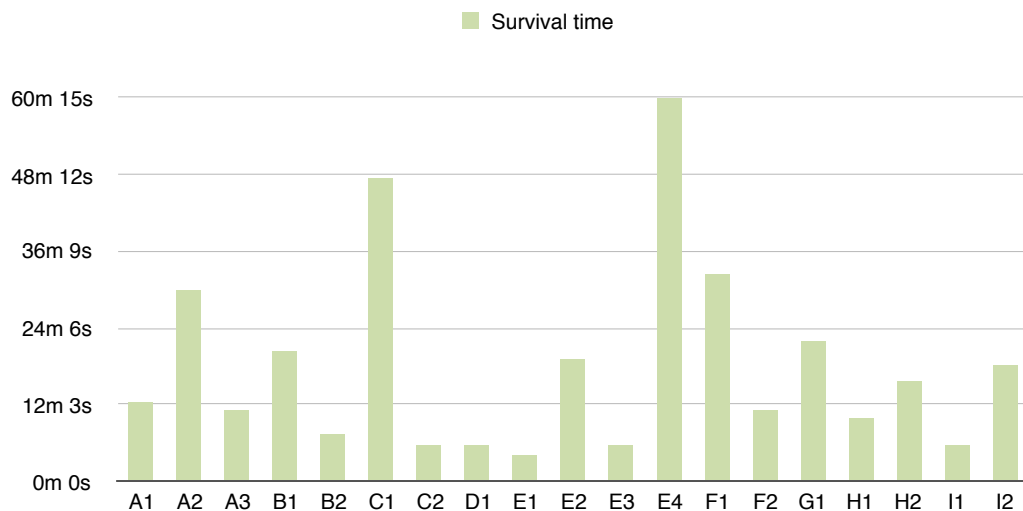


Figure 5.7: Player's avatar survival time. The letter corresponds to the computer used, and the digit to the playing session recorded.

5.5.1.2 Analysis of survival time

The survival time across all recorded sessions varied notably, and since the computers were shared among different pupils, it was not possible to identify clear individual gameplay patterns. It is however possible to say that in most cases players employed strategies, with a varied degree of success, to overcome the game's survival challenges. Notably, in 21% ($n=4$) out of the total of sessions recorded ($N=19$), the players had their character die in the maximum time that he could have survived without any food or water (approximately five minutes and 35 seconds), meaning that in the majority of sessions the players were able to collect or produce food and drink.

The average survival time across all sessions was 18 minutes and two seconds, with a best surviving time (on session E4) of one hour and seven seconds, followed by a second best of 47 minutes and 26 seconds (on session C1).

These results suggest that the game's survival challenge was difficult for most players, but possible to be achieved and sustained provided that players applied effective survival strategies.

5.5.1.3 Spatial exploration

Every two seconds, the game recorded the position of the player's avatar as it moved through the game-world. By using the purposely created visualisation software discussed previously, it was possible to reconstruct the movements of each player's

avatar on each one of the individual playing sessions (Fig. 5.8). The navigation patterns of all the sessions were afterwards superimposed into one single image. This analysis follows the ideas of anthropologist Tim Ingold (2000) on the perception of the environment. For this author, the lines formed by the movements of human and non-human agents in the landscape, which he identifies as a *meshwork*, are one of the most revelatory ways to understand how people inhabit their environment. We can certainly extend this form of analysis to historical synthetic worlds.⁴⁰

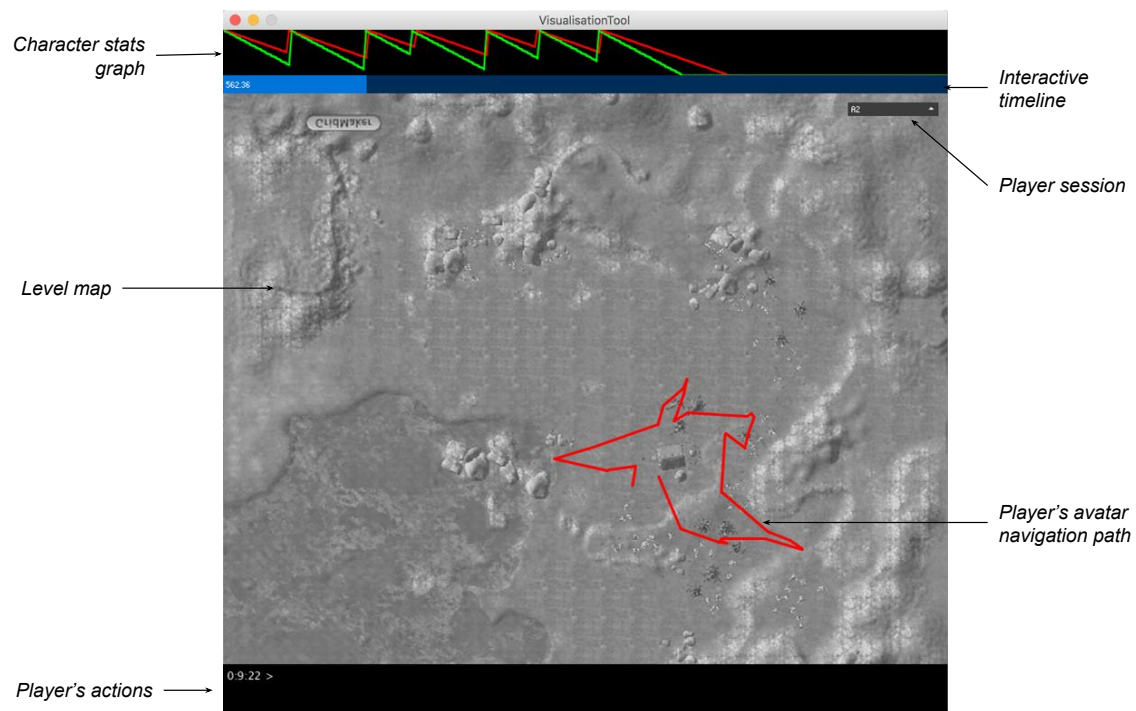


Figure 5.8: Interactive visualisation of a play testing session.

5.5.1.4 Analysis of spatial exploration

A first reading of the superimposed player avatar's movements reveals that, for the most part, their actions and navigation concentrated around the space where they first spawned, and where some initial constructions were set. Although in all the sessions players actively explored the world around, in most cases they decided to come back to this place, forming the dense area of paths seen on the game map in Figure 5.9.

⁴⁰ In his book *'Archaeogaming'*, Andrew Reinhard (2018) also proposes to analyse the movements of humans and non-humans in game environments as a form to understand their behaviours in synthetic worlds. Reinhard strongly argues that for games to be considered as built environments "*something made by people for other people to use*" (p. 88), which are not essentially different from the environments we build in the natural world. To understand these environments, he proposes to adapt the methods and tools used in real-world archaeology to the synthetic space, collecting and interpreting data from the game media, files systems, and the game-space as created by the developers and inhabited by its digital dwellers.

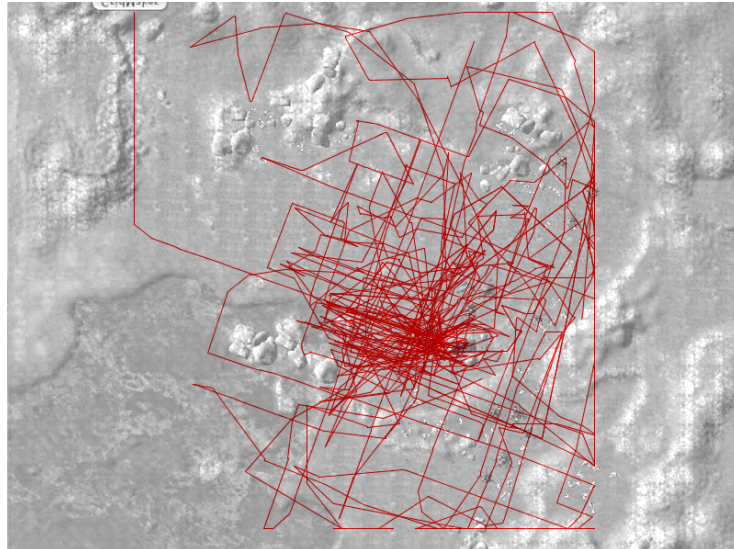


Figure 5.9: ‘*Meshwork*’ produced by the superimposition of the avatars’ navigation from all the playing sessions recorded.

The exact reasons behind this player behaviour are difficult to establish via the collected data, but it can be hypothetically linked to inhabitation patterns from the real world being transferred to the environment of the game. As the spawning place presented some initial constructions and artefacts, players probably decided to concentrate in this place for practical reasons, or due to some acquired sense of familiarity with this place, influencing them to come back while exploring (see 2.3.3.2). As the play-testing of the game was limited to only one session, it was not possible to obtain more complete explanations about the navigation patterns, nevertheless, this is an interesting subject for future investigation.

5.5.1.5 Survival strategies

To survive in the historical game-world, players have to perform actions and make a series of decisions, which were all recorded by the system. Figure 5.10 compares the food collected from the game environment versus the food cooked, which demanded a better understanding of the game’s interface and procedural systems. Equally, Figure 5.11 compares resources collected versus resources produced or crafted.

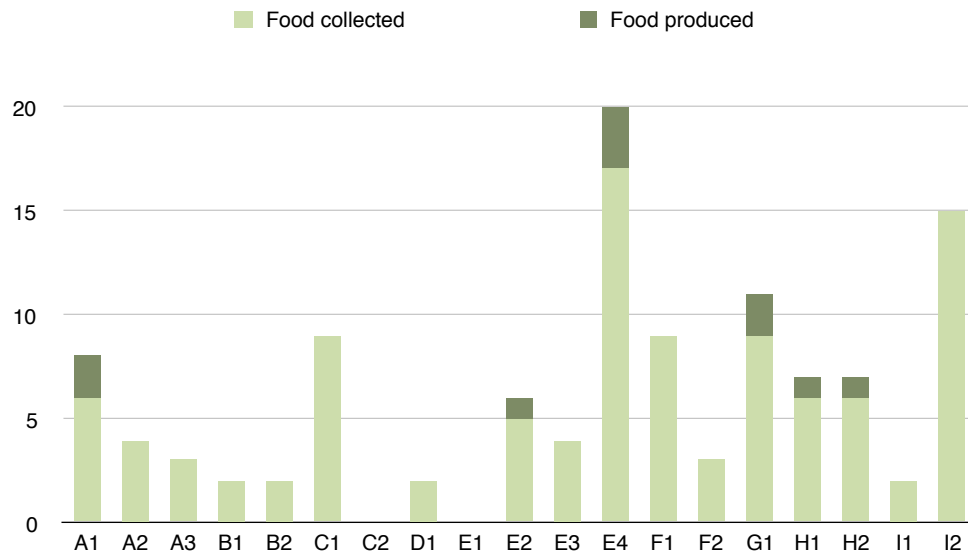


Figure 5.10: Proportion of food collected (91%) versus food produced (9%)

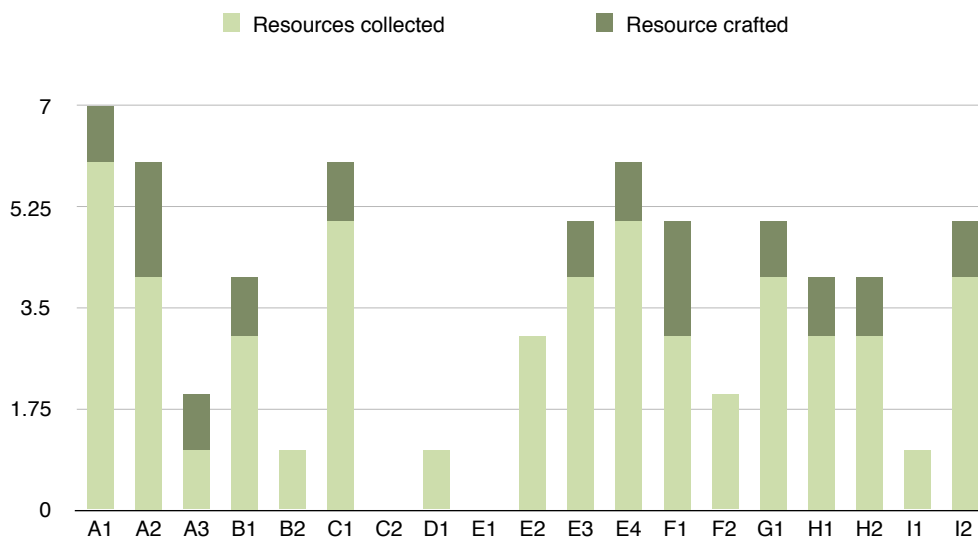


Figure 5.11: Proportion of resources collected (79%) versus resources crafted (21%)

Another important part of an effective survival strategy involved the more complex and demanding actions of farming and building, which are presented in Figure 5.12. In this graph, the number of farming actions performed by players in all sessions is compared to the number of building actions.

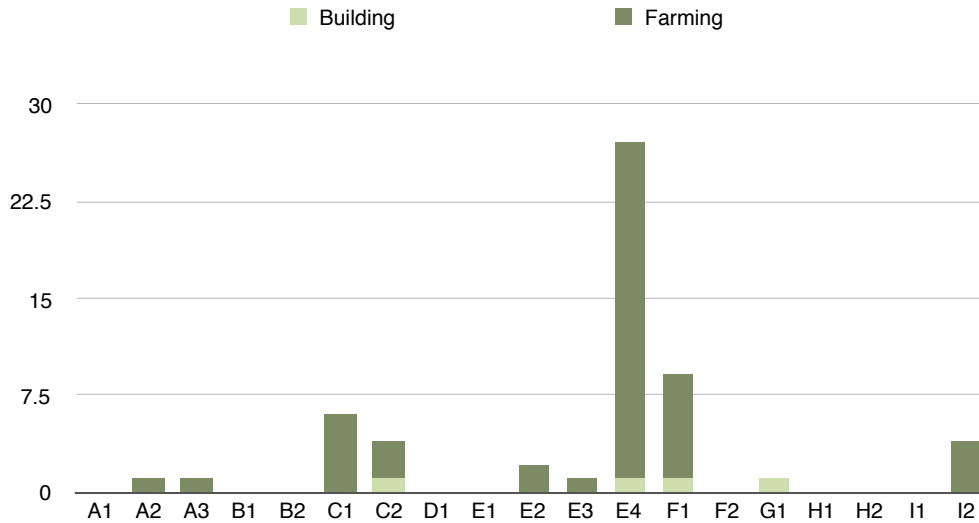


Figure 5.12: Proportion of building actions (7%) versus farming actions (93%)

Finally, Figure 5.13 contrasts the number of actions executed by the player, which demanded him or her to wait until the task was finished, and the number of tasks delegated to a family member or slave, which were executed autonomously by the agent without the player's assistance.

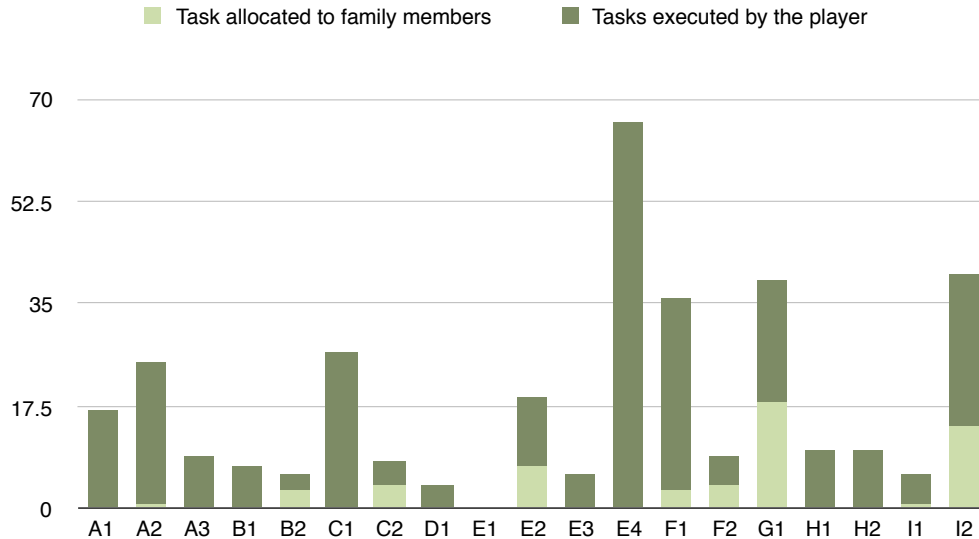


Figure 5.13: Comparison between tasks performed by the player (84%) versus tasks delegated to family members (16%)

5.5.1.6 Analysis of survival strategies

From all the actions registered involving the collection and production of food (N=114), players relied much more on collecting food (91%, n=104) from the

environment than producing it (9%, n=10), despite that the food produced (e.g. bread, nettle soup, lamb stew, etc.) returned a comparatively higher nutritional value. While players collected food from the environment in all 19 sessions, food was produced only in six (31%). The same unbalance can be observed in the proportion between the collection of resources, such as hay and coppice versus the production of more elaborate products, such as wood planks or campfires. In all the registered actions (N=67), resources were predominantly collected (79%, n=53) rather than produced (21%, n=14). In regard to the distribution by the number of sessions played, resources were collected in all sessions (n=19) while produced in 63% (n=12) of them. This disproportion between resources collected and produced can be hypothetically linked to the complexity involved in producing food or products, which demanded a better understanding of the game interface as opposed to the comparatively simpler action of just taking resources from the environment. Since this was the first time that children interacted with the game, and given the lack of a tutorial, the familiarity with the game's interface and game-world functioning might have played an important factor in their choice of survival strategies.

Equally, the actions of farming and building, which were tasks that demanded the accomplishment of a series of prerequisites and followed a chain of steps, were likely affected by the lack of familiarity with the game's functions and interface. From all the sessions recorded (N=19), farming was conducted in 47% (n=9), and building in only 21% (n=4).

Another important comparison in regard to the player's survival strategies was the proportion of tasks conducted by the player's avatar versus the tasks delegated to a family member or slave. This distinction is important; when performing tasks by themselves players had to wait until the selected actions were completed in order to continue playing, but if delegated to a family member or slave it meant that they did not have to wait. From all the tasks recorded (N=344), 84% (n=289) of them were carried out by the player while 16% (n=55) were delegated to a family member(s) or slave.

5.5.2 Empathic play

5.5.2.1 Family care taking

The pupils were presented with the challenge of sustaining their family members, by providing them food at regular intervals. The effectiveness of players to keep these characters alive is shown in Figure 5.14.

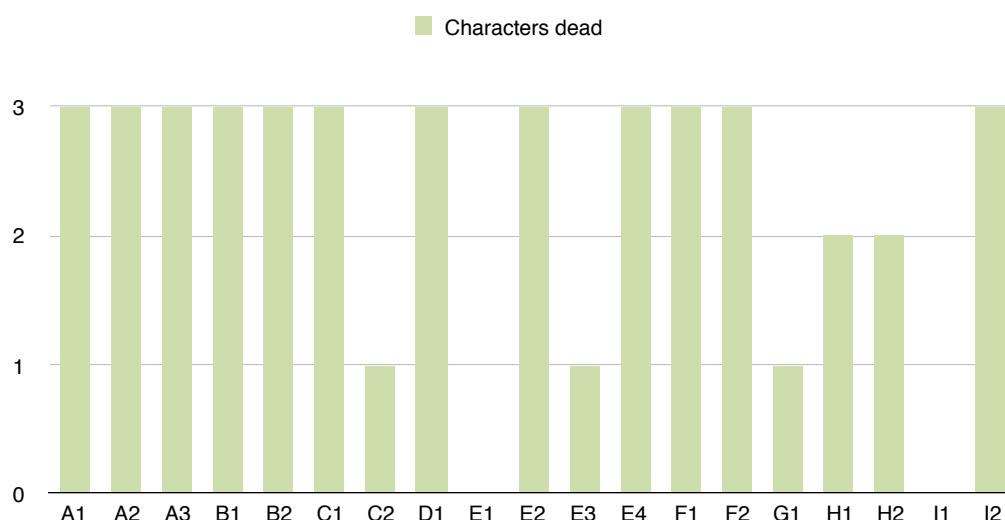


Figure 5.14: Number of family members' deaths ' in each player session.

5.5.2.2 Analysis of family care taking

In a significant number of cases, players completely failed to keep their family members alive. In 63% (12 out of 19) all three characters were neglected – deliberately or not – to the point of starvation. In the remaining 37% (n=7) cases, players made an effort to take care of their family member characters. Within this group, in 10% (n=2) of the sessions players managed to keep all three characters alive, while in 27% (n=5) players were able to maintain one or two of them for the duration of the playing session.

5.5.2.3 Dialogues

At different moments during gameplay, children were presented with characters *talking* to them, who had to be interacted with through a text-based dialogue system (see 4.3.3.1.5). In order to understand the level of attachment to their family members, these conversations gave players the choice of selecting empathic or non-empathic answers. Examples of both types of answers are provided below:

- ❖ **Empathic:** *I am pleased to meet you [CHARACTER NAME]. Please tell me the news.*
- ❖ **Non-empathic:** *I never heard about you [CHARACTER NAME], and your news do not interest me.*

In all the situations where players were presented with the choice between the two types of answers, their selection was non-empathetic. The distribution according to the play sessions is shown in Figure 5.15.

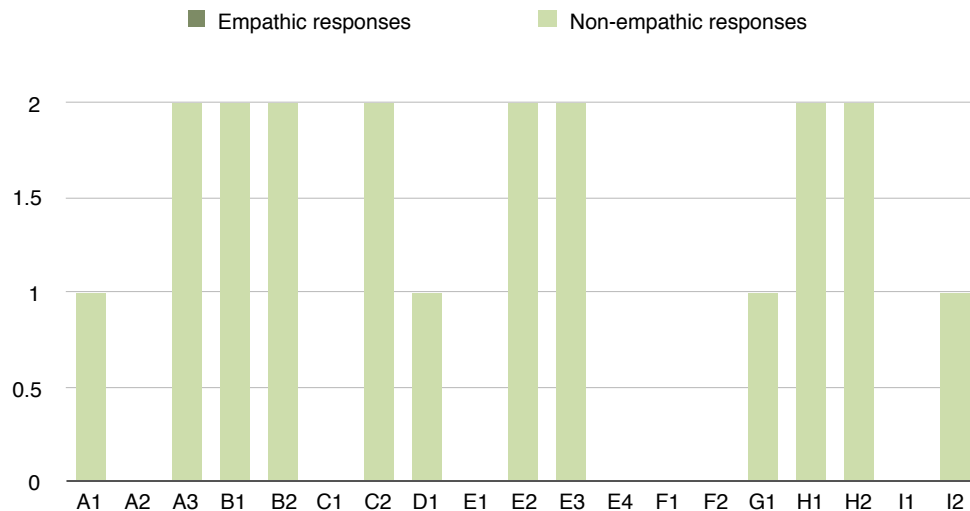


Figure 5.15: Empathic (0%) versus non-empathic (100%) answers given to family members within in-game dialogues.

5.5.2.4 Analysis of dialogues

The data collected demonstrates that in all of the cases where players were given the option between empathic or non-empathic answers, they consistently opted for the latter. Although the sample of data collected for this analysis was very small (consisting of only three instances), it can be provisionally interpreted as a failure of the text-based conversation system in establishing a meaningful or empathic connection between the players and their virtual families. This initial conclusion will be further analysed in the synthesis of findings (section 5.8) vis-a-vis the data obtained in post-playtest activities.

5.6 Post-playtest

As with the previous sessions, this 60 minutes activity took place in the year group classroom. In the same way as with the pre-playtest activity, children were organised around group tables, and were asked once more to draw how they imagined life in the Anglo-Saxon age. In the same way as before, their drawings were used as catalysts to engage in semi-structured conversations about their historical assumptions. This time, however, the drawings and discussions with children also included, and spontaneously leaned to, their experiences and perceptions of the game prototype. These discussions were structured around the following themes (Table 5.8).

Table 5.8: General themes and example questions for the pre playtest session.

THEME	EXAMPLE QUESTIONS
Game authenticity	Did you feel like being an Anglo-Saxon while playing the game?
Empathy	Can you remember any conversation with your family members?
Historical significance	What kind of tasks you did while playing the game?
Game criticism	How would you make the game better?

5.6.1 Children's assumptions about the Anglo-Saxon world and way of life

5.6.1.1 Drawings

Figures 5.16 and 5.17 show the objects (buildings, artefacts) and activities drawn by the children after playing the game. Figure 5.18 shows a comparison between self-representations, representations of other characters and depictions of death (graves and dead characters).

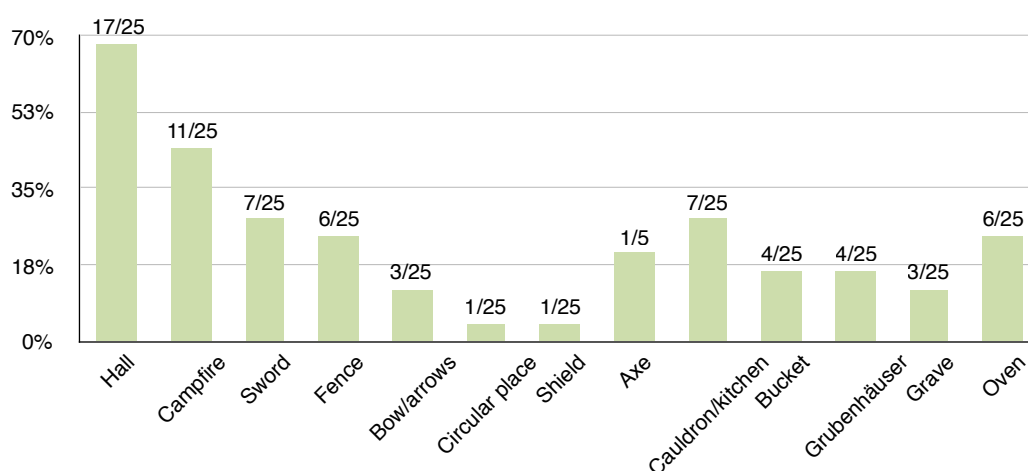


Figure 5.16: Frequency of Anglo-Saxon objects represented in post-playtest drawings.

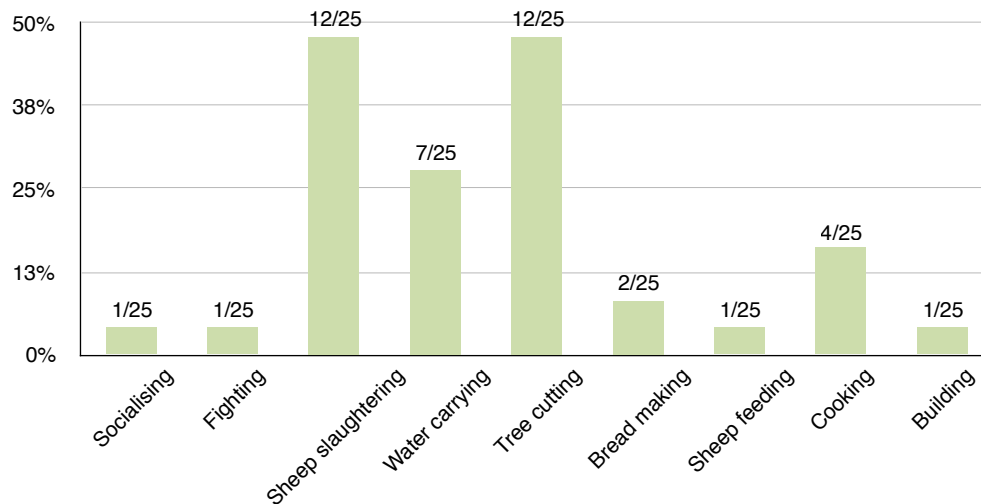


Figure 5.17: Frequency of Anglo-Saxon activities and tasks represented in post-playtest drawings.

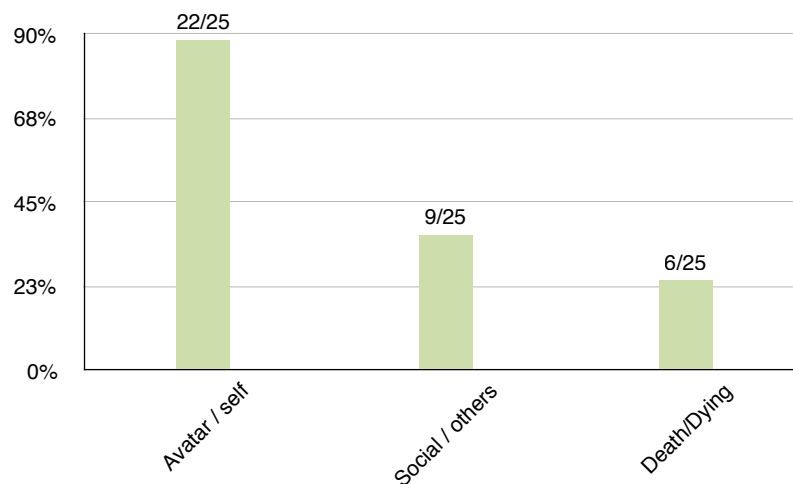


Figure 5.18: Comparison between representations of self, others and death in children's post-playtest drawings.

5.6.1.2 Mini-interviews

Tables 5.9, 5.10 and 5.11 present the themes and sub-themes defined from discussions (interviews) with the children while they were working on their drawings. In the same way as in the pre-playtest analysis, the data obtained from these mini-interviews were analysed mostly through open-coding, with axial coding being used to define sub-themes.

Table 5.9: Sub-themes and samples of coded text for theme 1.

THEME 1: DRAMATIC ENGAGEMENT	
Sub-theme and coding instructions	Sample of coded text
Self-reference. Indication that the character drawn/played corresponds to the drawing's author.	<p>Researcher: Which tasks were more important to you?</p> <p>Participant 5: Keeping myself alive. staying alive is meant [...] impossible.</p> <p>Participant 5: I never killed sheep, because I cant kill sheep. I told others to do it... because...I can't do it.</p> <p>Researcher: You told them to kill the sheep, but you didn't do that yourself?</p> <p>Participant 5: No. I don't like killing animals. so I got a family member to do it.</p> <p>Researcher: Really?</p> <p>Participant 5: Yes.</p>

Table 5.10: Sub-themes and samples of coded text for theme 2.

THEME 2: LIFE IN THE PAST	
Sub-theme and coding instructions	Sample of coded text
Life was a struggle for survival. Indication that life was people had to work hard to sustain themselves and their families.	<p>Researcher: What kind of challenges you had to do?</p> <p>Participant 5: looking after my family so they did not die</p> <p>Researcher: They kept on dying?</p> <p>Participant 5: Yeah..., I think it was a lot like being in Anglo-Saxon time</p>
Life was very busy Indications that there was no time to accomplish all tasks and responsibilities in the game, reflecting a real struggle in the past.	<p>Participant 6: [...] It was very hard to keep your family alive, because, most of the time you were trying to collect things and do things, and you could only check them very quickly, and was very tricky to find the time to do things</p> <p>Researcher: So you were busy all the time?</p> <p>Participant 6: Yes</p>
Life was social. Comments where children imagine social activities - Criticism on the game for not displaying enough social life	<p>Participant 5: I think you could have a village where you could see everyone</p> <p>Participant 6: Would like to actually meet your family</p>
Life was violent. Evidence that life in Anglo-Saxon time was violent Suggestions for improvement related with adding violent action to the game.	<p>Researcher: How would you make this game better?</p> <p>Participant 5: Having the sheep reproduce, and having invasions, you can go down to the coast and invade other countries</p> <p>Participant 7: I would add a bit more action to it, like other tribes, or the vikings or something invading</p>

Table 5.11: Sub-themes and samples of coded text for theme 4.

THEME 4: EMPATHIC CONNECTIONS	
Sub-theme and coding instructions	Sample of coded text
Caring for the family Indication of commitment to keep family alive, and/or the establishing of an empathic connection with characters.	<p>Participant 2: I tried to keep them alive, to save them... a 100 days... and they both died and I have 100 days on my own</p> <p>Researcher: Can you remember any conversation with your family members?</p> <p>Participant 7: There was one about the boy... the little boy saying about the neighbours trying to... they were going to sell him... to be slave</p> <p>Researcher: Do you remember that one?</p> <p>Participant 7: Yes</p> <p>Researcher: He was important to you?</p> <p>Participant 7: He was quite important to me because he was just... he was a family member</p> <p>Researcher: Were the other family members important to you?</p> <p>Participant 7: Ehhh... Yes, they could help me with jobs</p> <p>Researcher: Do you remember any conversation with the characters?</p> <p>Participant 2: It was something like...I remember the little boy, who came up to me and asked if is it true if your family don't have enough food and money they gave themselves and their children as slaves... and then I asked who told you that, and he said the neighbour... and then... I didn't know that before, that they had to sell their children as slaves</p>
Not caring for the family Indication of a partial or complete lack of commitment to keep characters alive, and/or an absence of empathic connections established with them.	<p>Researcher: Were the family guys important to you?</p> <p>Participant 8: They kept on blocking my survival, because you had to share your water with the other people</p> <p>Researcher: Can you remember any conversation with the family members?</p> <p>Participant 4: Me and [other child's name] told them to shut up, because, they kept on [appearing]</p>

5.6.1.3 Analysis of children's assumptions about the Anglo-Saxon world

As with the pre-playtest drawing session, children used different representational approaches in their depictions of the Anglo-Saxon world. In the majority of the drawings, the representations were composed by independent, floating elements distributed in the blank space of the page. In other cases, children created more complex drawings, using the object alignment with the vertical or horizontal axis of the page to give a sense of distance between the represented elements and the observer. Other children opted to communicate their ideas in a sequence of connected events, utilising conventions from comic strips, such as speech bubbles. Finally, in a few cases children drew direct references from the game prototype,

adding graphic interface elements from the game (health bars, buttons, etc.) into their representations.

In most drawings, constructions and everyday objects occupied a prominent space. In all the drawings produced by children at this session (N=25), Anglo-Saxon halls continued to be the most important type of building in most representations (68%, n=17), with a few drawings including Sunken-featured buildings (16%, n=4). A few drawings (12%, n=3) also included graves and cemeteries in the representation of the world. All the constructive forms this time were drawn as solid shapes, with no use of transparency displaying their interior spaces. Other constructive elements drawn were fences (24%, n=6), and circular social places configured by logs. Despite not being part of the game, representations of weapons continued to be significant, with swords (28%, n=7), axes (20%, n=1), bows and arrows (12%, n=3), and shields (4%, n=1) incorporated in many of the representations. Objects for cooking or for agricultural tasks were also included, such as ovens (24%, n=6), kitchens (28%, n=7) and water buckets (16%, n=4).

Forms of self-representation, drawn as prominent figures in the scene were found in most drawings (88%, n=22). These references were also made explicit in the interviews, with most of the children explaining the events drawn in the page or experienced in the game as enacted in first person (i.e. *“keeping myself alive”*). In one interesting description, a child gave also an indication of how her identity and personal moral codes were projected to her in-game avatar: *“I never killed sheep, because I can’t kill sheep; I told other [family member] to do it... because, I can’t do it”* (Participant 5, Post-playtest session).

Although not as prominent as the self-representations, other characters were also included in some of the drawings (36%, n=9). Indirect references to death or explicit representations of dead characters were also found in a considerable number of drawings (24%, n=6). These representations were frequently referred to during interviews, in connection to their struggles to survive and keep their family alive as they played.

Most of the drawings referred to relevant tasks and activities performed within the game. The most relevant tasks drawn were logging (48%, n=12) and slaughtering sheep (48%, n=12), followed by depictions of characters carrying water (28%, n=7) and cooking (16%, n=4). With a lesser level of importance, other activities drawn included bread making (8%, n=2), feasting or socialising (4%, n=1), fighting (4%, n=1), feeding sheep (4%, n=1) and building (4%, n=1). Both in their drawings and in

their comments, children commented that the Anglo-Saxon life was “*very busy*”, with little time to lose in the challenging business of keeping themselves and their families alive. Remarkably, for all the children, the game in this regard offered an accurate representation of early medieval life.

In this last session, children were also questioned about the kind of relationship they established with their *family members*. Their responses revealed a marked contrast between two different groups. In the first group, children perceived their family members as an unwanted competition for resources (food and water) and/or a troublesome responsibility not worthy of their time. Children in this group tended to ignore the characters’ dialogues, skipping through the conversations and barely taking the time to read the text. In sharp contrast, other children manifested their concern towards their family characters, accepting and taking seriously their responsibility towards them. In this group, children tended to remember the presented dialogues, recalling specific details from the conversations.

5.7 Wrapping-up interview

After the post-playtest session, a final interview with the School Teacher was conducted. This interview focused on the general assessment of the whole process, discussing the aspects considered more relevant for the teacher. In the same way as in the preliminary interview (see 5.3), this activity followed a semi-structured approach; a basic set of themes was prepared beforehand, but most of the topics discussed emerged from the conversation itself. The transcripts of both interviews have been added in Appendix E, and selected parts from both interviews have been incorporated in the next chapter.

5.7.1 Analysis of the wrapping-up interview

Table 5.12 shows the sub-themes identified from the interview analysis. These codes will be compared to the preliminary interview.

Table 5.12: Themes and examples of coded text for the wrapping-up interview.

THEME AND CODING INSTRUCTIONS	SAMPLE OF CODED TEXT
Integration of history with other subjects. Comments made in relation to the the integration of history with other subjects.	[The implementation of the game] was kind of far more than what I would expected, far more than just historical knowledge: problem solving, reasoning skills, and questioning skills.

THEME AND CODING INSTRUCTIONS	SAMPLE OF CODED TEXT
Experiential understanding. Difficulties in connecting historical knowledge with personal experiences from children.	[The game was] very personal to them. I suppose [giving up their children] was a decision that they couldn't imagined their parents having to make, or wouldn't imagined their parents having to make.
Competing sources. The school in competition with other sources (films, TV, family, etc.) of historical information	Often information [from] books always have the most exciting bits of history or the biggest things so, [for example,] in our class [all the children] thought that the saxons where all warriors... whereas [with this] game would have been what the real life side was [...] When we do history topics we try to do a lot of reflective writing, like, imagine you are a Saxon writing a diary with your day, and they find it very hard because becomes very factual: I did this, I did this, I did this, because they just read the books whereas something like this gives them the kind of journey of a day in their life rather than just hearing about it.
Dealing with complicated subjects. Comments about the problems of dealing with topics difficult to address with children at their age.	About slavery there are some historic elements but in terms of justice and equality which are all values that we teach at school it is a very nice and appropriate way to talk about what justice and equality means today, because children often don't have a reference point.

5.8 Synthesis of findings

In many ways, the children's experiences of communicating their ideas about the Anglo-Saxon time through drawings shared common attributes with the process of playing the historical game. In both types of engagement, children connected with a narrative about the past positioning themselves as active agents, having a protagonistic role within the representations. In the game, as well as in the drawings, children were their characters, importing their views about the world to the imagined situations recreated in the blank sheets of paper as well as in their actions and decisions within the game (e.g. *"I can't kill sheep"*). In both types of engagements, drawing and playing, children spontaneously engaged in dramatic exercises of re-enactment (of being-in-the-world), which revealed as much about their personal identities in the present as about their conceptions of an imagined historical world (subgoal 1-1).

Despite the limited interaction that children had with the game prototype, it can be said that it affected their previous ideas about the studied period, encouraging them to consider new perspectives about the past. Perhaps nowhere is this more evident than in regard to the relevancy of death. While self and social representations

were present both in pre and post playtest drawings, depictions of death, such as graves or drawings of dead bodies, only appeared in children's representations after playing the game (Fig. 5.19). These concerns were also repeatedly made explicit in their comments about the game experience, which in all cases were considered to be a faithful depiction of the lives of people from Anglo-Saxon age (subgoal 1-2).

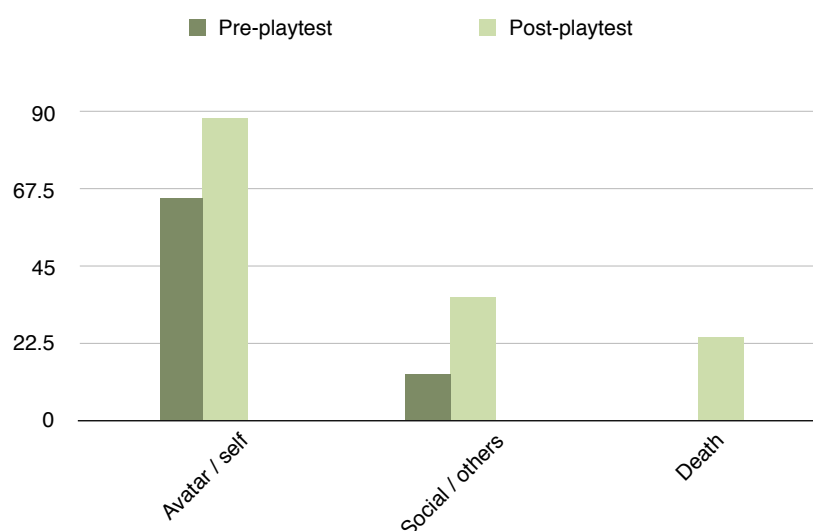


Figure 5.19: Self-referential and social agencies in pre and post playtest drawings.

The comparative analysis of the data collected in pre and post playtest sessions suggests that while some of the children's assumptions about the past were mirrored and therefore reinforced by the game's core gameplay, other conceptions presented contradictions. The themes that emerged from the analysis of the sessions' data were:

1. Life was a struggle for survival.

In their pre-playtest comments, children agreed that life in Anglo-Saxon time was difficult, and self-preservation presented a constant struggle for most people. In this sense, the core gameplay of the game which focused on the conventions of the survival genre, was in line with the pupils preconceptions, and seemed to reinforce them. In most cases, the game's representation was accepted as an accurate depiction of everyday life in the past, without questioning the game's construction or the ways in which it interpreted the past. The partial understanding of the game's interface, for example, proved to be a critical factor in the survival strategies adopted by most children. However, this did not affect the general perception of the game as "real" (subgoals 2-2, 1-2).

2. Life was social.

Before playing the game, many children perceived the Anglo-Saxon period as a highly social place where people met in halls or around campfires and engaged in a variety of social activities. Consequently, the lack of social presence in the game world was considered a design flaw by some children who voiced the need to have a world where “*you could see everyone*” (goal 6; subgoal 1-2).

3. Life was violent.

The design decision to exclude any form of combat mechanics was also considered as a design flaw by some pupils when they were asked to offer their ideas for improving the prototype. Comments about violence in Anglo-Saxon time were commonly made in the pre-playtest session, and continued to be a recurrent theme in the post-playtest activities, despite the emphasis of the game in non-violent interaction (goal 6).

The representation of Anglo-Saxon material culture registered variations between the pre and post-play drawings, with the addition of objects that children interacted with in the game (Figs. 5.20, 5.21 and 5.22). Three objects seemed to remain constant in terms of their perceived significance: halls, campfires and swords (subgoal 1-2). Their meaning within the representation needs to be considered not only from the perspective of their perceived historical significance, but also in terms of the symbolic value that children assign to those objects, both consciously and subconsciously. Malchiodi (1998) remarks how the representation of houses constitutes an important way to understand children’s interpersonal relationships, and embody their impressions about family life and relationship with their environment (p. 177). Likewise, the representation of campfires was recurrently linked to children’s ideas about social life. Although not entirely explicit in their comments, the representation of swords or other weapons can be linked to meanings not necessarily within the context of the represented scene, such as power or protection. Even though the symbolic importance of children’s drawings has been remarked by several authors (for example, Merriman & Guerin, 2006), other factors, such as the level of drawing difficulty in comparison to other elements may also have played a role in their selection.

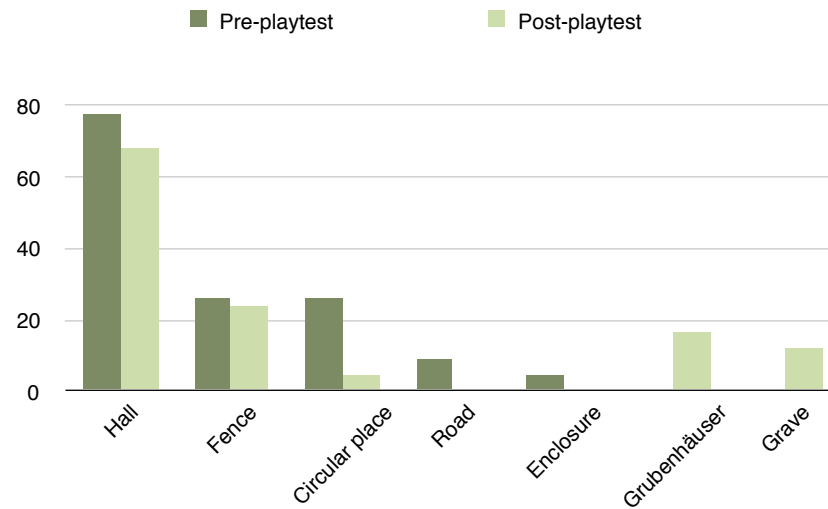


Figure 5.20: Representations of constructions in pre and post playtest drawings.

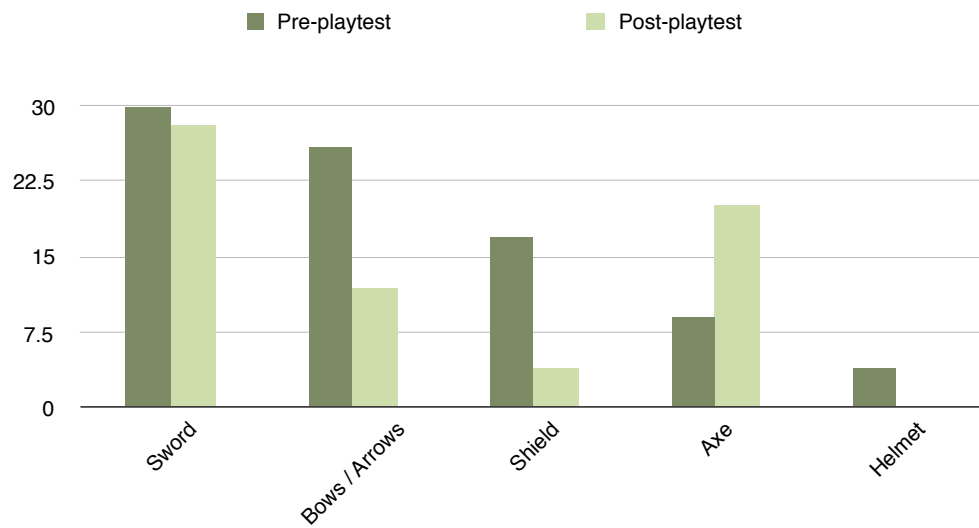


Figure 5.21: Representations of weapons in pre and post playtest drawings.

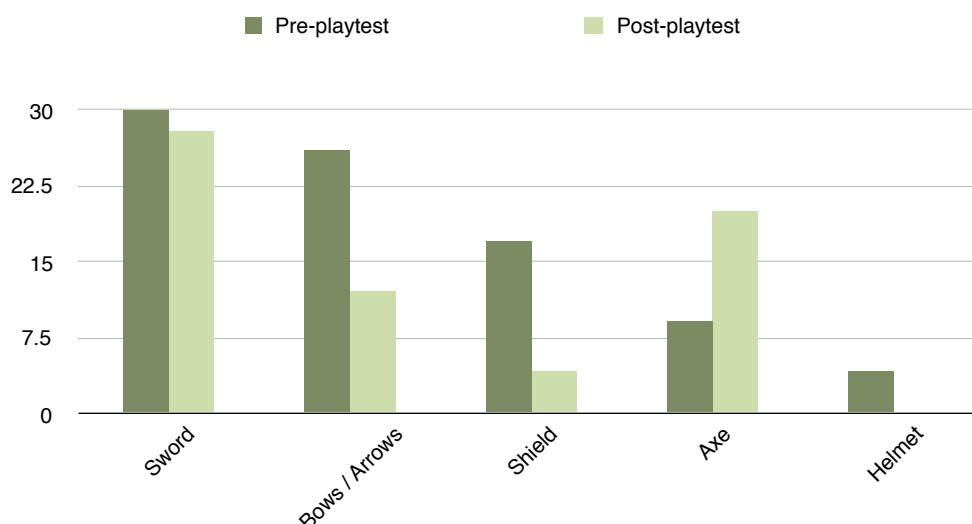


Figure 5.22: Representations of tools in pre and post playtest drawings.

Notably, the representation of tasks increased significantly after playing the game (Fig. 5.23). While relatively few pre-playtest drawings included tasks or activities representative of Anglo-Saxon everyday life, in post-playtest drawings their presence became considerably more prevalent and varied. Also, the children's appreciation of tasks seemed to have become more procedurally-oriented, reflecting in some cases a level of understanding and strategic thinking not observed in the first sessions. For example, some children remarked the importance of being close to sources of water because it "*run out quick*", or recounted the slaughtering of all their sheep as a poor decision (subgoal 2-1).

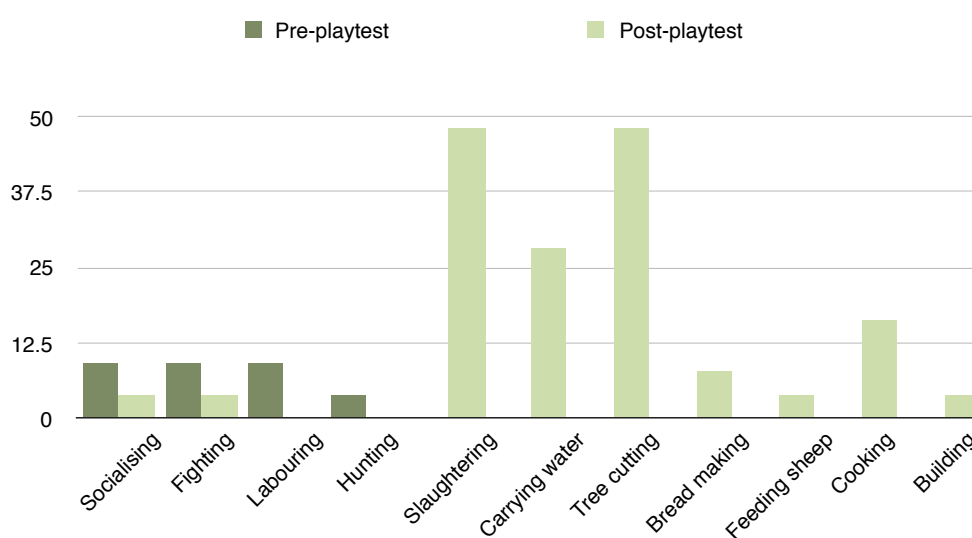


Figure 5.23: Representations of everyday tasks in pre and post playtest drawings.

In regard to the relationship between players and their family members, the data showed a marked polarisation of attitudes towards the fictional characters (subgoal 3-1). While some players regarded them as a “*hassle*” and refused to spend time providing for them, other players made an effort to keep them alive. The reasons players gave for the latter varied; in some cases the characters were regarded as “*useful*” because of their ability to carry out tasks; in other cases players took care of their characters due to their inclusion as part of the game goals, and competed with other players to finish the game with the biggest number of characters alive. In very few cases, the children engaged with characters beyond their perceived instrumental value within the game (subgoal 3-4).

Further indication of this was the fact that conversations with characters were for the most part skipped without reading the dialogue texts and when given the choice to answer empathically or non-empathically, players overwhelmingly leaned to non-empathetic answers. While these results suggest that for the most part players did not establish any form of meaningful relationship with non-player characters, one case appeared to contradict this conclusion. The case of the character presented as the son of the player, who in a conversation asks not to be sold as a slave. This conversation triggered a dissonance among many of the children, leading to an open discussion where the topic of slavery was examined in detail (Appendix G3). Drawing from the interest manifested by the pupils, the teacher explored the reasons why parents in Anglo-Saxon time sometimes had no option but to give up their children into slavery, and offered a definition of this concept and its current state in the modern world (goal 6; subgoal 4-1, 3-3).

The analysis of the initial and final interview with the school teacher brought further insights into the pedagogical implementation of the game in the classroom. In this regard, the teacher remarked the potential of the game prototype for the integration between subject areas. By interacting with the game, children set into march not just game-play abilities, but problem solving, reasoning, and questioning skills. Further, the game became a medium to connect children experientially with subjects that are often difficult to bring meaningfully into the classroom. As the teacher commented, many times the knowledge that students acquire from other media remains encapsulated as mere facts without further development, questioning, or integration with their previous structures of understanding. In marked contrast, the narrative interaction with the game became personal, driving students to consider historical topics, such as slavery, in a completely different light. These experiences helped them to make connections between the past and the present, becoming

reference points for the further discussion of more abstract concepts, such as justice or equality.

5.9 Chapter summary

This chapter presented and analysed the results from the pilot implementation of the final game prototype in a primary school. This context was explained in detail, describing how the evaluation strategy outlined in the methodology chapter was implemented within the school. Importantly, the ethical considerations for this phase were also explained, detailing the measures taken to ensure the participants' well-being, informed consent, data protection and potential exposure to distressful situations.

The analysis of the qualitative and quantitative data obtained in this implementation revealed that most children set into march similar processes of personal identification when imagining the past, made evident in their graphic representations of the Anglo-Saxon age as well as in their interpretations of game experiences. In both instances, children spontaneously imagined themselves *within* the narrative engagements with these mediums.

As a result of interacting with the game, the children's appreciation of Anglo-Saxon everyday life became more *procedural*, with a better understanding of the tasks representative of this time. In some cases, children's preconceptions about the early medieval age were reinforced, while in others contradicted by their experiences with the game. While the belief that life was a struggle for survival for Anglo-Saxons became stronger, the lack of a violent confrontations and tangible social presence was considered an inauthentic portraying of this historical period. These contradictions, however, were not openly questioned by children in the discussions that followed the playing session. In contrast, the narrative engagement with one of the player's virtual family members through an interactive dialogue grabbed the attention of most children, leading to an in-depth discussion with the teacher about a range of historical topics related with the dialogue situation (slavery, family relations, fair-unfair economic systems).

In the next chapter, these results will be discussed in connection with the relevant academic literature and the comments expert reviewers made about the game.

CHAPTER 6: DISCUSSION

6.1 Introduction

This discussion focuses first on the educational intervention from a general standpoint, analysing the children's engagement before, during and after playing the Anglo-Saxon game. Following, the discussion will centre on the evaluation of the game from a learning perspective, analysing the particular ways in which it affected the children's preconceptions and naive understandings of the Anglo-Saxon period. The most relevant themes from the pre and post playtesting sessions will be examined in detail, and connected with relevant theoretical frameworks and comments obtained from the game's feedback sessions with archaeologists, historians and educators. These lines of analysis will be used as filters to reflect on the design decisions taken during the game's development, pointing to areas of improvement and future development. Finally, the discussion will highlight the most important learning moments and will use them to reflect on the educational potential of video games as historical learning contexts.

6.2 Historical video games as personal encounters with the past

The engagement with the past that children experienced through the Anglo-Saxon game can be seen as a simultaneous occurrence in different "*spaces*" or "*analytical planes*" (Nitsche, 2008). In the most obvious sense, the interaction with the game occurred in the *play space* defined by the hardware and software devices which form the system. The interaction with the game can be seen as an entry point to a fictional space, in this case, situated in a reconstructed historical past, where children were able to interact with a virtual world through the embodiment of an identity different from their own. Playing as an Anglo-Saxon free peasant (Ceorl), children became immersed in the simulated landscape of early medieval Britain; a virtual world designed to communicate, in recognisable albeit simplified terms, the complex set of interactions and dependencies that people from the past had with their environment. From a general perspective, this world was composed by three dimensions. First, children interacted with fictional elements such as characters, dialogues, buildings and artefacts. Second, children also interacted with virtual elements, describing *how things worked* in the past through computer code. Finally, the past was presented

through ludic elements structured through the interplay between game challenges and player actions. Through these dimensions, the game attempted to create the fantasy of *being-there* in a past reality, generating emergent personal narratives that in many cases led them to perceive or understand the past in a different way.

As it became evident from the drawings and comments collected via the pre-playtest session, children did not come as *blank slates* to the classroom. As Wineburg argued (section 2.2.5), children carry with them a range of preconceptions about the past, which are often not considered in the structuring of their formal teaching and learning. These preconceptions range from different ways of understanding how the world works and how people behaved (Husbands & Kitson, 2010) to a myriad of dissimilar media representations that children have amassed in their lives as keen consumers of historical media (films, books, video-games, comic books, etc.). The importance of these preconceptions cannot be underestimated, as they play a key role in shaping children's historical understanding. Not uncommonly, the *good history* taught in schools, despite the best efforts by history teachers, fails to successfully replace the naive assumptions children bring into the classroom (Wineburg, 2000; Gardner, 2011).

As the data analysis revealed, the preconceptions about the Anglo- Saxon age were very much present when children were asked to draw life in the past as well as when they interacted with the game. In both the drawings and playing sessions children did not just create or interact with representations of the past as external observers, but situated themselves within them, as active agents within imagined worlds. In both forms of narrative engagements, their spontaneous exercises of re-enactment revealed as much about their personal identities, lives and world views in the present as about their conceptions about the past. Borrowing the term from Katie King (2010), we can refer to these type of engagements as "*pastpresents*"; "*examples of how the past and the present continually converge, collapse and co-invent each other*" (para. 2). In the same line of thought, Barton & Levstik (2008) claimed that:

All our concerns— whether as historians, teachers, or students—must originate in the present, because that's all we have; anything we know or believe about history derives from the questions we ask in our own lives today (p. 229).

For the sake of illustration, consider this extract of a conversation with one of the school students (Participant 17, Pre-playtest session) as he worked on his pre-playtest drawing:

Researcher: [Pointing to a part of the student's drawing] Is this your house?

Participant 17: Yes.

Researcher: Why is this your house?

Participant 17: Because is the best house I drew in this picture.

Researcher: So you would be living in the best house?

Participant 17: Yes.

Researcher: Why? Why you would be living in the best house?

Participant 17: Because, I'm thinking that I am respected... Because, food was an important thing for the Saxons [...] there was quite a bit but it was hard to get... and if you were a good hunter that means you would have more money from selling the food that you caught... and if you had family you were able to keep your family safe.

In this particular case, the child composed a drawing where his personal identity, his Anglo-Saxon avatar, functioned as an externalisation of both his objective and subjective assumptions about a past reality (Bolton, 1979). From an objective perspective, the subtext of the drawing evidenced the child's efforts to come up with the rules defining what was like to be a character from the past. In this form, ideas about the Anglo-Saxon world, such as *hunting was a valuable skill*, went hand in hand with personal ideologies of fairness, such as *the best hunter deserved the best house in the village*. The child, however, was not imagining a situation with just any agency as the protagonist. As he was portraying no other than himself in the scene, we need to recognise also the subjective meanings, conscious or not, at play. In this case, the child was also implying his desire to *be the best* and to be recognised for the kind of things he regarded himself good at.

As Heathcote (1991) and Bolton (1979) argued, the dramatic engagement with conflicting aspects of the past through the *eyes* of a fictional ancestor, can be a powerful way of exploring "*below the surface*" and reaching the deepest levels of meaning at play when thinking about the past (section 5.4.1.3). Children also gave evidence through their drawings and comments of assumptions about the hardships of everyday life (*life was very hard*), violence (*they used to fight a lot and people got hurt a lot*) and social life (*sometimes they met on campfires to sing songs and tell stories*) in Anglo-Saxon time. While playing the game, these assumptions were very much present, coinciding or being at odds with their interpretation of game experiences (Fig. 6.1). These two processes can be analysed through the lens of Piaget's learning theory (see 2.2.5). When coinciding, the game narratives were assimilated, reinforcing the previous ideas that children had before interacting with the game. However, when the game experiences and previous ideas were at odds, the internal contradiction, if perceived, was resolved through a process of accommodation, leading to a

subsequent reorganisation and complexification of the children's existing structures of knowledge. In the next sections, each one of the mentioned themes will be discussed in more detail according to this conceptual frame.

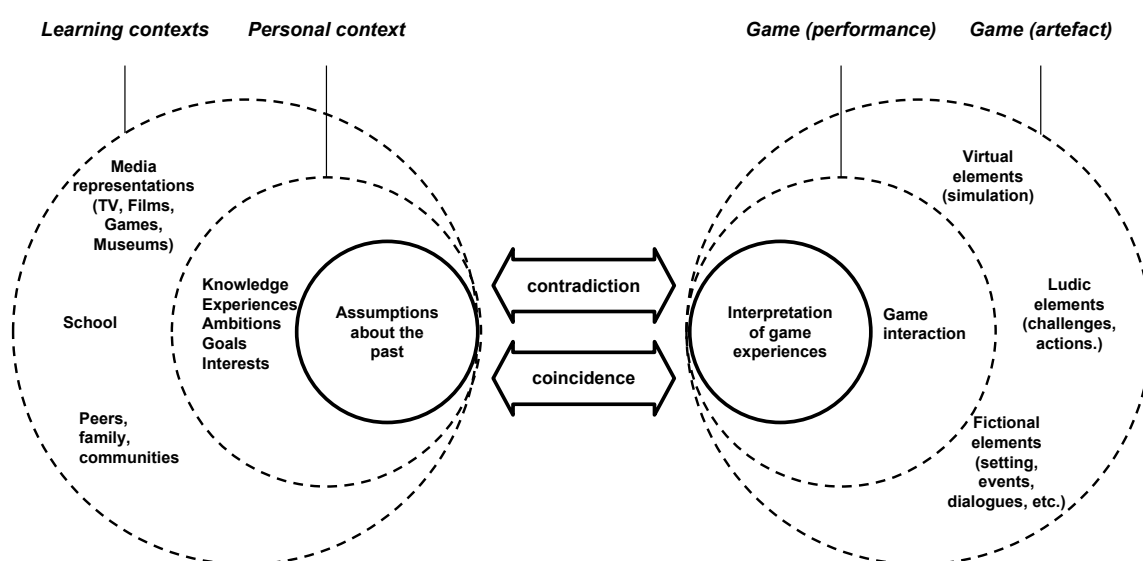


Figure 6.1: Relationship between children's assumptions about the past and their interpretation of in-game experiences.

6.3 Surviving the middle ages: games as historical challenges

According to the information obtained in playtest and post-playtest sessions, the game's focus on survival appeared to be in alignment with the children's assumptions of life in the Anglo-Saxon time, which, in general, was imagined as harsh and difficult. The game's emphasis on survival reinforced the children's previous conceptions about the medieval world, where life was imagined as a constant struggle for finding the basic means of existence. This general idea, in the game was conveyed by the interplay between the challenges the game imposed to the player (i.e. keep yourself and your family alive), and the actions that he or she was able to do, which, in a way, is presented differently from other media forms such as books or films. This emphasis on action led to a considerable surge in the depiction of everyday tasks within children's drawings (section 5.8).

To get a better understanding of what this change implied in terms of historical learning, we can dissect it from three different perspectives: *temporal*, *spatial* and *game interface*.

6.3.1 Temporal challenges

More than anything, survival within the Anglo-Saxon game was a challenge defined by time. As game-days passed inexorably, children found themselves working hard to sustain themselves and their virtual family members. As one child recounted in a post-playtest comment, “*finding the time to do things*” (Participant 6, Post-playtest session) was a constant struggle. The relevance of time as a primary category in historical thought is well-recognised. Kubler (1962, in Ingold 2000) states that “*[w]ithout change there is no history; without regularity there is no time. Time and history are related as rule and variation: time is the regular setting for the vagaries of history*” (p. 194).

However, historical change does not occur in one single path, but along different intersecting timelines. Drawing from the reflective analysis of the game prototypes, we can distinguish at least four levels of representation: the level of *perceivable movement* (measured in fractions of seconds or seconds), *biological and social needs* (minutes), *everyday tasks* (minutes, hours or days) and *cycles of rituals and celebrations* (weeks, months and years). Each level can be translated as specific challenges within a digital game.

6.3.1.1 Perceivable movement: life

The first time frame, identified as perceivable movement, corresponds to updating cycles of the machine, or what in computer jargon is known as *framerate*. At this level, any object in the game world identified by the player as *alive*, needs to update both in terms of its virtual model and graphic representation through recognising the player’s presence in the world. As Ingold (2000) writes:

there is a fundamental difference between our perception of animate beings and inanimate objects, since the former – by virtue of their capacity for autonomous movement – are aware of their surroundings (including us) and because they act on those surroundings (including us) [...] In other words, they afford the possibility not only of action but also of interaction” (p. 199-200)

This timeframe cannot be overlooked, as it plays a decisive role in the capacity of the medium to immerse players, making them feel like “*being*” in an alternate historical reality, populated by systems and agents holding the illusion of being “*alive*”. In terms of its possibilities for structuring game challenges, this is the level where the interaction with characters, by violent or non-violent means, can be implemented.

Using Zagal and Mateas (2010) typology of time in games (section 2.3.4.1), it is possible to say that this is the time band where *real-world time* has to closely match *game-world time*. Since any discernible change in the game world can only be perceived by the regular update of each frame, any significant drop in the updating speed of the rendering system results in an immediate breaking of the illusion of immediacy, betraying the existence of the machine running on the backstage. Unsurprisingly, the capacity of computing systems to run at an acceptable speed has played a major role in the design decisions of many game titles, ever constrained by the limitations of the technology available at the time they were produced (Nitsche, 2008).

6.3.1.2 Organic and social needs

In a second timeframe, the focus shifts to the biological and social needs, emphasising the rhythms of the human body; the physiological needs of hunger, thirst, sleep, excretion and so on. In basic terms, these cycles are implemented in digital games through a numerical variable ranging from zero (where the system is in danger of imminent death) to full (where the organic need is entirely supplied). With each new cycle of this *fictive time layer* (see 2.3.4.1), and depending on the environmental conditions simulated in the game world, these numerical variables are updated, representing in this way the constant exchanges between the organic bodies and their environments. Systems of this type, in spite of their reductive nature, are relatively simple to implement and to be intuitively understood by most players.⁴¹

As the challenge was structured using the player's avatar and NPCs as “*metronomes*” of life experiences, this challenge can be considered “*rhythm analytical*” in the Lefebvrian sense (section 2.3.4.2), bringing a representation of the world where the natural cycles of the environment and the biological individual intertwined in defining and giving meaning to past human lives.

6.3.1.3 Everyday tasks

In a third level, we recognise the temporal dimension conformed by the performative grid of tasks performed in the environment. Based on Ingold's (2000) ideas on dwelling and inhabitation, the game can be seen as a playable taskscape (section 2.3.4.2).

⁴¹ Although most games keep these systems relatively simple, recent releases such as ‘*SCUM*’ (Devolver Digital, 2018) experimented with more complex character stats in an attempt to bring avatars closer to real life. For further information about these systems, see <https://www.pcgamer.com/scums-ridiculous-survival-meters-include-vitamins-muscle-mass-and-even-a-tooth-counter/>

In representational terms, the taskscape can be read in the inscriptions left in the landscape, but as long as we remain external observers to the representation, its understanding will never be complete. Tasks are multi-layered clusters of meaning, which require to be enacted to be fully interpreted. At its most basic expression, tasks can be seen as the means to survive in the environment, but they also carry cultural meanings and traditions, define identities, roles and social interactions. Therefore, tasks, , more than game artefacts or agents, are the most fundamental way to access the meanings of historical environments. While we can certainly bring a sense of being in the past by generating detailed environmental geometry populated by intelligent virtual beings, as long as the environment fails to implement this layer of interaction, it will fail to offer an adequate sense of everyday life.

This layer is an example of what Zagal and Mateas identify as “*coordination time*” (section 2.3.4.1). In the game prototype in-game tasks could be metaphorically executed by the player’s avatar, or be delegated to a family member or slave liberating the player of the pain of having to stay idle waiting until the task, symbolised by a horizontal bar, reached an end. In this way, and following Ingold’s conceptualisation of taskscapes, the task execution duration can be regarded as the cost of a task. As Ingold writes, “*value is measured out in units of money, and land in units of space*”, *the currency of labour is time, but “of a very peculiar sort, one that must be wholly indifferent to the modulations of human experience”* (p. 195).

Thus, the possibility of delegating tasks to family members gave them an instrumental value but in doing so, also created the need for children to negotiate the different meanings assigned to each member of their virtual families. As the testing data revealed, these meanings were in some cases different among participants; while for some children family members were more of a “*hassle*” getting in the way of their efforts of “*winning the game*”, for others these entities represented something worth to take care of because they were “*family*” (see 5.5.2.2; 5.6.1.2; 5.8). Ultimately, the relationship that children established with this simulated social layer cannot be seen as separate from the temporal challenge imposed by the game, which forced them to take a stance towards the virtual members that formed their in-game household.

6.3.1.4 Rituals and celebrations

The fourth and final level of this implementation of historical time is the level of the seasonal cyclical changes experienced throughout the year, which become imprinted in the features of the landscape as well as in cultural manifestation such as rituals and celebrations. The cyclical passages of time expressed in the game as another layer of “*fictive time*” add a new explorative level of gameplay: that of actions and decisions that need to be taken in preparation for the winter, where all the resources available in the environment will inevitably become scanty or completely disappear from the landscape.

At this level, the cycles of production and consumption of the taskscape are modulated by the seasonal changes in the environment, with transitions recognised through cultural manifestations such as rites, feasts and public ceremonies. This level is essentially social, and is built to express and drive players to explore the intimate relationship between culture and environment.

6.3.2 Spatial challenges

In contrast to history presented in books or films, where children are not capable of navigating or interacting with spatial representations, in games they are able to become part of reconstructed worlds, deciding freely where to go and what to do. In these spatial worlds children give rise to emergent narratives where the past is lived, presenting a striking similarity with other type of engagements of spatial “*mimicry*”, as defined by Callois (1961, discussed in section 2.2.1.1). In the sense given by this author to this category of play, we can closely connect the children’s experience in digital games with other playing forms, such as LEGO, Playmobil or dolls (Fig. 6.2). When children use the components that these playing environments provide to construct their fictional worlds, the relationship they establish with them is always space-dependent; they simulate the spatial organisation and interactions between doll-agents and environmental things. As digital games formalise these spatial relationships in scripted rules (e.g. walking speed of characters, time to move between places in a map), the playing experience within game-worlds becomes an important way to understand the significance of space in everyday life. The relevance of this form of understanding, can be observed in the recommendation that one child gave to another about building his house close to a source of water because it “*run out quick*” demonstrating an understanding that derived from his experience of having

spent a significant portion of his gaming time traversing the space between the house and the closest source of water.



Figure 6.2: Child playing with dolls (the child is the researcher's daughter. He was given permission from both the child and the other parent to include this image in this thesis).

In order for the understanding of space to become meaningful, it requires to go beyond the challenges of navigating the space for the accomplishment of tasks, such as fetching water. Just like children are able to configure fictional environments while playing with dolls or LEGO, historical games need also to be constructed so players can intentionally build or modify the game environment. We can establish here a fundamental distinction between the processes of *occupation* and *inhabitation*. While the former implies using the elements or things put at our disposal (water-source-place, home, etc.), the latter can only happen when the space is transformed, recognising in this way the relationships of interdependency between all existing things in the world. For Ingold (2008), “[a] world that is occupied [...] is furnished with already-existing things. But one that is inhabited is woven from the strands of their continual coming-into-being” (p.2). A world that is inhabited never comes to be a “completed project”; it is always engaged in a perpetual state of change. Merrifield (1993), via De Certeau, synthesises this idea as “practised spaces”. For him place is a social dynamic, constantly changing, constantly evolving. This is the only way in which space transmutes into place.

Thus, we can regard the transformation of the game-space as a necessary condition for its virtual inhabitation. The project of making historical places will

not succeed if we do not give players the means to become “*illegal architects*” capable of producing “*new architectures through the act of using*” (Boano, 2015, p. 547). Kalay and Marx (2005) echoed this idea in their characterisation of cyber-places, highlighting the property of “*adaptability*” – the ability of the place to recognise affecting forces and change in response to their influence – as a defining characteristic of place-making in virtual worlds. The same capacity is referred by Aarseth (2003) by the term “*dynamic environment*”, describing the ways in which video games allow players to make alterations that become persistent in the virtual world.

As discussed, the ability of digital games to impose rules and constraints to the acts of spatial transformation makes it fundamentally different from other spatial forms of play. While the materiality and geometry of the LEGO and other forms of spatial play undoubtedly impose constraints, none of these forms are capable of establishing procedural spatial relationships between components as games are able to do (e.g. best spot to build a house, in-game walking distance between place X and Y, etc.). The progressive discovery of these relationships, which I have identified as *material life wisdom*, make games an advantageous medium to understand the nuances of everyday life in the past (section 4.3.3.1.3).

6.3.3 Game functioning and interface

An adequate knowledge of the game’s interface can be considered of critical importance for the success of the game, however, its understanding and familiarisation takes time. In general, the game’s most intuitive systems, such as picking-up things from the environment, were the ones more widely used, and the more complex actions, which required a better understanding of the game’s interface, were implemented scarcely (section 5.5.1.5). An adequate degree of understanding of the game’s functions and interface can be considered vital for the successful use of the game within the often limited time available in the classroom. McCall (2016) in this regard suggests investing time before the lesson to make sure that every student is able to interact with the game at an adequate level (section 2.4.3). For complex games, this is not always possible, but lessons can be planned so students know *enough* of the game to engage productively within the planned lessons.

6.3.4 Pedagogical structuring of game challenges

These three dimensions (*space, time and game functioning and interface*) should not be considered as independent from each other. Rather, they intertwine in their affect over the gaming historical experience. This interrelation becomes clearer as we analyse how the children's survival strategies progressed in terms of their understanding of the temporal and spatial determinants of the game world, and the multiple systems included in the game, which required an adequate level of understanding to be used effectively (Fig. 6.3). While at the beginning of the playing session an intuitive understanding of the most basic forms of interaction with the interface made it possible for children to execute simple tasks, a more complex understanding of the game was needed for the deployment of more effective survival strategies. An important outcome of this process of discovery and gradual mastery was the perception of the game as *fun*. Once one piece of *material life wisdom* became internalised, another part became available to try out.

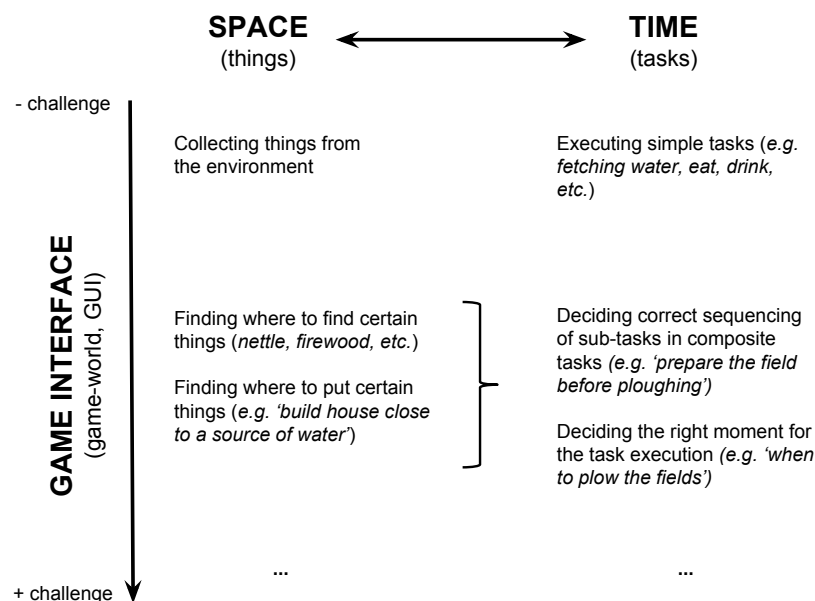


Figure 6.3: Progression of game challenges.

To what extent the aforementioned challenges can be used to gain a better understanding of life in the past? We can start by looking at the comments from history educators, who participated in the expert review of the game prototype. For them, the Anglo-Saxon game offered a form of historical encounter certainly different

from other forms of historical mediation but clearly advantageous in some respects. The teacher who participated in the primary school implementation, mentioned that:

[...] often information [from] books always have the most exciting bits of history or the biggest things so, [for example,] in our class [all the children] thought that the Saxons where all warriors... whereas [with this] game [the emphasis is on] what the real life side was. (School Teacher, Wrapping-up interview)

In the same line of analysis, a lead high-school history teacher commented:

Lot of kids would come in with a very “cookie cut” view of Anglo-saxon life [...] they all did this, they all lived like that, all of them had the same subset of experiences. [It would be interesting to see] to what extent the game could be used to look at diversity, looking at the fact that actually the Anglo-Saxon period was as wildly diverse as we are today. (Expert Reviewer 5, Personal communication, 4 September 2017)

In this sense, one of the game’s most evident successes was the experiential introduction of historical topics, and its effectiveness in to overcoming the often stereotypical portrayal of past cultures presented in historical texts (sections 4.3.2.3.1 and 4.3.2.3.2).

According to the expert reviewers, the game, after fulfilling its purpose as an experiential introduction, could be used to accompany the development of the topic, integrating it with the pedagogical goals planned for the learning unit. In this way, children could go back to the game with “*more of the historical knowledge and enjoy it in a different way*” (School Teacher, Wrapping-up interview). This potential, however, can only be fulfilled through a post-play engagement with complementary activities, such as story-boarding or the discussion of playing logs. This view coincides with Ackerman’s (1996) emphasis on the need to provide students with moments where they can distance themselves from their experiences, which in the context of gameplay are centred on the exploratory and performatory actions⁴² to overcome the challenges proposed by the game. The value of using games as educational resources resides on their ability to offer an experiential jumping-off point for the engagement of the class with perspectives that are often difficult to bring to the class using traditional learning materials. This can be exemplified by the increased significance that children gave to the concept of *death* after interacting with the game (section 5.8).

⁴² According to Linderoth’s (2011), gameplay can be defined as “*to perceive, act on and transform the affordances that are related to a game system or other players in the game*” (p. 8). Exploratory actions are the means by which players perceive new affordances in the game environment and performatory actions refer to the ones where players act on affordances already known to them.

Based on these observations and the data analysis, a general scheme for the pedagogical use of historical games in formal educational settings can be produced (Fig. 6.4). This scheme comprises of the following steps:

- **Prepare:** In agreement with McCall (2016), time should be dedicated to familiarise learners with the game interface and general interaction. This process can be greatly facilitated by the implementation of a tutorial level, as well as other systems throughout the game designed to help players discover the way of doing things.
- **Play:** Playing sessions should be self-directed, however, pre-programmed events and problem situations can be implemented to appear synchronically, directing the whole class to face similar situations during certain sessions.
- **Discuss:** All the educators consulted conceded in the need of leaving enough time at the end of each playing session to discuss the situations experienced in the game.
- **Further activities:** The playing sessions ideally should be connected with other learning activities, designed to complement the playing session and evaluate the students' progress in regard to the topic's pedagogical goals.

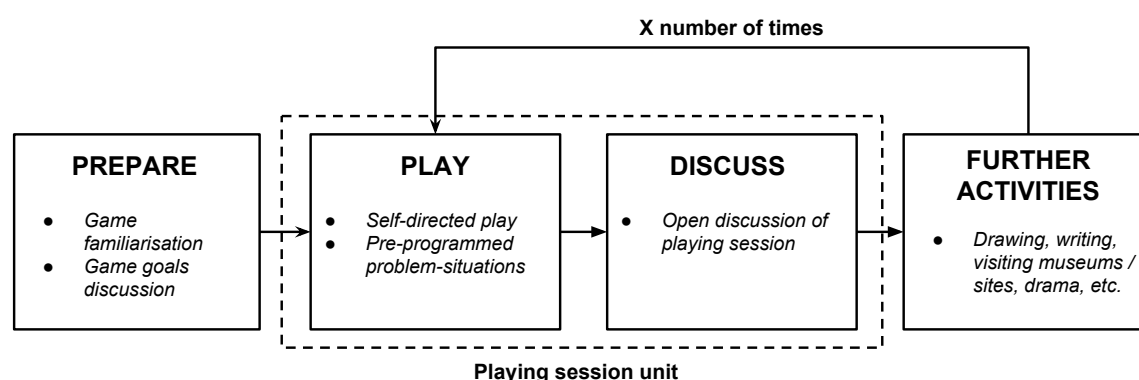


Figure 6.4: General scheme of pedagogical use of historical games in the classroom.

6.4 Historical Interactive Ludic Environments (HILE)

6.4.1 Micro-interactions: understanding everyday life in the past

One of the game's main advantages as a historical learning environment resides on its ability to provide context since children could relate to the elements or “constituents” of

material life (Braudel, 1985). What were those elements and why were they so important? In the same way that an empty room deprived of any objects to relate to becomes uninhabitable, an empty desert does not allow life to take place (Gibson, 1979). It is only through the perception and everyday use of the things of the world (i.e. buildings, artefacts, rocks, plants and so on) that life can be sustained. Despite the non-physicality of virtual worlds, the same principle applies; it is only through the perception and meaningful interaction with virtual things that we can gain an understanding of life in the past within simulated worlds.

I refer to these sort of engagements as *micro-interactions*; the kind of interactions build in games to convey the multi-layered meanings that characterise the relationship between humans and their material culture. The relationship between the player-as-dweller within the environment was simulated through the processes of *collecting*, *producing* and *making things* (section 4.3.2.1). Can we say that these three types of interactions are all we need to achieve a meaningful representation of the relationship between humans and things? To further explore this question, the work of Latour (1996) on *Actor-Network Theory* brings new useful perspectives. According to this theory, things are never neutral. We make use of a myriad of things in our everyday lives, but as they become inextricably incorporated in our daily lives and routines, they also condition our understanding of the world and almost every aspect of our individual and social selves. This form of understanding became evident while analysing the children's drawings; in both their pre and post playtest representations of the Anglo-Saxon world, some material elements (i.e. halls, campfires and swords) seemed especially relevant (section 5.8). In particular, the children's ideas about the campfires were revelatory. Fireplaces and campfires, drawn with different uses in mind, were not considered as independent from other things. Consider this extract from a child's pre-playtest interview (Participant 3, Pre-playtest session):

Researcher: What is this?

Participant 3: This is a fire.

Researcher: Why do you have a fire in there?

Participant 3: Ehhh... Mmmm, I'm not really sure. They did have these fires in those days

Researcher: They had campfires?

Participant 3: Yes.

Researcher: Why they use that; they used that for something, probably? Maybe cooking?

Participant 3: Yeah.

Researcher: And it's outside the house...

Participant 3: Some can be outside, and some can be inside.

Researcher: That's cool. Why do you think they needed them outside?

Participant 3: Mmm... I think the outside ones were more for... you know, like singing songs and getting together.

Researcher: Excellent, yes, I think that's important, and maybe inside for?

Participant 3: Cooking things.

In this interpretation of material culture, the child's understanding of the fireplace as an important element in the Anglo-Saxon world is not seen in isolation from other things (the hall) and other humans (the ones who come together and sing songs). Things and humans are thus seen as forming entanglements made of intricate connections and dependencies. Things, in the first and more general sense, are enabling, they can amplify our sensorial apparatus or give us the power to perform tasks impossible to achieve using our bare hands. This relationship is as easy to recognise in the real world as in video games. In *'Half-life 2'* (Valve Corporation, 2006) a crowbar let us do little more than destroying obstacles, but equipped with an anti-gravity gun we can grab and throw whatever object we find in our way. From another perspective, the entanglement of things becomes a form of constraint: as we become more and more dependent on things to carry on with our lives, we are trapped in a relationship from which is ever more difficult to escape; we become dependent on *"the lives and temporality of things, their uncertain vicissitudes and their insatiable needs"* (Hodder, 2014 p. 20). Coming back to *'Half-life'*, the crowbar might not require much maintenance, but the ultra-sophisticated HEV suit⁴³ we receive soon afterwards demands us to keep looking for batteries to keep it functional.

This entanglement between humans and the things that conform their material cultures is a key aspect to understanding past societies. The appreciation of everyday life in the past demands an awareness of the ways in which tools and technologies enabled people to do things and, on the other hand, how the absence of things we today take for granted constrained their lives. These entanglements within simulated environments can be used productively to foreground the differences between present and past societies. When children recommended to build their houses close to sources of water, or to avoid the mistake of decimating all their livestock, they were expressing the discovery of some link from the *"entanglement of humans and things"* (Hodder, 2014) that suddenly became evident through play. In this respect, the

⁴³ In the game *Half-life*, the HEV or 'Hazardous Environment Suit' is a full-body suit that gives special powers to the player and protects him against radiation, energy discharges and blunt force trauma. The suit is given to the player at the beginning of the game and becomes an essential part of gameplay, but requires to be recharged in order to keep it functional. For further information, see http://half-life.wikia.com/wiki/HEV_Suit.

school teacher who participated in the evaluation of the prototype (School Teacher, Wrapping-up interview) commented that through these layers of in-game interaction, students could gain an understanding of

[...] the different roles of people and the physical skills that people had to have [in the past,] so [the game] would be about exploring how they made their clothes, the real kind of skills people had, that is something [young students] find really hard. When everything is mass produced now they find really hard to imagine that to get a new piece of clothing someone had to make it, and [also, that] would take a long time [...]

Through micro-interactions with virtual game-objects designed to act as Latourian things,⁴⁴ players can reach a form of understanding that, as the teacher commented, appears ever more difficult to be acquired in our late capitalist world. This can be outlined as a new design sub-goal:

Sub-goal 1-2: To establish a meaningful relationship with the material culture of the studied historical period, using it as a catalyst to understand their culture and society.

At this point, we can look into the problem of representing material culture through digital games. With their ever increasing rendering power, computers are now able to generate highly realistic worlds, visually almost indistinguishable from the real one. But the relationship with our material world is far more complex than its visual presentation. First, we can refer to the phenomenological experience of interacting with things. From this perspective, the experience that games provide is extremely limited; we may be able to see how an object looked or sounded, but there is no way with the current state of technology to bring us the whole spectrum of sensory experiences that manipulating an object gives in the real world. Things are metonymical devices in video games, in some cases reduced to the extreme. In recent game titles however, the more fine-level experience of interacting with things in the real world has been taken more seriously. An interesting recent example of this is the execution of small mundane tasks in the game *'Read Dead Redemption 2'* (Rockstar Studios, 2018), where small repetitive tasks were incorporated as an important part of the game's aesthetic experience. Heather (2018) writes in his review of the game:

⁴⁴ I borrowed this term from Katie King's (2011) book *'Networked Reenactments'*; a study of science-style documentary television, museums exhibitions and other forms of 'experiments in communication across knowledge worlds'.

[...] the game's best interactions are small. They are the tiny pieces of busy work and rote chores that give the game a sort of texture: rough, gritty, and breakable. They are the smallest parts of an almost excessively detailed whole, but they are essential to the game's overall identity (para. 1).

Second, we can look into the meaning of things as enablers in the synthetic world by turning our attention to Gibson's (1979) theory of ecological perception, and its application in Linderoth's (2011) model of ecological gameplay. According to these authors, the perception of game-things implies their consideration as value-rich objects, holding specific affordances for the benefit or harm of the player. In this determination of affordances, players heuristically assign meaning to every element in the game-world, identifying their properties or attributes in terms of what they add to their playing experience. Therefore, an in-game geometry can be tagged as *good for hiding* or *exposed and dangerous*. A meaningful understanding of these attributes, and to an extent the ability to succeed in a game, depends on this process of meaning-making in which players gradually gain a situated understanding of the world. I distinguish three interrelated parts in this process; first we have a player who interprets the elements of the environment according to their needs and the performative abilities of their avatar. Second, there is an environment composed by elements with recognisable affordances and patterns of use, and lastly, the triad is completed with the ludic level conformed by gameplay: the interplay between challenges and actions (Adams, 2013), which provides the context of meaning for every object included in the game. Coming back to our first example, *good for hiding* does not make any sense at all if there is nothing to hide from; it is ultimately the existence of some sort of threat that makes any occluding or concealing features in the environment meaningful to the player (Fig. 6.5).

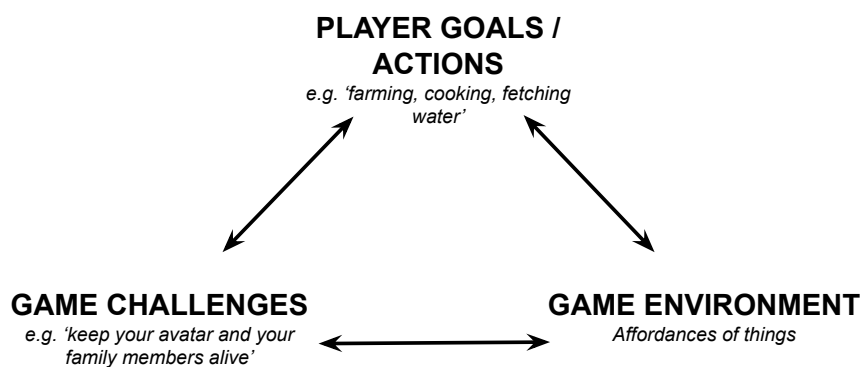


Figure 6.5: Representation of material culture within the game.

6.4.2 Macro-interactions: challenging historical preconceptions and naive forms of understanding

As the data from pre-playtest sessions revealed, children predominantly described the Anglo-Saxon period as “violent”. This preconception is not surprising; the medieval age has been recurrently portrayed as turbulent in popular culture. Generally, the medieval period is presented as narratives of epic battles, blood and sword wielding warriors. As discussed, violence not only has an appealing effect on consumers of historical media, but also influences or pre-conditions their expectations when interacting with new media content. Commonly the first thing many players seek to do when interacting with new games, even serious ones, is to explore the limits of their agency to kill and destroy (Champion, 2008, 2015).⁴⁵ For this reason, the design decision to remove combat mechanics was made in the first stages of the Anglo-Saxon game development (section 4.3.2.1.4). However, it is worth to question whether this was a good decision.

According to post-playtest interviews, children considered the omission of explicit violence within the game as an inauthentic feature. Even though representation of explicit violence in their drawings did not vary significantly, children’s comments indicating the need to incorporate representations of violence (sections 5.6 and 5.8) to make the game more authentic provided evidence of the persistence of children’s assumptions about the Anglo-Saxon age. Although other factors, such as the children’s gameplay preferences, could have played a role in keeping their views unchanged, it is possible to say from the data collected that the game was unable to challenge their preconceptions (or game preferences).

How should the game have been designed to confront children’s naive assumptions about the Anglo-Saxon age? For the psychologist Howard Gardner (2011) children’s preconceptions and naive forms of understanding can be very persistent, remaining unchanged despite efforts from their teachers to change their views. For Gardner, in most cases is not enough to teach the “right answer”. Children’s preconceptions require to be challenged for any change to take place. He describes this process as a “*Christopherian encounter*”. Just as Christopher Columbus challenged the common belief that the Earth was flat by running through the edge of the world, children’s misconceptions and naive forms of understanding can only be tackled by

⁴⁵ This, in fact, was precisely what happened in a significant number of cases, where children turned to slaughter all the sheep they could find as it was the only entity in the game they could kill.

presenting them with scenarios where the contradictions and disjunctions of their thinking become exposed.

In a Christopherian encounter you expose your theories to disconfirmation. If your theories are consistently disconfirmed, you will slowly abandon them, and hopefully construct a better theory. (Gardner, 2006, p.140).

Under this light, instead of excluding entirely the representation of violence, the game could have been designed to contrast it against other forms of social interaction, designed to avoid the risks and consequences of direct confrontations. As archaeologists emphasised during the game's review sessions, this was a very particular time in British history, where cultural groups, very different from each other, were gradually learning to live together (section 4.3.2.3.4). Without underestimating the occurrence of violent clashes, different groups and individuals could have socialised in contrasting ways, not different in many respects from the divergent patterns of interaction that we find today in modern multicultural societies. The potential problems or conflicts emerging from these interactions, instead of presenting a single fighting-like way of solving the problem, could have been designed to offer multiple solution paths, foregrounding the possible short-term and long-term consequences linked to each action (see 4.3.2.3.3). In this way, potentially problematic situations such as '*British woman marrying an Anglo-Saxon*', once presented to the player, could have been designed to explore different ways to address the situation, foregrounding the tensions, conflicts and contradictions that characterised the intercultural encounters of the Anglo-Saxon time. This observation can be re-written as a new design sub-goal:

Sub-goal 3-2: To represent the multicultural diversity of 5th century AD Britain, with an emphasis on the diverse patterns of interaction between Romano-British and Anglo-Saxons.

Perhaps one of the best examples of this type of gameplay is '*King of Dragon Pass*' (A Sharp, 1999), a strategy simulation fantasy game where the player controls the fate of a medieval-barbarian clan in the dangerous region of Dragon Pass, in the fictional world of *Glorantha*. The gameplay for the most part consists of facing problematic situations and taking meaningful choices. Problem-situations, – ranging from mundane law disputes to foreign invasions – appear in the game in the form of

interactive scenes,⁴⁶ where the player is asked to select what to do from a number of possible options. To inform themselves and consider the possible consequences that each option brings, players can consult with clan leaders, who often contradict each other in their advice.

Although *King of Dragon Pass* is set in a fantasy world, the system can be productively applied to historical situations, using historical and archaeological data to align the kind of problem-situations presented with the conflicts of the time. In contrast to micro-interactions, this level uses game systems to communicate the past from a more distant perspective than the one sustained with the simulated material culture. We can thus refer to these forms of engagement as *macro-interactions*. In their design, both environmental and cultural explanations of historical change can be incorporated. As it has been discussed (see 4.3.1.3.3), this has been a long-standing discussion in historical research. But games, due to their participatory nature, are to some extent flexible to represent both forms of causality, giving the player the freedom of choice to explore them independently. Systems like this can be used productively as exploratory devices, demonstrating the short and long term consequences behind the forces of historical change (Sub-goal 2-1).

Additionally, problem-situations can be used as means to develop the players' ability to conceptualise the past in terms of continuity and change, foregrounding dramatic events against periods of time where people most of the time simply occupied themselves with everyday tasks and domestic concerns. Against this background of domestic continuity, the system could be constructed to generate insightful incidents or events capable of *hooking* students, grabbing their attention and leading them to consider aspects of the past from novel perspectives. For the history educators who participated in the review of the project, a key part of achieving this goal involved the scripting of the events in dramatic terms. Expert Reviewer 6 (Personal communication, 4 September 2017) suggested some possible narratives: “[The] harvest just failed, or... is an unseasonable hot summer and your crops have all dried out, and your village is looking dangerously close to collapse...”.

This can be outlined as a design sub-goal, in extension of goal 4 (To convey historically based narratives of the chosen period), defined at the beginning of the project.

⁴⁶ For further information about the way this system functions, see <http://kingofdragonpass.blogspot.com/2012/09/how-many-scenes.html>.

Sub-goal 4-1: To introduce historical conflicts, structured from emergent or pre-scripted events, with the capacity of grabbing the student's attention, and leading them to reflect about the past using high-order thinking skills.

This type of engagement can be linked to a range of forms and practices generally grouped under the umbrella term of *historical reenactment*. For Agnew (2007), these forms of engagement reflect an “*affective turn*”, where the focus of the activities, in sharp contrast with traditional forms of historiography, is set on personal experiences, social relations and everyday life, and with conjectural and provisional interpretations of the past. As such, the main focus of this dissimilar kind of historical encounters, does not rely so much on the transmission of events, processes or structures, but on the psychological experiences and emotional involvement of the participants.

6.5 Campfires and halls: games as empathic encounters

In a similar way to the game's lack of violence, the lack of a tangible social presence was interpreted as a design flaw. As the player's avatar was the only character the pupils could interact with in the game, its representation was regarded as incomplete without other characters walking around in the game space. Although family members were introduced to the game through illustrations and text-based dialogues, this simplified representation was not sufficient to bring an adequate sense of social presence in the game world. Arguably, this lack of other fictional characters can be considered as one of the most important reasons why many children did not connect empathetically with their virtual family, and opted to skip their dialogues, refused in some cases to spend time feeding them and ignored the screen messages alerting of their proximate starvation.

Rejack (2007) blames much of the failure of video games in engaging players empathetically to the poor character AI development. Analysing his own emotional involvement while playing the WWII game ‘*Brother in Arms*’ (Pitchfork & Martel, 2005), he describes how he was supposed to establish a close bond with a member of his squad, who at some point during the game he had to watch die. The event was based on real characters and events, but despite the evident efforts from the game's designers to make him feel the emotional weight of the loss, the lack of realistic human behaviours from the characters made it impossible for him to feel the loss of

his comrades. As technology moves forward, Rejack reckons “*virtual characters [will] help to produce historical knowledge*” (p. 5).

While the inclusion of characters able to exhibit realistic behaviours would undoubtedly help to create more empathic and emotional responses, I am not convinced that this is the main reason why ‘*Brothers in Arms*’ and the Anglo-Saxon game failed to engage players *affectively* with narrative events. This line of criticism ignores the role of play and the interplay of choices and consequences as main drivers of the affective involvement within games (see 4.3.3.1.4). Because players can make their own choices and experience the consequences, games hold unique powers to evoke a range of emotions that cannot be triggered by other media (Isbister, 2016, p. 13). When conceptualising this design principle, I often take as an example the film ‘*Castaway*’ (Zemeckis, 2000). In this film, a sole survivor from a plane crash finds himself stranded in a deserted island where, since finding it impossible to live in isolation, starts to talk to a Volleyball. Although the protagonist is conscious of the falsehood of the situation, he nevertheless develops a strong bond with the inanimate object, driven to a big extent by his urgent need to care for someone other than himself. In the movie, one of the most dramatic scenes is triggered by guilt felt by the character when an irrational action from his side puts the ball at risk of getting lost. In my view, we (or most of us) are programmed to care and take responsibility for others, and this is probably how video games can be used to engage players affectively with the past. Another design sub-goal derives from this argument:

Sub-goal 3-4: To implement situations where players can develop a sense of responsibility towards historical characters, as a means to promote affective encounters with the past.

Despite the manifested weakness of the Anglo-Saxon game to encourage children to care for their family members, in one exceptional case a character dialogue succeeded in engaging them and involving them emotionally. In this narrative, Wilburg, the character posing as the player’s son, asked his father (the player) not to be sold as slave if the crops failed to produce. Many children reacted with manifested surprise, demanding the teacher to explain whether it was true that Anglo-Saxon parents eventually gave up their children into slavery (section 5.8). In the teachable moment that followed, the topic of slavery was discussed extensively by the whole

class; its meanings, implications and current status in the modern world explored in an open discussion (Design goal 6).

Based on this experience, it is possible to argue that the historical game prototype worked at its best when it engaged players affectively with certain aspects of the past. While other character narratives were simply ignored or quickly forgotten, Wilburg's drama succeeded in getting most of the children's attention because it successfully challenged their preconceptions about the functioning of the real world (i.e. parents don't sell their kids into slavery), and by appealing to their feelings, it also created an urgent need for resolution. Despite making an appearance only as a bi-dimensional drawing and text, Wilburg became significant because his possible fate connected with the children's objective and subjective meanings of being a child in the real world. In this *pastpresent*, the children's personal experiences and ideas of childhood and parenthood in the modern world, which were used as a frame to imagine the same institutions in the past, were suddenly pushed to be re-interpreted as they were urged to evaluate the implications of being an Anglo-Saxon parent in the rule-based world of the game. The interplay between these different identities deserves to be looked at further.

6.5.1 Conflicting identities

In *'Rules of Play'*, Salen and Zimmerman (2004) discussed the ethnographic work of Gary Alan Fine (1983) on tabletop role-playing game communities (see 2.2.2.2). Fine identified three different "*levels of meaning*" within the player-character experience. First, players have an identity grounded in the real world, that of the player as a person with no other laminations. Second, players also adopt the identity of a character, a different identity situated within the narrative context of the game. Finally, players also relate with a game context mediated by rules and constraints. While playing a game, players constantly *switch* between the different levels of meaning, sometimes even within the course of a single movement or action.

These three different identities were very much at play when children interacted with the Anglo-Saxon game (Fig. 6.6). When a child commented that "*I never killed sheep, because I can't kill sheep [...] because...I can't do it*" she was referring to her real self in the real world, incapable of inflicting any form of pain or suffering to an animal, however virtual it was; this was a child talking about her feelings and experience at a personal level. But also some children commented that they "*wanted to win the game*" or proudly announced to the rest of the class that they managed to "*survive 100 days*". In this case,

they were referring to their experience as players interacting with a system of rules. And when another child commented that a fictional character “*was quite important to me because he was just... he was a family member*”, he was making reference to his identity as a fictional character, inhabiting the goals of a virtual Anglo-Saxon ceorl and parent within a virtual world.

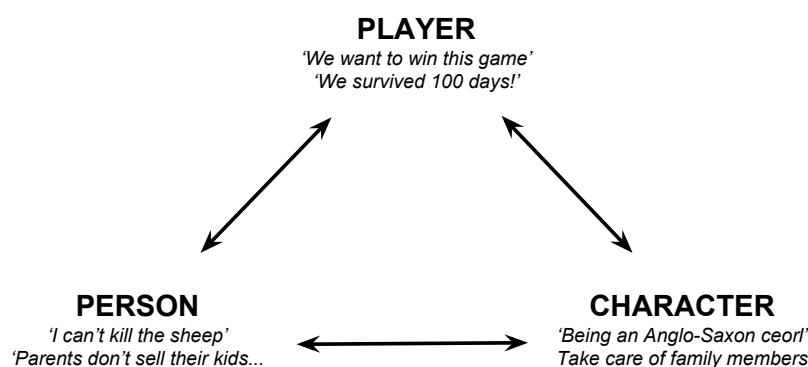


Figure 6.6: Identities at play.

But the interplay or “*switching*” between different identities did not happen without conflict. At certain moments within the game, the goals attached to their identities became at odds, and had to be negotiated. In one case, for example, the identity of a child as a player who wanted to “*win*” the game was confronted with his identity as a virtual character, who was supposed to take care of their family. As the family members were perceived as an impediment to win the game, the goals of the character as a diligent parent were quickly dismissed. By centring his goals and game experience uniquely on the perspective of a player, the child could not connect empathetically with the human dramas of the Anglo-Saxon time. In *‘The Well Played Game’*, De Koven (2013) summarises this observation in one sentence: “[o]nce winning becomes the only goal, everything else gets lost” (p. 78).

In contrast to this case, the dialogue of Wilburg pleading not to be sold as a slave triggered a completely different outcome. In this case, the children related with the game at a personal level, setting into motion their beliefs on how parents should behave in direct confrontation with the identity and goals of their Anglo-Saxon character, who might had to consider the option of selling his son as the best way to keeping him alive. In this situation, children became manifestly involved with the problem-situation, prompting them to demand further information to deal with the emotions triggered by the staged conflict. In short, they *cared* about Wilburg’s fate.

6.5.2 Historical empathy and care

As Rosenstone (1995) stated, historical films use the conventions of the medium to *emotionalise*, *personalise* and *dramatise* history. As the analysis of the testing data demonstrated, digital games hold the same capacity, however, the added opportunities given to players to extend themselves into the visceral, cognitive, social and fantasy possibilities of the avatar, provide the potential to amplify the medium's power to evoke emotions (Isbister, 2016). This process in some cases placed players in situations where their personal and fictional identities were set in conflict, triggering dissonances and strong emotional responses, hence it seems important to ask – as Rosenstone does in his analysis of historical films – to what extent do we wish emotion to become part of historical understanding? What do we gain by letting ourselves feel for or empathise immediately and deeply with particular people, events or situations from the past?

These questions have no simple answer. Inasmuch as we can see a defined sense of purpose in engaging empathetically with the past, the proposition does not go without detractors. Jenkins (1991), for example, in his brief and provocative book *'Rethinking History'* outlined the philosophical and practical reasons to support the claim that empathic history is “*unachievable*”. At the centre of his argument, rest the complete impossibility for anybody to get into another person's mind and see the world through their eyes. While we can counter this argument with the idea that intimate knowledge of a person can bring us at least close enough to appreciate their particular circumstances for the experience to be historically illuminating. We need to admit, however, that this endeavour is problematic. Despite our best efforts to avoid the “*sins of presentism*”, it is entirely impossible for us to divorce ourselves from our present values, beliefs and experiences when looking at the past. We might be capable of embodying a historical character's virtual body but no matter how much effort we put into being our avatar, our minds and thoughts will remain firmly attached to the present.

Inasmuch as these arguments are entirely reasonable, we must also acknowledge that historians and history educators are never entirely disconnected from their minds and present modes of thinking when doing historical research. For Jenkins, history is:

[...] a shifting, problematic discourse, ostensibly about an aspect of the world, the past, that is produced by a group of present minded workers [...] who go about their

work in mutually recognisable ways that are epistemologically, methodologically, ideologically and practically positioned [...]’ (p. 31, emphasis added)

In other words, no matter how much effort we put in following the disciplinary practices devised to make history objective, the outcomes of this type of research will never escape the bias, limitations and present views of the historiographer.

Despite our inherent inability to escape our present minds, it is precisely this ability to draw connections between our personal experiences and the particular circumstances affecting characters from the past what makes history engaging, and motivate us to learn more about the past. As we saw, children during the play-testing sessions demanded to know more about childhood and slavery in medieval Britain because they cared about the possible fate of the fictional character Wilburg, with whom they identified themselves at a personal level. Succinctly, without care there is no interest to learn.

Based on these findings, it could be argued that a video game can be filled with gigabytes of historical information, but if students are not able to engage empathetically with the game content none of it will be meaningfully incorporated into their learning experience. Although historical content provides an appealing setting for a gaming experience, and well-crafted simulations can bring us closer to understanding the inner workings of natural and societal forces of historical change, we can argue that historical understanding cannot be reached or be considered complete without an intimate comprehension of the concept of the person as the centre of historical thought. As Skodo (2010) remarks: *“it is with the concept of the person that an [historical] analysis has to deal, and it is the understanding of particular persons that historical research should result in”* (p. 721). Devoid of this analytical plane, tinkering with simulation games has limited pedagogical value. In this sense, I agree with Robinson’s (2013) remark that *“one can learn to play simulation games quite well without acquiring much knowledge at all of real history”* (p. 578). Real history is the level of understanding that can only be achieved by empathising with people’s lives and experiences.

Ultimately, it is only through emotional involvement that students’ preconceptions can be challenged and changed. Barton & Levstik (2008) in this respect, claim that:

When educational experiences are geared toward developing specific performances or skills—without attention to affective dimensions of the subject matter—they often fail

either to change attitudes or behaviours or to support transfer of skills to other settings (p. 236).

For preconceptions or naive forms of understanding to change, a willingness from the learner's part to enter the *liminal space*, where the security of the knowledge already known is left behind, is necessary (see 2.2.1.2). Commonly, this step is not taken without a good reason. *Care* provides the reason and purpose to enter the uncomfortable space where learning takes place.

6.6 Proposed framework for designing historical gameplay

As Cassone & Thibault (2016, section 2.3.5) argued, the process of designing historical gameplay can be seen as an translation from written (original historical sources, essays, spreadsheets, academic texts) and non-written historical sources (archaeological evidences, artefacts, simulations and so on) to the medium of a digital game. As such, this process can be compared to the translation between different languages (Hutcheon, 2006). In the same way that no linguistic translation can be completely perfect, no adaptation between two different mediums can preserve fully the meaning of the original source. In order to minimise the unavoidable distortion of meaning that any adaptation involves while using the full expressive potential of the new medium, a facilitating system is needed (section 4.3.2.3.5). In this section, a framework developed with the aim of facilitating the process of designing historical gameplay is proposed. This framework consists of a series of decisional steps, organised in two main phases: *contextual-perspectival* and *ludic-narrative*.

6.6.1 Contextual-perspectival phase

1. Substantive knowledge

The first stage in this process requires the definition of the historical content or "*substantive knowledge*" (Ashby & Lee , 2000) that will be explored through the game (i.e. what the historical game is about). A useful categorisation of different substantive concepts is provided by the Historical Association (n.d.):

- ✧ *Specific concepts*: Concepts that are highly specific to a period or place. For example, a game might focus on a particular event, such as a famous battle or invasion, or concentrate on a specific city, site or person of historical significance.

- ❖ *General concepts*: These concepts originate from specific historical contexts but can be applied more widely, providing the means to understand other historical periods or situations (e.g. Capitalism, Puritanism).
- ❖ *Abstract concepts*: These have much wider meanings and can be applied to contexts outside history (e.g. Church, Slavery, Revolution).

2. Historical conflicts

Once the substantive concepts for the game have been selected, the next step consists of defining how these concepts will be explored. At this stage, one important aspect to consider is that any content in games is primarily approached through action.

[...] there is one element, which [all games] have in common and that is action. [...] Without action there would, in fact, be no game at all. From the player's point of view, action is the most important (though not the only) feature of a game (Lankoski & Heliö, 2002, p. 312).

Within games, players are not just passive readers of the medium as their interpretation of the game's virtual and fictional systems is conducted through action-verbs such as *kill*, *build*, *explore*, *craft* and so on. Action, however, always has an origin since "*action cannot come of itself*" (Egri, 1960, p. 125). As drama writers have known for a long time, every meaningful action succeeds from some form of human conflict. The philosopher John Dewey (1922) summarises this observation:

Conflict is the gadfly of thought. It stirs us to observation and memory. It instigates to invention. It shocks us out of sheep-like passivity, and sets us at noting and contriving. Not that it always effects this result; but that conflict is a *sine qua non* of reflection and ingenuity. (p. 300).

Dewey's conclusion seems especially true in the context of games. As Salen & Zimmerman (2004) remarked: "[c]onflict, a game as a contest of powers, is core component of [the] definition of the term 'game.'" (p. 250). It is therefore through the determination of relevant conflicts, defined from substantive historical concepts, that history can begin to be translated into meaningful play.⁴⁷ At this phase, a distinction can be made between primary and secondary conflicts. While primary conflicts consist of challenges linked to winning or losing, secondary conflicts can be designed according to other rewarding systems such as achievement points, in-game rewards, and so on.

⁴⁷ This observation was also made during the development phase of the Anglo-Saxon prototypes (see 4.3.2.1).

3. Perspective

Digital games give players the opportunity to become someone different from who they are in the real world. Through their embodiment in the game-world, players can be a military commander as, for example, in the *‘Total War’* game series (The Creative Assembly, 2000–2018), or be a parent trying to keep his family alive in a country ravaged by war, as in *‘This War of Mine’* (Drozdowski & Marszał, 2014). Whoever the player is in the game’s fictional context, this choice is never neutral. *Being* a particular person implies a particular way of seeing the world as it is presented and experienced within the game.

This is why an important decision when designing historical gameplay is to determine who the player will be in the game. The player’s identity determines their perspective of particular historical conflicts and the limits of their agency in the virtual world. To be used productively, this decision also needs to define the spatial mode of representation. In spatial terms, the relationship between the player’s embodiment and the game-world is interfaced by the metaphor of the camera, which, at its most basic level, consists of a position vector in the internal cartesian model of the virtual landscape. From this position, rendering algorithms create the illusion of a 3D navigable space. As discussed, the position of the camera holds important meaning within the historical representation (see 4.3.1.3.1). Top-down distant cameras are mostly used for understanding macro-historical processes from a god-like perspective, the closer camera of the third or first person perspectives results in a more intimate relationship between the player and the fictional character they embody in the game-world.

Table 6.1: Substantive concepts, historical conflicts and perspective.

SUBSTANTIVE CONCEPTS	HISTORICAL CONFLICTS	PERSPECTIVE
Everyday life Environment Childhood Family Slavery Multiculturalism	<p>Primary conflict Find the means to survive in the harsh environment of early medieval England.</p> <p>Secondary conflicts Keep all members of your family household alive.</p> <p>Overcome multicultural clashes between Anglo-Saxons and Romano-British</p>	<p>Player identity Free male peasant (ceorl), single parent of two siblings.</p> <p>Point of perception Third person camera</p>

The substantive concepts, conflicts and perspective of the Anglo-Saxon game can be seen on the following table (Table 6.1):

6.6.2 Ludic-narrative phase

The specific design goals of the project can be set according to the definitions from the contextual-perspectival phase. These definitions are rarely all taken at the conceptual stage of a game's development, but are formed as design solutions emerge and are reflectively evaluated, in order to inform and re-shape the problem space of the project (see 3.6.2). At this stage, the defined design goals can be translated into the expressive language of the medium taking advantage of its ludic and narrative conventions. As discussed in the literature review, game scholars have debated at length whether games should be studied as a form of fictional engagement or in terms of their ludic components and relationships; this discussion has been considered counterproductive by some authors. Aarseth (2012), for example, proposed a model that integrates both narrative and ludic analytical dimensions (section 2.2.2.2). Using this framework, the *ludo-narrative* design space of digital games can be deconstructed into four independent dimensions: *world*, *objects*, *agents* and *events*. Using these categories, the design goals of the Anglo-Saxon game can be translated into specific definitions of game design.

Table 6.2: Ludic and narrative structures.

	DESIGN SUB-GOALS	LUDIC	NARRATIVE
WORLD	(1-1) To grant the perception and interaction of the world through multiple perspectives, making possible for players to acquire a sense of being-in-the-world (see 4.3.1.3.1).	Multiple spatial representations to explore or navigate the world.	The World has a rich background narrative, constructed from historical/ archaeological data.
	(2-1) To explore possible ways to represent processes of historical change as a result of both environmental and cultural dynamics, driving the player to make contrasts between both perspectives (see 4.3.1.3.3).	The environment changes depending of different factors (weather, natural disasters, etc.), proposing new challenges to the player. The player has multiple options to deal with the new challenges.	Changes in the world are explained to through narrative components (character dialogues, text, etc.)

OBJECTS (THINGS)	(1-2) To establish a meaningful relationship with the material culture of the studied historical period, using it as a catalyst to understand their culture and society (see 6.4).	Player can interact with things in multiple ways (Collect, produce, make, destruct, modify, etc.)	Relevant objects have historically illuminating narratives (makers, previous owners, associated stories)
AGENTS	(3-1) To represent historical agents as complex human beings, revealing their personal identities, stories, and thoughts (see 4.3.1.3.2).	Characters have different personalities, and are able to acknowledge and react to the player in a recognisably human fashion.	Characters have different historically-based background stories.
	(3-4) To implement situations where players develop a sense of responsibility towards historical characters, as a mean of promoting affective encounters with the past (see 6.5).	Characters' fates depends on the player interactions and decisions.	Characters develop meaningful narrative connections to the player.
EVENTS	(4-1) To introduce historical conflicts, structured from emergent or pre-scripted events, with the capacity of grabbing the student's attention, and leading them reflect about the past using high-order thinking skills (see 6.4.2).	Interact-able problem-situations, where the player is asked to make meaningful decisions.	Unconstrained: the narrative direction of the game is decided by the player actions and decisions.
	(3-2) To represent the multicultural diversity of 5th century AD Britain, with and emphasis on the diverse patterns of interaction between Romano-British and Anglo-Saxons (see 6.4.2).		Constrained: the narrative direction of the game cannot be changed by the player.
	(3-3) To provide situations for players to become aware of the contrasts between the way we see the world today and how it could have been conceived in the past (see 4.3.2.3.2).		

6.7 Chapter summary

This chapter discussed the key themes that emerged from the design and development of game prototypes (Chapter 4) and the contextual implementation of the final game in a primary school (Chapter 5). The analysis of these processes revealed that one of the most important advantages of using digital games in history classrooms resides on the translation of historical topics into experiential game challenges, offering opportunities for students to overcome their often simplistic and stereotypical ideas about the past. Digital games provide valuable learning experiences from the ludic interaction with simulated historical worlds, however, this research showed that one of the most important potentials of the medium lies on its capacity

to present conflicting situations to the player. As the pilot school implementation of the game revealed, the educational potential of these conflicting situations is amplified when they are designed to engage players emotionally and empathically, leading them to *care* about the possible consequences of their actions. Without this form of engagement, the historical game experience risks to be perceived in abstract terms, diminishing the capacity of the medium to engage players into historical thinking.

As another research outcome from this investigation, a framework for the facilitation of the designing of historical game-based learning environments was proposed. This framework operates in two main phases. In a first *contextual-perspectival* phase, the design goals of the project are defined as substantive concepts, historical conflicts and perspective. In a second *ludic-narrative* phase, the established goals of the project are translated into gameplay and narrative definitions for the game's world, objects, agents and events.

CHAPTER 7: CONCLUSIONS

7.1 Introduction

This chapter brings together the key findings and conclusions from this long research journey. To do so, the research questions outlined at the beginning of this thesis are answered according to the analysis of the key findings. Secondly, all the outcomes and contributions of this project are outlined. This review will also points to the outcomes that cannot be fully translatable into written text, and require to be experienced to be fully understood. Following, this chapter provides recommendations for further research, and, finally, a personal reflection and continuation of this research in future developments.

7.2 Main findings

Following the methods of action-research through creative practice, this work investigated the suitability of digital games as mediums for the representation of history, looking at the specific ways in which they can be used in history classrooms. This investigation was framed according to three interrelated research questions:

1. Can digital games be considered a suitable medium for historical representation?
2. Which defining characteristics of digital games are relevant and advantageous for producing a historical representation?
3. How can historical digital games be designed to foster the meaningful understanding of history in formal educational settings?

After engaging in this creative exploration, I conclude that the medium can be a valid, and in some respect advantageous form of historical engagement, with specific affordances not available by other media. This conclusion stems from a conceptualisation of historical understanding not solely as the mere recalling of factual information about the past, but on the capacity of *thinking historically*, understanding of components, relationships, and underlying operations that characterise historical processes.

Under these terms, this research demonstrated the capacity of the medium to:

- ❖ generate meaningful historical experiences, driving players to understand the key albeit subtle aspects of living in the past, and
- ❖ challenge players' preconceptions and naive forms of historical understanding, leading them to *reflect critically* and *care* about certain aspects of the past.

To do so, digital games have unique properties, which separate them from other means of historical mediation. As forms of historical representation, games can be analysed as:

- ❖ **Environments:** they provide historical game-worlds presented with different levels of abstraction.
- ❖ **Interactive:** the player has the agency to affect and be affected by game events.
- ❖ **Ludic:** the interaction within game-worlds is conveyed through *play*.

Each one of these aspects will be reviewed in more detail.

7.2.1 Environments

Historical game environments can be presented abstractly, like the first prototype developed in this research, or be meticulously built to resemble historical landscapes, as it was done with the second and third prototypes. Regardless of their level of abstraction, synthetic environments are not constructed only to be seen but to be *lived*; to be explored and inhabited in ways that are unique to this medium. Within game-worlds, the past becomes alive through computer code. This makes digital games an advantageous medium for the exploration of components, systems and formal relationships (see 2.2.2.1).

To a big extent, the production of digital historical environments involves the translation of historical substantive knowledge into ideas of space and time, accessible through different game interfaces. For their production, some design considerations are:

- ❖ The definition of the perspective, scale and scope of the representation. The point of perception of the virtual camera determines the type of historical understanding and the level of abstraction of the representation.
- ❖ To provide flexible ways for the player to access and interact with the game-world's representations of space and time (i.e. zooming in and out), uncovering the multiple and often contradictory ways in which people from the past used, transformed and conceptualised the places where they lived (see 2.3.3.3; Subgoal 1-1).

- ❖ To provide the means to appreciate life in the past according to different timescales: perceivable movement, biological and social needs, everyday tasks, and rituals and celebrations (see 6.3.1).
- ❖ To give players the agency to create personalised worlds. For players to *inhabit* and not just *occupy* historical virtual worlds, games need to contain systems permitting the persistent transformation of the space (see 6.3.2).

7.2.2 Interaction

Digital environments can be coded to provide players with different levels of interaction. These can be categorised in two levels: micro-interactions (see 6.4.1) and macro-interactions (see 6.4.2).

- ❖ **Micro-interactions:** the ergodic and non-ergodic forms of interaction designed to simulate the relationship that people have with material culture. For these interactions to be meaningful, the game interfaces should be capable of bringing an adequate sense of how things were grown, produced, made and used by people from the past, allowing players to gain an understanding of how these processes determined or influenced past societies and cultures (Sub-goal 1-2). Within games, these processes are represented by:
 - ❖ the player's goals and performative abilities of their avatar
 - ❖ the game challenges that determine the player goals, and
 - ❖ the virtual representation of the affordances of things (see 6.4.1).
- ❖ **Macro-interactions:** interactions designed to communicate the past from a more distant perspective than the one sustained by the player's avatar in the game world. At this level, alternative representations of space (e.g. minimaps, map-like menus, etc.) are able to expand or collapse the perception of space and time, driving players to form and contrast different explanations of historical change (e.g. environmental, cultural, etc.), in a way not supported or directly encouraged by their avatar's interactions (4.3.2.3). For this level, I proposed its implementation through problem-situations. These situations can be emergent or pre-scripted, and should offer different paths of resolution (see 6.4.2), allowing players to explore different forms of historical determinism (e.g. environmental or cultural), and thus acquire a better sense of history in terms of continuity and change (Subgoal 2-1).

7.2.3 Ludic

Drawing from the revised definitions (2.2.1.3), games can be defined as a system of conflict, where opposing goals are negotiated between all the elements participating in the experience (players vs other players; player vs the game systems, etc.). As such, the value of digital games as historical mediums can be judged according to their capacity to present relevant conflicts (i.e. conflicts capable of challenging naive forms of historical understanding or capable of bringing novel historical perspectives). For this to happen, I have claimed that an effective historical game-based learning experience should be capable of bringing into play not only the identity and goals of the participants as players, but also their personal and fictional identities and goals (6.5.1). When these identities are successfully brought into play then the game experience becomes personal, that is, capable of engaging participants not just as external observers who are emotionally disengaged from the game narratives, but as insiders capable of empathising with the virtual characters' particular circumstances (6.5.2). For this, it is essential that the characters included in the game are presented as human beings, capable of exhibiting complex behaviours and thoughts (Sub-goal 3-1), familiar in some respects to our present understanding of the world but very different in others (Sub-goal 3-3). Through the interaction with them, players should acquire an elevated sense of responsibility by engaging affectively and caring about their particular circumstances and possible futures.

7.2.4 Historical game design framework

Driving from the reflective practice of a building a historical educational game, a new design framework was proposed (section 6.6). The aim of this framework was to guide and to facilitate the iterative and multidisciplinary process of designing new historical game-based learning experiences. In this framework, the design of a new historical game begins with a *contextual-perspectival* phase in which *substantive concepts* were defined and translated into relevant historical *conflicts*. In a second phase, these conflicts were articulated into an integrated *ludic-narrative* gaming experience, taking advantage of the expressive potential of the medium.

7.3 Contributions to knowledge

7.3.1 Practical contributions

Three game prototypes were produced through a process of experimental iterative design and development. A myriad of files (2D/3D game art, computer code, etc.) were

produced and assembled to compose fully functional playable artefacts. Insofar the practical development guided the theoretical reflection and understanding of the research problem, these prototypes need to be considered an integral part of the contribution to knowledge made by this project.

It is important to note here that a considerable amount of time and effort was spent in the production of the successive versions of the game prototypes (i.e. production of 2D and 3D assets, writing, testing and debugging the game code). Although these were developed as “thinking tools” more than finished, polished products, it was considered highly important to produce game artefacts capable of attracting the attention of all the people involved in this research (directly or indirectly). Even though all this material is not publicly available at the moment of finishing this thesis, I intend to release both the binaries and the production files to the general public under Creative Commons licences.

In addition to the game prototypes, a digital tool for the visualisation and analysis of play-testing data was also produced (5.5.1.3).

All the binaries of the digital software, along with videos demonstrating their main features have been included in the Appendices as shown in Table 7.1 below.

Table 7.1: Practical research outcomes.

PROTOTYPE	FILE TYPE	SECTION	APPENDIX
Final game prototype	Windows and MacOX binaries Demonstration video	4.3.3	A3
Survival game prototype	Windows and MacOX binaries Demonstration video	4.3.2	A2
Village simulation	Flash player executable file Demonstration video	4.3.1	A1
Gameplay analysis tool	Windows and MacOX binaries Demonstration video	5.5.1.3	B1

7.3.2 Theoretical contributions

This project produced a number of research outcomes which can be classed as original contributions to knowledge:

1. A novel conceptualisation of digital historical games as personal encounters, where objective and subjective meanings are mobilised in the interpretation of game experiences (see section 6.2).

2. A set of guidelines for the design of game challenges that take advantage of the spatial and temporal structures of the medium to offer a better understanding of material life in historical environments (see section 6.3).
3. A set of guidelines for the implementation of game-based historical learning experiences in formal educational environments, and their integration with other learning resources and activities used in school classrooms (see section 6.3.4).
4. A model describing the properties of historical interactive ludic environments and their affordances for the support of the teaching and learning of socio-cultural structures and processes (see section 6.4).
5. A model describing the interplay of players' identities and goals while interacting with game structures. Through this model, the research found evidence of the potential of the medium to challenge preconceptions and naive forms of understandings about the past (see section 6.5.1).
6. A framework detailing the sequential steps for the design of historical gameplay, from conceptual decisions to the design of meaningful historical experiences, through the exploitation of the ludic and narrative systems of games (see section 6.6).

7.3.3 Implications for stakeholders

This project has direct implications for the research's stakeholders:

Historians and archaeologists will find useful perspectives to translate historical knowledge or data into virtual and game worlds. As I have argued in this thesis, this is not a simple or direct process; the communication of history through a digital game requires a thorough understanding of the conventions and affordances of this medium. In this sense, this research constitutes a useful resource to help researchers from the disciplines studying the past to work with game designers, or to become game designers themselves in the effort of creating historical game environments.

Educators will find in this thesis a useful resource to implement game-based historical experiences in formal and informal educational settings. Aligning good pedagogical practices with game design theory, this research's insights and outcomes will help educators to better understand and integrate digital games within their teaching practices, in conjunction with other pedagogical activities and resources.

Game designers will find in this work useful theoretical perspectives with practical applications in game design. In particular, this research's approximation to

game-world inhabitation and player identities can be productively applied in the design of more meaningful interactions within digital game worlds.

7.3.4 Dissemination of the research

Along with the stated practical and theoretical outcomes, this research allowed the researcher to become an active member of an international community of scholars studying the intersections between video games, history, archaeology and digital heritage. As discussed in Chapter 4, during the development phase of this project, key ideas were discussed with the individuals and research groups that contributed as expert reviewers. As the project progressed, different aspects of this work were presented at academic seminars and conferences which allowed me to discuss and further develop conceptual findings with an active community of researchers working on similar topics. Perhaps more importantly, the dissemination of this research provided the initial momentum to establish a research network and form collaborations which hopefully will continue beyond the context of this doctoral study.

All the instances where this research was disseminated are listed in Appendix J where the abstracts and links to the related academic outputs can be found.

7.4 Limitations

7.4.1 Methodology

This study employed action-research through creative practice hence the defined research goals and aims were explored through the means of practice to devise new design ideas, principles and practices for historical game design. This process cannot be regarded as completely systematic but as rather non-linear, emergent and unpredictable. However, the inherent messiness of the creative design process can be considered one of the key advantages, as it allowed the emergence of research outputs that, arguably, would have not seen the light if a more systematic model of inquiry had been followed. It must be noted that in most cases the solutions attempted during the development of the prototypes followed mostly intuitions rather than a methodical theory-driven response to the problem at hand. Only after a new form materialised and became available to be evaluated, the conceptual ideas behind its design started to emerge, making it possible to build a rational discourse explaining the logic in the design, or to connect the design decisions to relevant theoretical frameworks.

Although the adoption of the chosen methodology was considered successful in providing meaningful answers to the project's research questions, it is worth to note here some of the inherent difficulties of building theory from design. A first concern to mention regards the need to produce new "*communicable knowledge*" – knowledge produced from a systematic form of enquiry which is systematic, goal-directed, knowledge-directed, intelligible and "*located within some framework of understanding for an appropriate audience*" (Archer, 1995, p. 6). For these criteria to be met, the design process requires to achieve a minimum level of coherence and completion: two conditions not necessarily taken as granted when working creatively (Goldschmidt, 1997). Many times, the design ideas in this project came from nowhere, making it difficult to trace back the sequence of rational steps that led to a particular design solution. A second concern regards the subjective nature of the design process, and its dependence on the particulars of the problem situation. Despite my commitment to methodically articulate my design ideas in a logical manner and to build more abstract definitions from them, I must recognise the unavoidable bias from personal goals and intentions influencing the design process. A different designer facing the same problem, and working under similar constraints, would most likely have come up with entirely different solutions than the ones that materialised in this project. Most design problems do not have a single correct answer, and my own answers to the problem would most likely experience significant variations further in time. For this reason Redström (2017) consider the theory emerging from design "*inherently unstable, fluid, and dynamic in nature*" (p. 2), and I must agree with him.

7.4.2 Design and development

It is important to acknowledge the limitations and problems of conducting practice-based research within a games development context. Functional games, even at a prototype level, are complex artefacts to build. Their production is commonly carried out by a team of professionals with different specialisations, who often work for months or years to complete a testable product. This level of production is undoubtedly unachievable for a game created by a single practitioner, therefore extra care had to be taken into defining the specific systems that were implemented into the different prototype iterations. This meant that some important aspects such as sound design, NPCs and in-depth game narratives, remained underdeveloped or were excluded from the design. Ultimately, the aim of developing the prototypes was not to produce a finished, polished game akin to a professional release standard, but to

gain a better understanding of the research problem and, as the project progressed, to shed light on the defined research questions.

Despite the limitations, the final prototype achieved a satisfactory level of production. This would have been entirely impossible only a decade ago. Fortunately, the democratisation of game development technology – a process led by game engine providers such as Unity, Unreal and Crytek – has improved game development tools and production pipelines to a point where small teams or individual developers, without an extensive budget, knowledge and specialisation of a big 200-staff studios, can construct games exhibiting many of the technologies available in top commercial titles. As this trend continues, the quality of development of many research studies or so called ‘conference games’ will continue to improve.

7.4.3 School implementation

The implementation and testing of the game prototype at the primary school also met significant challenges and limitations that must also be acknowledged. At the time this research was conducted, primary (and secondary) schools in the United Kingdom very commonly have a time-constrained curriculum, where fitting all the content becomes one of the main challenges teachers have to face.⁴⁸ This makes it difficult for school directives and teachers alike to allocate time to collaborate in research projects not directly committed to the full curriculum’s content delivery. Since the methodological approach defined for this phase required the close collaboration and involvement of a school teacher to be successfully implemented, ideally, the teacher had to be actively involved in the preparation, design and implementation of the game-based activities. This form of involvement, given the demands of their everyday workload, was not possible as originally envisaged, so the teacher’s participation was notably reduced. Even though the testing of the game with the pupils yielded important data-driven conclusions, the project would have benefited from a more substantial involvement of the teacher in the research project, as well as an increase in the number of testing sessions conducted in the classroom.

Another constraint concerns the computing resources available at the school. As many public educational institutions, the public school where the game was implemented did not have enough computers for all the pupils to use at the same time, and the ones available had very low technical specifications. This meant that the game

⁴⁸ According to the 2017 survey from the Historical Association into teaching history in primary schools, time, resources and training were estimated as the key concerns. Primary teachers feel “*under-resourced to deliver the primary history curriculum*”. The same survey on secondary school teachers deemed the amount of content to be covered in the GCSE history curriculum introduced in 2016 as “*essentially unmanageable*”.

had to be tested in groups, with more than one child interacting with the game at the same time. This made it completely impossible to study each pupil's individual performance for each playing session.

Finally, but by no means of less importance, the research required to comply with all the ethical considerations to work with minors and resolve any possible ethical issues. Although all these issues were discussed and agreed with the school beforehand, some of the restrictions that had to be followed had a significant impact on the data that was possible to gather in testing sessions. More specifically, it was agreed that no video or images could be taken of the children. Although, this is completely understandable, it significantly limited the amount of research data that was possible to collect, with a consequent impact on the project's research outcomes.

Despite the stated limitations, the combination of data gathering methods provided useful insights into the ways children interacted with the historical prototype. In particular, the use of drawings and mini-interviews was surprisingly revealing, providing an advantageous viewpoint into the cognitive and affective processes triggered by the pupil's interaction with the gameplay and narrative systems of the game. These data gathering methods undoubtedly can be further developed by studying ways to integrate them with other research methods.

7.5 Recommendations for future research

A number of possible strands for further research can be identified from reviewing the topics that emerged at different stages in the study as well as from revisiting the limitations and constraints faced by this project. These can be summarised as:

- a) better integration of the historical game within the school curriculum,
- b) implementation of the project in other educational settings and
- c) further development of game aspects and integration of emerging technologies.

7.5.1 Curriculum integration

A first suggestion for further research would be the implementation of the game (or an advanced version of it) for a longer period of time. A more extensive and better integration of the game within the school classroom would allow to focus the attention on aspects that could not be addressed in this doctoral study, and which would most

definitely lead to further areas of investigation. For instance, some aspects that were not incorporated in this research due to time restrictions concerned the integration of the game with extra-gaming learning activities such as drama, and the involvement of children as narrative and gameplay designers and content-creators, and not just as players.

7.5.2 Learning settings

This research concentrated in the study of historical game-based learning in primary school classrooms, however, the outcomes from this project can be extended and investigated within other educational environments for historical education, such as secondary schools or higher education institutions. We must recognise, however, that these contexts present significant differences to primary schools. Although still a matter of academic debate, some authors have emphasised the differences between educating children and adults (Knowles, 1973), in aspects such as commitment to self-direction and engagement with experiential and problem-solving activities. Hence, another line for further enquiry could involve the understanding of these differences, and how they manifest in the design of historical game-based learning experiences.

Likewise, the practical and theoretical outcomes from this research can be also extended to informal educational contexts, such as museums and exhibitions. The use of games specifically designed for these contexts is a growing trend (Beale, 2011), which has also been reflected in an increasing number of academic publications devoted to this topic. Museums and exhibitions present different requirements than formal educational settings, which still need to be understood for the effective implementation of game-based learning artefacts and methodologies in their spaces. Despite the differences, I do believe that some outcomes from this research can be almost directly applied to museum spaces and it would be beneficial to study their educational potential and effectiveness in these more public environments.

7.5.3 Game design and development

Due to the stated constraints of conducting this project as a solo developer, some important aspects of game development could not be incorporated or adequately addressed. Among these, sound design is probably one of the most easily identifiable. As the prototype now reached a functional level, sound can be easily integrated, investigating the ways in which its inclusion affects the aesthetic, affective and cognitive experience of interacting with the virtual historical world.

Furthermore, although development work was done to play-test the final prototype in multiplayer mode, this aspect could not be realised and properly tested in the primary school, remaining a strand for further investigation. Similarly, other interesting paths for further research can be suggested from the integration of emerging virtual reality and augmented reality technologies. Although these technologies were not within the scope of this research, they can be identified as one of the most interesting areas to explore for the continuation of this project. In particular, the creation of *blended spaces*⁴⁹ combining the digital and physical worlds into integrated historical gaming experiences open very interesting possibilities for the use of this game in existing archaeological or heritage sites.

7.6 Final personal reflection

This research project raised from two main personal motivations: my professional experience and interest in using digital technologies, in particular, games, for education; and an equally strong interest in the disciplines studying the past. Coming to the end of this project, my interest in these topics has grown bigger fuelled by the new perspectives and research paths that emerged from this investigation. Ultimately, conducting a project of this magnitude leads to the development of a certain identity, product of the researcher identifying him or herself with a distinct set of conceptual and practical tools to explore and interpret the world. In my case, this identification has been that of an *action-researcher* and a *creative practitioner*; an approach to investigate the world by the means of *making*.

As a digital designer, I have been making things for a good part of my life, but this project allowed me to see them in a different light, not just as end products but also as powerful mediums to explore and to challenge existing theories and concepts, as well as to raise ideas of my own. This, of course, did not happen in isolation. I relied on establishing links of collaboration with varied stakeholders—historians, archaeologists, and school teachers—who became pivotal in the shaping and re-shaping of my thoughts. The potential of making as a research method is certainly amplified when we make *with* others and not just *for* them.

Undoubtedly, one of the most important results coming from this long project was the relationships established with the academic community that in one way or

⁴⁹ In his book *'Archaeogaming'*, Andrew Reinhard (2018) comments on recent experiences of using games such as Pokemon GO, where players seek and catch fictional monsters from real-world spaces using their phones, for the engagement of audiences with heritage sites. The evaluation of such experiences has been varied, but remains a very promising avenue for further research and development.

another became involved in this investigation. In the last years, some of these relationships have concretised in collaborations where the outcomes of this research will be applied, and, I hope, will continue to develop.

The first of these contexts, in which I am particularly interested in, is the study of the Amerindian indigenous history and culture. As mentioned at the beginning of this thesis, my participation in the recollection of local histories from native American communities was one of the central motivations for this project and continues to be a strong personal interest. Thanks to the dissemination of this project in various academic instances, I have established links of collaboration with archaeologists and anthropologists working with Amerindian groups in Brazil. In collaboration with them, I have started developing a digital game to foster the understanding of the history and ways of life of the *Xokleng*, an indigenous group from Southern Brazil.

A second context where I have also started a research collaboration is the archaeological work being conducted in the site of the Battle of Waterloo, in Belgium. As part of a multidisciplinary team, I am at the beginning of a game development project to communicate the stories of the woman known as “*camp followers*”, who accompanied their husbands at enormous personal risk during the Napoleonic Wars. Despite their contribution to the war effort, the stories of this woman have been ignored in the annals of history, and this project represents an effort to make them be known.

Finally, the third context of investigation in which I intend to apply and expand the outcomes of this investigation concerns one of the most obscure periods in the history of Chile, my country of origin. The historical period I am referring to is the sixteen years long dictatorship that followed the military over-cup to the government of President Salvador Allende, in 1973. During this period, thousands of Chileans were illegally detained, tortured and executed; their remains scattered in secret mass graves throughout the country. Working alongside the forensic teams in charge of finding and interpreting the shreds of evidence of these crimes, I intend to apply the theoretical and practical knowledge acquired in this project so these stories are never forgotten.

APPENDIX A: GAME PROTOTYPES

A1. First prototype

Demo: <https://www.dropbox.com/s/6sjeuov5dyoxafm/Prototype1.zip?dl=1>

Demonstration video: https://www.dropbox.com/s/wsvhg81mzdfdbrs/Prototype1_DemoVideo.mov?dl=0

Instructions of use:

1. Download the demo from the link provided and extract the files to a location in your computer.
2. Open any browser
3. Drag the file “AngloSaxonVillageSim.swf” to the browser window. Your .swf file should start playing automatically. If your file can't be opened, you may need to install the latest version of Flash for your browser (see <https://get.adobe.com/flashplayer/>).
4. Press the “Go Once” button to run the simulation one step at the time.
5. Press the “Go Forever” button to run the application continuously.
6. Adjust the variables of the system moving the sliders on the “Inspector” window.

A2. Second prototype

Demo Mac: https://www.dropbox.com/s/6v6pjaxm6w9rdhr5/SurvivalGame_Mac.zip?dl=1

Demo Windows: https://www.dropbox.com/s/ouomnujrmjyjdjiq/SurvivalGame_Windows.zip?dl=1

Demonstration video: https://www.dropbox.com/s/6npq109hia5omji/Prototype2_DemoVideo.mp4?dl=0

Instructions of use:

1. Download the demo from the link provided and extract the files to a location in your computer.
2. Run the game by double-clicking either the Mac .app or Windows .exe versions of the game.
3. Select a screen resolution of minimum 1024 x 768 on a “windowed” mode.
4. Walk around pressing the W key and changing direction with the mouse. Press LEFT SHIFT key for the character to run.
5. Interact with the environmental objects with your mouse.
6. Press the TAB key to open the character inventory.
7. Press M key to open the hexagonal representation of the environment.

A3. Third prototype

Demo Mac: https://www.dropbox.com/s/qdpstl4xpsmnhn7/SaxonGame_Mac.zip?dl=1

Demo Windows: https://www.dropbox.com/s/sdqab3827aei4bk/SaxonGame_Windows.zip?dl=1

Demonstration video: https://www.dropbox.com/s/zo1hez5duesktzb/Prototype3_DemoVideo.mp4?dl=0

Instructions of use:

1. Download the demo from the link provided and extract the files to a location in your computer.
2. Run the game by double-clicking either the Mac .app or Windows .exe versions of the game.
3. Select any graphic configuration and press the Play! button.
4. Press the START HOST button.
5. Move your avatar with W, S, A, D keys. Press LEFT SHIFT for the character to run.
6. Press SPACE to align the camera with your avatar.
7. Press 1 or 2 keys to change the camera distance. Alternatively, use the mouse wheel for the same effect.
8. Interact with the environment objects and terrain with your mouse.

APPENDIX B: OTHER DIGITAL SOFTWARE

B1. Digital tool for the visualisation of play-test data

Application Mac: <https://www.dropbox.com/s/ch2njt4tisgz79y/application.macosx.zip?dl=1>

Application Windows: <https://www.dropbox.com/s/lfy2lasogodzoeg/application.windows64.zip?dl=1>

Demonstration video: <https://www.dropbox.com/s/zeozfj9pkoik6wl/VisualisationToolVideo.mov?dl=o>

Instructions of use:

1. Download the demo from the link provided and extract the files to a location in your computer.
2. Run the application by double-clicking either the Mac .app or Windows .exe versions of the game.
3. Select any playing session from the list located on the right of the screen.
4. Change the time of the game by sliding through the timeline at the top of the screen, under the character stats graph. Alternatively, change the time position with RIGHT ARROW or LEFT ARROW.

APPENDIX C: DESIGN AND DEVELOPMENT DATA

C1. Selected design diary pages

Year 2012: https://www.dropbox.com/s/4cgn32vvuxr66u5/GTP_DesignDiary_2012.pdf?dl=o

Year 2013: https://www.dropbox.com/s/njdhmocb5pecqxy/GTP_DesignDiary_2013.pdf?dl=o

Year 2014-15: https://www.dropbox.com/s/gvcd4zypdttkxzl/GTP_DesignDiary_2014-15.pdf?dl=o

Year 2016-17: https://www.dropbox.com/s/6d5ohiiojjmrh2r/GTP_DesignDiary_2016-17.pdf?dl=o

Year 2018: https://www.dropbox.com/s/2jc5oyfhzvaeyro/GTP_DesignDiary_2018.pdf?dl=o

APPENDIX D: RESEARCH DOCUMENTS

D1. Project booklet



PhD research

Gaming the Past

Designing and Using Serious Games as
Historical Learning Contexts

Juan Hiriart
University of Salford
October 5th, 2016

j.f.v.hiriart@salford.ac.uk

Traditionally, the discipline of history has been conceptualised as the most plausible account of the past that is possible to construct from the available evidence that has come to the present. This approach has been challenged during the last decades, and its epistemological, ideological, methodological and practical inherent problems exposed for academic debate (Jenkins, 2012). In this new context both historians and history educators have been pushed to review the ways in which history has been traditionally taught in formal and informal settings. Although still a matter of debate, the teaching of history as a linear and chronological narrative has been contested by new paradigms that seek to promote more complex forms of thinking about the past. This shift can be welcomed, as multiple research evidence has demonstrated the inefficiency of long-established methodologies to overcome student's naive structures of historical understanding developed during the early childhood (Gardner, 2011). In accordance to these findings, several authors have stressed the need for historians to consider alternative learning methodologies and the possibilities that new technologies bring for the teaching practice (Wineburg, 2000; Ferguson, 2006; Kee et al. 2009; Cohen and

Rosenzweig, 2006). It can be argued, however, that this effort is worthless without understanding the properties of new media and the ways in which their structures of meaning affect the representation and understanding of the past.

In the new digital landscape, video-games have been regarded by several authors as a promissory medium for historical learning and understanding. During the last decades advances in computer processing speed and rendering power have raised spectacularly the capacity of digital mediums to generate highly realistic environments along with new forms of interaction with virtual agents and artefacts. Although promising, the application of these technologies have also raised many questions that request attention. In particular, the educational and representational impact of using immersive or semi-immersive technologies to convey the complexities of history is not yet well understood. Several authors have expressed concerns about using these technologies without a clear understanding of their educational effects. While commercial titles have been strongly criticised for being ahistorical or for privileging a too narrow version of history, not clear design guidelines have been yet developed to orient the development of new games with educational purposes.



The present research seeks to make a contribution to this debate studying video games as media forms both for the representation and teaching of history. The position that this study adopts resides in the intersection between the fields of serious games - the application, development and research of games with goals beyond pure entertainment - and digital history, which has been broadly defined as the research and dissemination of the past using electronically reproduced sources (Levesque, 2006). The convergence of this two fields result in an area that still has not received much attention from the

academic world, in spite of the considerable amount of research dedicated to study the links between games and learning. By bringing these two fields together, this research project pretends to make a substantial contribution to history education, helping designers and teachers alike to design better history games and to effectively integrate them into the school curricula.

Project aims

- **To explore the suitability of games as a media form for the representation of historical knowledge**
- **To make a contribution to the comprehension of the roles digital games can play in fostering the meaningful understanding of history in both formal and informal learning contexts.**

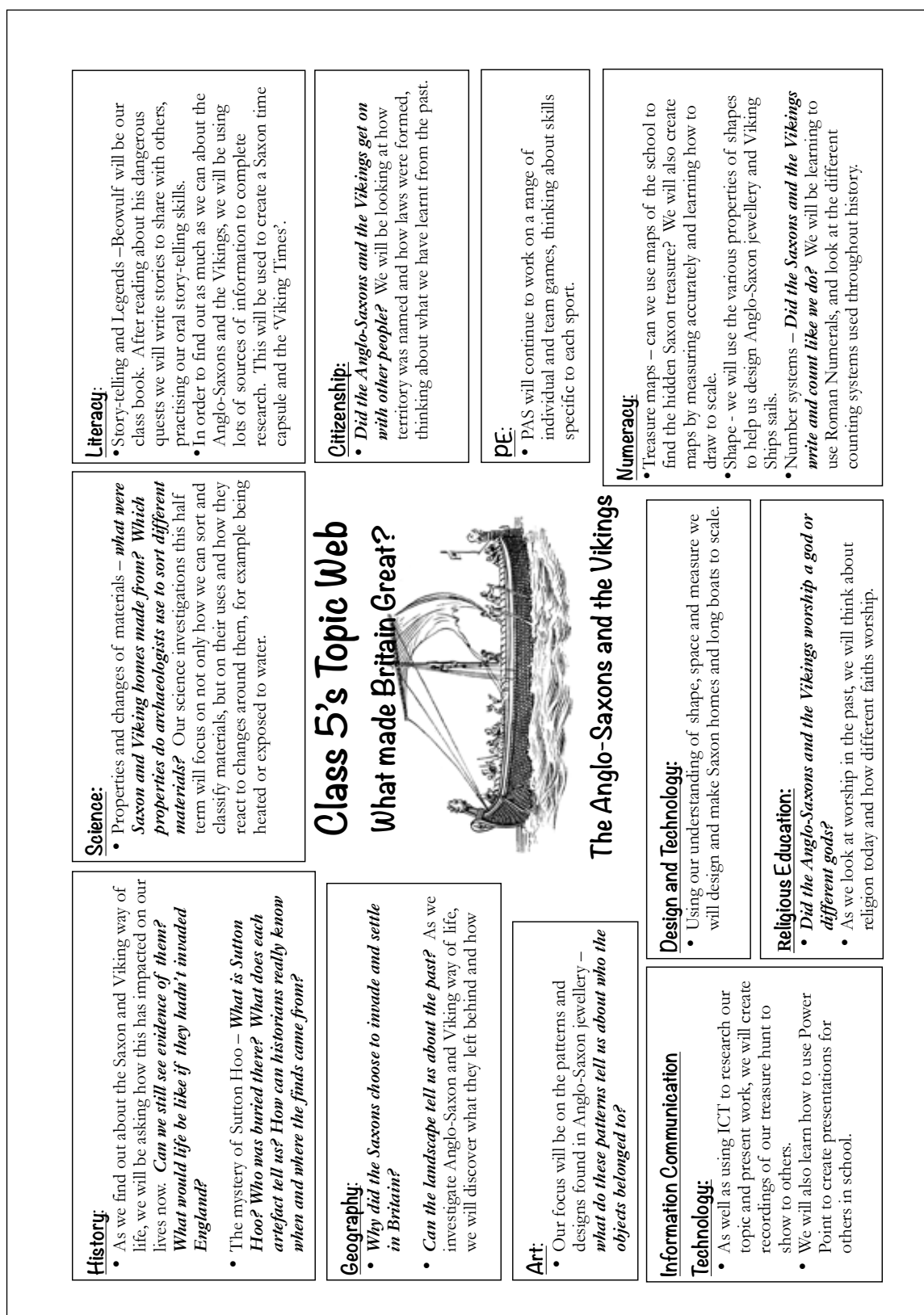
Ethical aspects

This study took as a reference the Ethical Guidelines for Ethical Research of the British Association of Educational Research. In accordance to this body of regulations, I will explicitly ask participants if they prefer to participate as anonymous subjects. If this is the case all information leading to their identification will be removed from the records, and replaced with pseudonyms and alternative personal data.

In any case this research will comply with all the legal requirements in regard to storage and use of personal data as set down by the Data Protection Act (1998). Raw data will be stored in an external mass storage unit protected by password. All data from game playing sessions (stored temporally in the computer's HD used to play the game) will be backed up and removed from the computer used in the session once is finished.

This research will also comply with the articles 3 and 12 of the United Nations Convention on the Rights of the Child, and considers to ask for informed consent to parents or guardians of the child before the start of the project, and to ensure the compliance with all legal requirements in relation to working with school children in the UK.

D2. Class 5 topic web



D3. Participant consent form (version 1)

version 2 (05.10.2016)

Participant Identification Number:

CONSENT FORM

Gaming the Past: Designing and Using Serious Games as Historical Learning Contexts

Name of the researcher: Juan Hiriart

1. I confirm that I have read and understand the information sheet dated October 5th, 2016 for the above study. I have had the opportunity to consider the information and ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
3. I understand that the information given by me may be used in future reports, articles or presentations by the research team. ☐
4. I request all my personal data, including name, to be anonymised. I do not want my name to appear in any report, article, presentation, or any other academic research output. ☐
5. In case that I did not ask for my personal data to be anonymised, I understand that my name will appear in reports, articles, presentations, and other academic research outputs. ☐
6. I understand that all data will be stored securely and is covered by the Data Protection Act 1998 (DPA). ☐

Name of participant

Date

Signature

When completed, please return in the envelope provided. One copy will be given to the participant and the original to be kept in the file of the research team at the University of Salford

D4. Expert reviewer consent form (version 2)

University of
Salford
MANCHESTER

**Designing and Using Digital Games as Historical Learning
Contexts for Primary School Classrooms**

Researcher: Juan Hiriart

Many thanks for attending to this presentation and demonstration of the Anglo-Saxon historical game prototype. With your consent, I would like to use your feedback and comments for my research. Please take your time to read the following information and mark the relevant box.

1. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
2. I understand that the information given may be used in future reports, articles, and other academic outputs by the researcher. ☐
3. I understand that the information provided will be stored securely, following the guidelines specified in the data protection act. ☐
4. I would like my feedback and comments to remain anonymous ☐
5. I would like to receive a copy of the game prototype once is finished ☐

Name: _____ Email: _____

Signature: _____ Date: _____

D5. School contact email

Mail – J.F.V.Hiriart@salford.ac.uk

Anglo-Saxon game - PhD project

Hiriart Juan Francisco Vera

Fri 22/07/2016 15:08

Sent Items

To: j.f.v.hiriart@salford.ac.uk - j.f.v.hiriart@salford.ac.uk

Dear Miss Bayliss,

I hope you are well. I am writing to explore with you the possibility to integrate the Anglo-Saxon historical learning game that I have been developing in the next year 5 semester term. I knew from Julieta that next semester the Anglo-Saxon period would be set as the main topic, so this seems like an excellent moment to bring the game to the school. As we discussed some time ago, this game forms part of my PhD research at the University of Salford, which in general terms is set to explore the impact that digital technology, and in particular video games, have in the representation and understanding of historical knowledge.

In a nutshell, the game is designed to engage students and develop their historical thinking skills and is constructed to articulate layers of representation, simulation, narrative and game-play around the chosen historical period. At its current version, students can assume the role of an Anglo-Saxon character, explore representative buildings, interact with a range of other historical characters, and manipulate objects and tools of cultural significance.

My intention in bringing this game to the year 5 is to test and validate the design hypothesis involved in its design and explore the ways in which it could be used in the context of a primary school classroom. To do so, I would like to discuss with you different ideas to insert this learning material into the existing curriculum (I have been looking at the information provided in the school's website about the topic).

I am aware that working with children is especially sensitive, and I also would like to talk with you about the necessary measures to ensure that this project does not disrupt the learning environment of the school. This research project has undergone a very strict process of ethical approval at the University, and I have developed a set of material to explain and ask for the necessary permissions from the children, parents, and the school.

Looking forward to hear your comments,

Best wishes,

Juan

Juan Hiriart

Lecturer in Computer and Video Games | School of Art and Design

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t: +44 (0) 161 295 4879

j.f.v.hiriart@salford.ac.uk | www.salford.ac.uk/art-design

D6. School parent consent letter

[SCHOOL NAME]

[SCHOOL LOGO]

Dear Families

As part of a PhD research project, one of our parents, Juan Hiriart, will be working with Year 5 over a number of sessions. The aim of these sessions is to explore the use of an Anglo-Saxon themed computer game, and its impact on children's understanding of this historical period. This subject is part of the Key Stage 2 Curriculum and therefore these sessions will form part of the children's history lessons over the next term.

They will include:

- opportunities for the children to draw and write what they know about Anglo-Saxon times
- sessions to play the game – imagining life as an Anglo-Saxon
- recorded discussions to assess the children's understanding of the game and its content

None of the children's work will have any personal information attached to it (including names) and recording will be transcribed into written format.

If you have any further questions, or would like to withdraw your child from these sessions, please speak to myself or Mrs Downing.

Many thanks

Miss Bayliss

APPENDIX E: PRIMARY TEACHER INTERVIEWS

E1. Preliminary interview plan

General information

Name interviewee: Miss Sarah Bayliss	Researcher: Juan Hiriart
Institution: [SCHOOL NAME]	Date: 6 October 2016
Position: Teacher Year 5	

Introduction to the interviewer

Hi, my name is Juan. Many thanks for helping us with this project. The purpose of this interview is to know more about the way in which history is included in the curriculum, the challenges of teaching history to primary students, and the potential problems that we should take into account when integrating game based learning methodologies at this level. This information will be used to make adjustments to the game prototype we are producing as part of the research, as well as the methodologies we are planning for its inclusion in school classrooms. This interview is planned to take between 30 - 60 minutes.

Interview plan

TOPIC	MAIN QUESTION	ADDITIONAL QUESTIONS	CLARYFING QUESTIONS
History curriculum. Perception of history from the teacher / school. Integration with other topics. Things that work and things that do not.	Which are the main problems that you face teaching history in this school?	<ul style="list-style-type: none"> - Which specific methodologies work best on your experience? - Can you recall any specific method or activity that didn't work? 	<ul style="list-style-type: none"> - Why that did / didn't worked? - What change could have improved that method?
Historical game based learning	Have you used games as part of the methodologies you use to teach history? (i.e. role-play games, board games, etc.)	<ul style="list-style-type: none"> - Do you see any advantage on using games as part of the curriculum? - Which are the main problems of using games in a history classroom? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?
Historical significance.	Do you think that students care about the topic at all?	<ul style="list-style-type: none"> - Do students perceive history as significative / important for their life? - Which are the aspects in which students are more difficult to motivate? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?

Evidence	Are students able to use primary sources to develop a sound historical argument?	<ul style="list-style-type: none"> - Which method or activity works best in driving students to build historical arguments? - Which are the main problems that students face attempting to construct historical arguments? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?
Continuity and change	How difficult is to drive students to understand the opposition between continuity and change when dealing with a historical period?	<ul style="list-style-type: none"> - Which method or activity have proved to be effective on driving students to reflect or understand historical change? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?
Cause and consequence	Do students develop an understanding of causality in history?	<ul style="list-style-type: none"> - Which method or activity have proved to be effective on driving students to realise causal connections in history? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?
Historical perspectives	Do students realise the differences between the past and present time?	<ul style="list-style-type: none"> - Which media (films, books) exposition do you think has a greater impact in their historical conceptions? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?
Moral dimensions	How do you deal with moral aspects in your history classes? (i.e. slavery, religion, etc.)	<ul style="list-style-type: none"> - Which morale aspects are generally the most difficult to deal with? - Do you think that some sensitive topics should be excluded from the game? 	<ul style="list-style-type: none"> - Can you give me any specific examples? - Can you expand on this?

E2. Preliminary interview transcript (6 October 2016)

Researcher: A very open question. What are the main problems that you have teaching history in the school?

Primary School Teacher: Sometimes time can be a restriction to go into the depth that if your'e interested in history you would like to go to because obviously math and literacy, reading skills, those core skills take such a large chunk of time, that history and all the other foundation subjects... geography, art all those extra can be tricky, but as a school we do as much as possible cross-curriculum. As much as literacy, as much as history as we can to get all the subjects in, so lots of my writing this term is based on Anglo-Saxon mythology and all that kind of side of things so trying to as much as you can through all the subjects, so do you know that you sorted. So time is a big factor.

Researcher: I noticed that [the history curriculum] is quite integrated across subjects. Is that challenging for you?

Primary School Teacher: Certain topics, I think, and the more experience you are obviously as a teacher the more you begin to spot the links that really work. I think sometimes you feel you're making very tenuous links between subjects just to trying forcing them into your curriculum. Math, so to speak, but the longer you do it the more you know what works, don't you...

Researcher: Generally, which specific [teaching and learning] methodology you think works best?

Primary School Teacher: For me, I prefer to approach history in an enquiry kind of side, so, I prefer to present them with a picture or objects, or something before telling them what they are so is all working out trying to pierce together evidence... or if I was approaching through writing, going from the story and then asking questions about the story. Is that a true reflection of the history, so yeah, I suppose enquiry, asking questions and then them being the researchers themselves to find out.

Researcher: Taking some source material, and the working out from...

Primary School Teacher: Yes, rather than the approach of this is how the Anglo-Saxons were or this is how the victorians lived... Ok, let's write about it, kind of...

Researcher: A more constructivist approach?

Primary School Teacher: Yes, and then, some of the groups will try to find a trip if there is something locally at the start of the term and then from that it will be all the questions that arise about that time period or that place.

Researcher: How do you use games as part of this?

Primary School Teacher: Not directly. If they got free choice or they have a bit of spare time they might independently go in the computers and find stuff but nothing that is directly taught as a kind of historical game.

Researcher: So this is the first one?

Primary School Teacher: This is it. You are the first [Laugh] Yes, because there's nothing... nothing that has been shown or seen that is educational enough. You get a lot of "proper games" that maybe look like a historical [...], but in terms of the learning that we get from it, I don't think I have ever seen anything in an educational setting.

Researcher: Do you see any advantage in using games?

Primary School Teacher: Definitely. I think the more children are so technological aware, aren't they? And so, there is so much out there that impresses them, and it's new, that just showing them photographs or just showing them the kind of old Youtube clips isn't impressive anymore, so the more we need to keep up with technology to keep them [interested].

Researcher: And in terms of specific problems that you can think of about using these technologies inside a classroom?

Primary School Teacher: I suppose, just the idea of this technology then fails or things being charged and not having enough resources. Because as much as you plan to use the iPads and an update is going on and everything is very slow and things like that. But, that the same with any kind of technology, isn't it? Always have a backup. That would be my only worry about using it...

Researcher: Do you think that students care about the history topic?

Primary School Teacher: I think they do, but not to the extent where they can apply it completely to current life. So making those links between things that they find interesting to learn about, and they find interesting to think: how would be my life if I would live there? but then they not necessarily look around and think: we do that now because of those things. That might depend on the topic itself because when we did the ancient greeks, you were left with: we wouldn't do this if it wasn't for that, but I don't think they necessarily make the connections between those events in history and how they have impacted on them today. But maybe that is a quite higher level of skill... I don't know, some of the children probably begin to...

Researcher: In terms of motivation, what do you think are the aspects that contribute more?

Primary School Teacher: I think, they are generally quite motivated to learn, if they think is exciting, isn't it? Something like the Anglo-saxons is fun because there are battles and weaponry and it looks interesting when you show them the pictures they find that interesting but when you then want to teach them about home life in the past... and they think, campfire isn't that interesting to think about... they just want certain bits of the history that for them is exciting and I think that this is because of media seen by the children: films and television. The simple stuff is not as impressive as once was...

Primary School Teacher: I think they got something new every few weeks, haven't they now, children... I suppose not they know more because they are exposed to so much. Whereas, not long ago when I was young there was no internet in-house so you just knew what the school taught you, was your WOW factor. Whereas these guys are, you know I have seen this on something else so you have to have a way to approaching everything that would hook them... that's get harder and harder

Researcher: You mentioned that campfires aren't so interesting?

Primary School Teacher: Well, now we are doing forest school so hopefully any campfire outside will give you that way to teach as we are doing it, but, equally, I think... Ok, great, but... that's it... kind of... I don't know, some kids are easier to impress than others.

Researcher: That's interesting because you are targeting what is meaningful for them, so if they have the experience of being in campfires, then...

Primary School Teacher: Yes, so they kind of feel they are living like the Anglo-Saxons did at that time. I think, that might be the constraints with history as well as time is... making it happen in the classroom, because, we are lucky to have a lovely outdoor space and do things like that, but it's not always [possible]. You don't have the number of adults with you to get outside and do those [things], so you can't. So it's making it happen in the classroom, a lot of the time, so...

Researcher: Do you work with students so they use primary sources to develop historical arguments?

Primary School Teacher: In terms of having artefacts in front of them and things like that?

Researcher: In terms of getting knowledge from evidence.

Primary School Teacher: Yes, we always have a range of sources, and we try to encourage them to question how useful it is so if its a written account, always thinking of who, where it came from. If it was a picture, trying to question and then build their own idea of that time of history before going into directly talking.

Researcher: And which approach you think works better in terms of bringing their own ideas and arguments?

Primary School Teacher: I do a lot of this talk based learning, that kind of thing... methodology, you mean? The children themselves questioning each other and trying to answer the questions as they were characters in there. If it is images, we often try to do a role play with images, saying what you might be, thinking you are that person now, would you be cold? You get a little bit further eventually, but...

Researcher: Do you try to engage them in social activities?

Primary School Teacher: Yes, lots of talking when it comes to look at evidence and what can it tell us, and now we have done the Sutton-Hoo mystery, and we kind of acted out who was digging got this, and you put out of the ground, what you think this could be, why... then drawing other things, do you think it is metal, you get into science, could have disintegrated, rusted, things like that, but again, part of you wants to get outside and have it there, dug up... but unfortunately... not quite got the space.

Researcher: How difficult is for students to perceive this opposition between continuity and change?

Primary School Teacher: I would say some begin to develop that, but I do think one of the hardest things to grasp at this stage in history is time span and a real concept which I think is quite hard, well for adults as well to really actually imagine that this was how long ago or... I think is hard to grasp for them... yeah, the idea of, this was once, how it was... they can't actually envisage this... they learnt about, and think, yes In the Anglo-Saxon time this is what is like... in ancient Egypt this is what it was like... but then to actually say how that kind of continued and how that changed slowly over time and put it within a sequence of other events, I think they find...

Researcher: It's a high level thinking?

Primary School Teacher: Yes, some of them begin to, I would say. Some of them are already thinking: That makes sense, because last year when we did the Romans, this happens, so... and they are beginning to make these connections, which now we teach... this first half term we all do chronology of British history, so all now goes in kind of order so as they cover through the years they should be able to look back and make those connections, but I think this is a quite high level reasoning, and at this stage is too much to ask from them to remember all they did.

Researcher: And in terms of cause and consequence, do you teach that as part of history?

Primary School Teacher: Yes, largely so we look into the religion in Anglo-Saxon time and how, you know, things that happen in the Roman empire that changed religious beliefs in England hugely and then... now we have these religions in Britain because of that, but, I do think again that is quite... you get through with some of them, some of them just think: they were pagan, they became Christian, I've learnt that fact, Thank you [Laugh] I don't really get why, I don't really got what went through the Roman empire either, but I know

that that was what happened during that time, whereas some of them will begin to really think: why did some people wanted to change, and that the stuff that we are trying to get out of them, but again is a higher order thinking: the real why and the reasoning to it.

Researcher: Does it get to a point in which they start thinking the past was actually a different place with people different from us?

Primary School Teacher: I don't think I got to find a way to really get them to think these were people, humans just like you but, the way they responded to things was not because they were built differently but because of the environment they were in, which is... whereas they think: Oh, they were boring because they just didn't come up with this things, they didn't do this, rather that, that's their life because of the environment they had, and the technology they had. I think they think: well, if I was in that I feel this, so they must have felt that... whereas if they didn't had an iPad, they would have been bored... I think actually putting themselves in the shoes of them is really tough... yes, really tough, and tough to feel, like we have a genuine way apart from drama maybe and a bit of role play, but even then...

Researcher: Have you done role play?

Primary School Teacher: Yes, we do little bits of that, especially through... when you have a topic where you have a good story. Like doing Beowulf, at the moment, they love that side of it, but even so the amount of things that they say or want to bring into... the drama or mini scripts if they are writing their own kind of sequence that is historically inaccurate, not because they don't know it, they didn't have those things back at that time, just because their so... their will is there, isn't... so to take themselves out of that, they find really tough... so yes, they need a lot of practice to really take themselves into a different time.

Researcher: How do you deal with difficult subjects like slavery, or religion?

Primary School Teacher: Certainly religion wise we always talk about... you know, look into all religions and talk about... everyone, it's a choice, isn't it... obviously, when, you then, and children do ask questions now about terrorism and they begin to make links between that... I try personally to talk about as many events in history where there's always been groups of people that for many reasons have felt isolated and therefore reacted, but that have always happened, not this time in history that has always been... because I think they think, now and here is the only time has being anything, because is what they feel... things like slavery, again, I think is that acknowledging that there was a time when people didn't know as much about the world, they didn't know much about the role that the least played in life, so... yes, it's really hard but often at this age the children themselves come out with things that make you go, oh, that's the way to explain it! You know, they come out with things like, well, they didn't know back, then that this was this, they just believe a story and therefore though it was right to do that, whereas now we know better. That is often what kids say: Oh!, now we know better, now we know that is wrong. They do judge those behaviours as wrong but... so you as a teacher find yourself doing is actually saying: well they were responding again to what maybe they had at the time or what they believe at the time, and although we know that's wrong now, you can't necessarily say they were terrible people, because... it's like, when they found hilarious that Saxons came here to push everyone out of the village, and [they] said: now we want your land, Off you go! That kind of thing... and they found that funny, and I said: they didn't had the land they needed, they wanted more land... that was their way to get it; now we have democracy, we have rights and we have borders, and all these kind of things... Now you don't suppose to invade other countries... Now we haven't taught yet, but then we talk about the British empire, and that's when things get tricky, because of [the] British values... You're thinking, we went on invading lots... the world, lot more than the Saxons... You do find yourself, and then you think: I'm with ten years old, and I'm getting into a real kind of... there are times in which I have to say: look, at your age guys, this is how I would try to understand it, and try to reason with it,

because otherwise you can end up trying to get too far into the rights and wrongs of moral behaviour, of which they are not in age to comprehend... so sometimes... I would never say, I would never lie to them, but I would try to give them a maybe stripped version of why something happened so they can at least process it... It is hard, when something happen in the news, they come and ask you, and you find yourself trying to get them the most balanced view without giving your own opinion.

Researcher: So you are always careful on [showing] your own position?

Primary School Teacher: Yes, I always try to get the “on defence” position. I suppose, some people believed this because of this, some people would believe this, but, it is how we deal with this... Things like the UE referendum, where parents were saying quite openly, and the kids were saying: mum has done this! And I’m going hmm... I have no opinion, or I was very much like: well, I wouldn’t say I believe this but I’m a different age maybe to your parents, or I have experienced my growing up maybe differently... that’s all, that’s maybe the way that we brought up, isn’t? So yes, I wouldn’t lie to them but I wouldn’t be completely open about my own opinion to something.

Researcher: That’s hard... And do you think that some sensitive topics should be excluded from the game?

Primary School Teacher: I think with most things there is a way to deal with them, because I do think kids are expose so much without our control anyways, that if anything sometimes I think is better that they might get exposed to something within the classroom, where they have their peers and they feel safe, and they often do feel a lot safer when they are with other children talking about something. And the teacher, whether they stay at home on their own, then they kind of think: Oh, I can, no one kind of seen this so it’s not ok to talk about it. So, I think to a certain extent they have to be exposed to things in school now before they see it in other contexts that might be... more damaging or more worrying for them, I think, is often the case.

Researcher: Do you think that they get exposed to many media messages and ideologies that have an impact on their historical understanding? Which one do you think is the most important one, films, or books or...

Primary School Teacher: Is hard to say, I think, I suppose in terms of books and films, we all have grown up with wildly historically inaccurate stories, haven’t we? But, I think the way that kids have technology now is that they believe on it more, whereas, I think, if I watched the hobbit as a child, I would knew it was completely make-believe and it was a story whereas I think, they used to see so much now that they believe is true, and they believe almost anything they read on the internet. A lot of them, which is a whole of an issue in itself, and they don’t question what they read. If is on the internet [then] is true. Telling them Wikipedia can be edited was like a shock to them. So, they feel, they think that what they see or what they read if is on there [on media] then is true.

Researcher: So you are not anymore the authoritative source of knowledge, you have competition now...

Primary School Teacher: Oh yes! [laugh] One of them said: When I looked that on Google, it said this! So, that’s quite an interesting aspect of this.

Researcher: So they Google facts to challenge you?

Primary School Teacher: Not directly to challenge me, but they will be thinking: when I looked in this website, it said this... which is Ok. I said: How do you know if that is true? Because is in a website? That’s a whole of an internet usage and safety issue in itself, but I think the same... If they see any film, if is not definitively make-believe then they think, yes... I talked about the vikings, they said: Yes, because in ‘How to train your dragon’, which is animated as well... well they didn’t have dragons... We’ve done pictures and a lot drawn

the horns and I said which of our books and what we have seen showed horns on the helmets, and they were like, Oh, none actually... so, I try to encourage them to question it, but...

Researcher: How important to you is to keep it accurate?

Primary School Teacher: I think it is important. I wouldn't go overboard with things like the horns on the helmets... I would mention it, but I think in itself that might... that shouldn't really change their understanding of how people used to live at that time. But I would like them to be historically accurate [when] thinking on maybe games that the children could have done... they were talking about: They would have this, because this looks really old, and you think: maybe they wouldn't have cooked in this way, or they wouldn't have known they could use leather and things in that way. They would have used it, but it wouldn't be nice and shiny, and, you know, things like that. In terms of clothing, they drew themselves with purple and pink stripes outfit on as a Saxon so we talked about dying things with natural colours and that kind of thing. I think that things like that, understanding that if they see a picture of the Saxon with beautiful armour and beautiful broaches, then that is a very special person. A posh person, one of the absolutely richest of the rich. So I think is the feeling of picking your battles and stuff like that. Thinking what is really worth for them to reflect on. Maybe also to compare themselves and say: actually, we are pretty lucky with what we have today, and we've come a long way. So yes, I think accuracy is important for them to value change, really.

E3. Wrapping-up interview transcript (2 December 2016)

Researcher: This is the last interview... I promise

Primary School Teacher: It's been really interesting

Researcher: It's more about wrapping-up certain things. Very open question, how do you think the activity went?

Primary School Teacher: I think it was fantastic, it was really valuable. from an assessment point of view for me what they put into it initially in your images, what they were talking about when they were playing the game because I think we both noticed that they started bringing some extra elements, whether they were true or not... these kind of story elements, and actually to see the reasoning between the children, like oh that is in the story, that's for real because you know you have to do that and then the wider conversations that came from it about slavery, family, and the decisions between letting children die versus feeding them... all of that was kind of far more than what I would expected, far more than just historical knowledge: problem solving, reasoning skills, and questioning skills; just fantastic.

Researcher: Do you think that this tool could be implemented in the curriculum?

Primary School Teacher: Yes

Researcher: Would you be interested on that?

Primary School Teacher: Yes!

Researcher: What kind of changes you would make?

Primary School Teacher: We always at the beginning of the topic have something we call an 'emerging day' where we let the children research in their own way with no guidance to get to grip with the topic, but I think this kind of game would get a real life way into it whereas often information [from] books always have the most exciting bits of history or the biggest things so, [for example,] in our class [all the children] thought that the saxons where all warriors... whereas [with this] game would have been what the real life side was and from there it would have come how they actually got here and then the invasion could come in...

Researcher: So would you use the game at the beginning?

Primary School Teacher: Yes, I think so, and then use it as you go along, going back to it so they then have more of the historical knowledge and enjoy the game in a different way, but I think early on would give a good grounding, and questions that would come from it would be [addressed] because you ask them, what you know about the Saxons? and they say: Ehhh, nothing. Where if they had half an hour playing [the game] the questions would be really precise.

Researcher: So would be to prompt spontaneous conversations, like for example the slavery conversation...

Primary School Teacher: Yes

Researcher: What kind of topics would be more useful to include... like dialogues or...

Primary School Teacher: That would be personal and British values, which is in the curriculum now. About slavery there are some historic elements but in terms of justice and equality which are all values that we teach at school it is a very nice and appropriate way to talk about what justice and equality means today, because children often don't have a reference point. They just live in this world and think: this is the way it always have been. So something like that gives them, not a real experience but, the most close experience of what

slavery meant. So, yes, it could come through a history lesson but it would also cover a lot of personal and social aspects of the curriculum as well.

Researcher: I noticed that many children just skipped the dialogues, perhaps because they don't like reading but there is one they all seemed to remembered; the one where the kid ask not to be sold...

Primary School Teacher: Yes

Researcher: They all remembered that one

Primary School Teacher: They did, didn't they? Yes, [it was] very personal to them. I suppose is a decision that they couldn't imagined their parents having to make, or wouldn't imagined their parents having to make, where the other decisions were more... a bit more boring, weren't they?

Researcher: So coming with topics that in some way contrast the way they understand the world ... do you do that normally?

Primary School Teacher: One of the big things that any historical topic is what life was like then compared to now, and how impacted on today, so any kind of discussion about different family roles, different lifestyles more so just well they didn't have X-Boxes because they weren't invented [yet], more about the actual values of families and how that have changed... yes, through a game and conversations is more interesting than just...

Researcher: What kind of values do you work?

Primary School Teacher: I suppose kind of work ethics, education and the right to education, the difference between boys and girls and their expectations of, certainly on Ancient Greece that comes quite quickly... you know, lots of girl babies were often sold or just left. So just telling them that is like: All right ok, but if they would be in a game as a young girl having to go through this kind of: Oh you've been sold because we don't need you, they would be a lot more emotionally invested, wouldn't they? Because they would be playing a character, whereas just research is kind of: Oh can separate it from my world. I thin the game makes them feel that attachment...

Researcher: Yes, but some children played the game in a completely different way but some kids, and especially the girls felt a lot more empathic...

Primary School Teacher: Yes, when we do history topics we try to do a lot of reflective writing, like, imagine you are a Saxon writing a diary with your day, and they find it very hard because becomes very factual: I did this, I did this, I did this, because they just read the books whereas something like this gives them the kind of journey of a day in their life rather than just hearing about it, so the kind of writing you get from this as well... I think the kind of problem solving and reasoning that they are doing without thinking about it, the process and logical kind of thinking... the kids that just said: I let them die so I could live longer probably, I wonder they are being more mathematical or scientific... because they are going through the factual side of things rather than the emotional side of things... is strategy rather than that

Researcher: Yes, they were playing the game rather than playing to be an Anglo-Saxon

Primary School Teacher: Yes

Researcher: And if you could mod the game, what kind of modding you would do?

Primary School Teacher: I think having some other characters walking around with them, and one of the girls mentioned about zooming in and zooming out a bit to get a wider perspective. And maybe making it easier to stay alive a little bit longer?

Researcher: Yes, it was a bit too extreme, really...

Primary School Teacher: Yes, but I think they needed that because each time... you know because in one hour, or the short time that we tested it, because they die very quickly, each time they came back with a different plan. They had to constantly re-adjust whereas in a different situation they would have played just once or twice, where as lots of them had two or three goes and got that bit better each time, so they were constantly shifting their strategy

Researcher: What if I could give you an interface where you could design the maps, that would be useful for you?

Primary School Teacher: Yes, if that is technically easy to do [laugh]

Researcher: Yes, I think that would be possible, or making your own conversations?

Primary School Teacher: Yes, I think that would be more valuable from a teaching point of view, because in that way you could develop characters that you could direct where the conversations would lead, they would lead on to something... yes you could really design the conversations to challenge existing beliefs and ideas

Researcher: Well yes, for me is kind of difficult to create conversations, where as for you would be like: yes I will put this conversations because it leads to the kind of topics I want to explore with them...

Primary School Teacher: Yes, yes.

Researcher: Any new narrative you can think of? Or any conversation you can think of?

Primary School Teacher: Maybe about the different roles of people and the physical skills that people had to have, because they had to take stuff out of the ground and stones and things like that, so would be about exploring how they made their clothes, the real kind of skills people had, that is something they find really hard. When everything is mass produced now they find really hard to imagine that to get a new piece of clothing someone had to make it, and would take a long time obviously, so maybe something that let them explore that a bit more or them as characters being the ones doing the work...

APPENDIX F: PRE-PLAYTEST DATA

F1. Drawings and interviews



Researcher: What's your name?

Participant 1: [Child Name]

Researcher: No, but your cool name, your Anglo saxon name?

Participant 1: [Not audible]

Researcher: So what was your question? You asked something about the fences?

Participant 1: Yes, I don't know how to draw them... you can do it like that, when...you can't do it like that

Researcher: I think, just do it the way you imagine

Participant 1: Ok

Researcher: Thank you

Researcher: What is that?

Participant 1: My [...] house... for the warriors to fit

Researcher: You want to do a house, with warriors Mmm

Participant 1: Ok

Researcher: That's brilliant. Do you think warriors were important?

Participant 1: Yes, they had to fight, to win... to get the country... they wanted England, but the romans had it

Researcher: The Romans? How was that?

Participant 1: They had to fight the Romans to get the country

Researcher: How do you know that?

Participant 1: we learnt about it

Researcher: It's a beautiful knowledge



Researcher: So what's your cool name, your AngloSaxon name?

Participant 2: [Child Name]

Participant 2: I put some crops going the back

Researcher: Crops?

Participant 2: Yes, crops, because they had wheat

Researcher: So, warriors and crops... and a house



Researcher: Wow, what is this?

Participant 3: This is a saxon hut

Researcher: Looks fantastic, this is your name?

Participant 3: [Child Name]

Researcher: Tell me a little bit about it. What is this?

Participant 3: This is a fire

Researcher: Why do you have a fire in there?

Participant 3: Ehhh... Mmmm, I'm not really sure. They did have these fires in those days

Researcher: They have campfires?

Participant 3: Yes

Researcher: Why they use that; they used that for something, probably? Maybe cooking?

Participant 3: Yeah

Researcher: And it's outside the house...

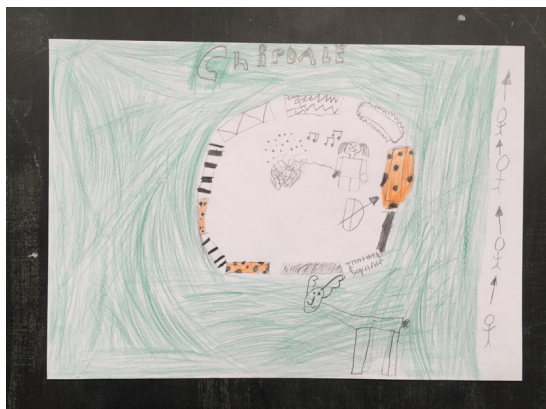
Participant 3: Some can be outside, and some can be inside

Researcher: That's cool. Why do you think they needed them outside?

Participant 3: Mmm... I think the outside ones were more for... you know, like singing songs and getting together

Researcher: Excellent, yes, I think that's important, and maybe inside for?

Participant 3: Cooking things



Researcher: What's your name?

Participant 4: [Child name]

Researcher: No, your Anglo Saxon name...

Participant 4: Chipindale!

Researcher: Is that an Anglo-Saxon name?

Participant 4: Yes

Researcher: Is that a fire?

Researcher: Why you have a circle?

Researcher: That's from above, isn't it?

Participant 4: Yeah..

Participant 4: Is one of those that [...] plains and stuff

Researcher: Right, ok. It's super cool. I like it

Researcher: This is looking super good!

Participant 4: That's where you grow crops. Right so chipdale. She is singing around the campfire

Researcher: Singing around the campfire? Do you think in AS they sang a lot?

Participant 4: Yeah

Researcher: Why is that?

Participant 4: mmm.. It's like a habit thing

Researcher: A habit?

Participant 4: Yeah, probably. When they like... sing... they are at the campfire and start to sing

Researcher: How do you know all this?

Participant 4: From the research that we've been into, and the lessons about AS and the books

Researcher: So mostly books and research on the internet

Participant 4: Yes

Researcher: And tell me something, do you think it was cool to live in the Anglo-Saxon time?

Participant 4: Not really

Researcher: Why not?

Participant 4: because, they used to fight a lot

Researcher: and that was dangerous?

Participant 4: yeah... people got hurt a lot

Researcher: right. this is brilliant

Researcher: Chipdale is your name. You have a deer

Participant 4: Yeah, but is a giraffe deer, because is not good enough [Not audible]

Researcher: Deers were important at that time? Do you think we should have deers in the game?

Participant 4: Yeah!

Researcher: For hunting

Participant 4: Yeah



Researcher: Hello

Participant 5: Hello

Researcher: So your Anglo saxon name is?

Participant 5: Ren

Researcher: That's a cool name

Researcher: So what are you drawing there?

Participant 5: I don't know... a bonfire

Researcher: A bonfire, so you think bonfires were important for the Anglo saxons

Participant 5: Yeah

Researcher: Why do you think it was important?

Participant 5: [Not audible]

Researcher: So no TV at that time

Participant 5: Yeah

Researcher: That makes perfect sense. So no TV

Participant 5: No TV

Researcher: No TV, bonfire

Participant 5: bonfire TV

Researcher: And what they do with the bonfire?

Participant 5: Marshmallows

Researcher: Did they have marshmallows in Anglo saxon time?

Participant 5: [Not audible]

Researcher: Maybe stories?

Participant 5: Yes, they definitively had stories

Researcher: Have you been in a bonfire?

Participant 5: Yeah

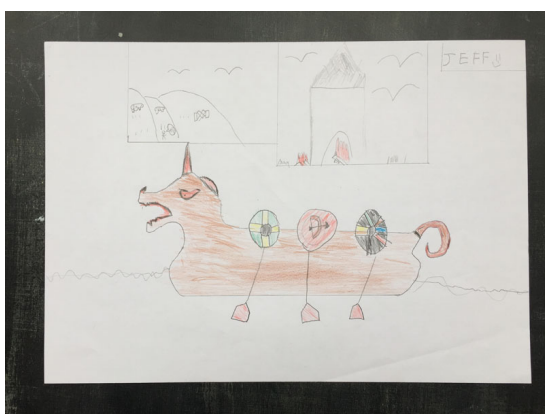
Researcher: Do you think is cool?

Participant 5: Yeah

Researcher: So marshmallows in the bonfire

Participant 5: and chesnuds

Researcher: Well that seems more likely



Researcher: Let's see this. Oh this is amazing, this is a very difficult drawing

Researcher: What's your AS name?

Participant 6: Comet

Researcher: Beautiful, what is this?

Participant 6: It's a Saxon longship

Researcher: Do you think longships were important?

Participant 6: Yes, they were made for the travel

Researcher: Yes. It was difficult to travel in roads... what is this?

Participant 6: The shields

Researcher: Ok, they put the shields like that

Researcher: Where have you seen this before

Participant 6: I have seen them online but never...

Researcher: On the internet?

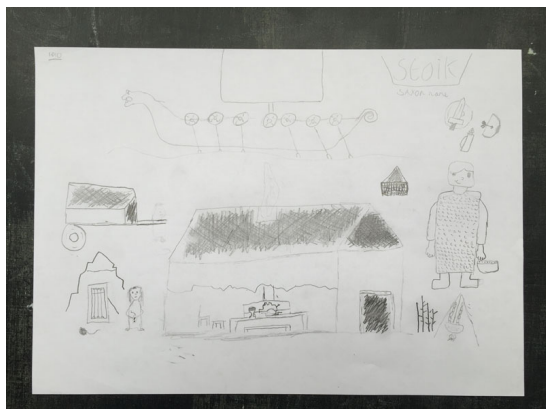
Participant 6: Yeah

Researcher: What about movies? have you seen movies about the Anglo-Saxons?

Participant 6: Errr.... No

Researcher: Vikings maybe?

Participant 6: Errrr... not sure... I've seen something about the vikings, but...



Researcher: Hello, what's your Anglo-Saxon name?

Participant 7: I don't know

Researcher: What do you have in here?

Participant 7: A house and me

Researcher: You are there. And what are you doing?

Participant 7: Carrying buckets

Researcher: What are you carrying in your buckets?

Participant 7: Crops

Researcher: Crops. Do you think crops were important?

Participant 7: Ahhh... yeah

Researcher: Yes? Why?

Participant 7: Because you needed to eat

Researcher: You needed to eat. Of course

Researcher: And the house. What kind of house is that one?

Participant 7: Ahh, I think is a round house

Researcher: A round house? Did they have round houses at that time?

Participant 7: Similar to that

Researcher: And this? What is this?

Participant 7: A room



Researcher: Hi [Child name]. What are you doing here?

Participant 8: Ehhh... I'm thinking might... I was thinking curtains were quite important for the saxons. That's why he put them rights there...

...and they are clearing the woods

Researcher: Ah, they are clearing the woods

Participant 8: There's a clearing in the wood and that is the wood

Researcher: Beautiful. And they are hunting. Why they are hunting?

Participant 8: Because hunting was quite important. They needed to survive

Researcher: Ok, brilliant. And those are the houses...

Participant 8: Yeah. I'm going to draw a long house

Researcher: Long houses. What happened in the longhouses?

Participant 8: Cooking, and doing stuff



Researcher: This is very good. What are we doing here?

Participant 9: Im making leather stuff. So leather boots for the people who going walk

Researcher: So you have an occupation here. You are working with leather. What kind of house is that?

Participant 9: Ahh, I don't know how it is called...

Researcher: why leather?

Participant 9: Emmm... because it comes from cows that I have inmy house

Researcher: was an important occupation in Anglo-Saxon time?

Participant 9: yes, I think was quite important because I don't want people in the army to go in barefoot

Researcher: What other kind of things you think that had to make?

Participant 9: Ahh, helmets

Researcher: They use leather in helmets as well?

Participant 9: Ehm, loads maybe? The handle of the shields, and the handle of the swords, so you can hold them properly. Grip it

Researcher: That's super cool. Thank you



Researcher: What's your super Anglo-Saxon name?

Participant 10: Ren

Researcher: Yeah like the bird [...] they have all different names. And what is this? Ah so this is a hilly environment

Participant 10: Yeah

Researcher: What are you doing in the house?

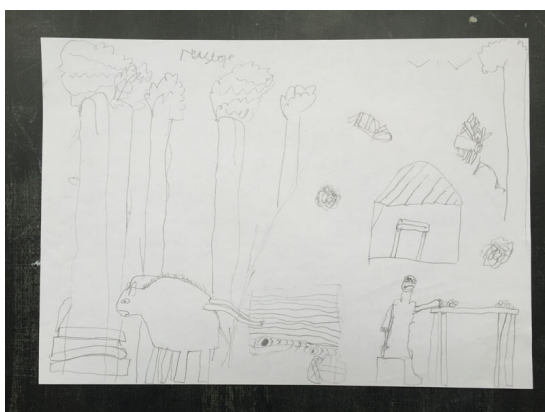
Participant 10: ehh... [Not audible] not too sure

Researcher: You haven't decided

Participant 10: I just like to [shave] it

Researcher: Are you planning to do something in the woods

Participant 10: [Not audible] Flowers



Researcher: Hello. This is a great drawing. Whats your Anglo-Saxon name?. What are you drawing there?

Participant 11: A donkey pulling a cart

Researcher: Do you think that was important in Anglo-Saxon time?

Participant 11: Really, probably to carry on stuff

Researcher: Of course, they didn't have cars so they needs carts to pull stuff between here and there...



Researcher: Oh, this is looking super good! What's your Anglo-Saxon name?

Participant 12: I don't really know...

Researcher: Can we put a number here. Maybe number one?

Participant 12: yeah

Researcher: brilliant. So... What are we drawing here? What is this about?

Participant 12: It's a... a house from the Anglo-Saxons

Researcher: All right, how was the house? Rounded like this?

Participant 12: Ehmm... yeah

Researcher: What else? What is this?

Participant 12: Trees

Researcher: Trees? You have lots of trees. Why are you drawing trees?

Participant 12: Because, I don't know now, it was sort of an idea...

Researcher: Do you think that in Anglo-Saxon time there were lots of trees?

Participant 12: I think there were a lot of trees

Researcher: More trees than now?

Participant 12: Maybe..

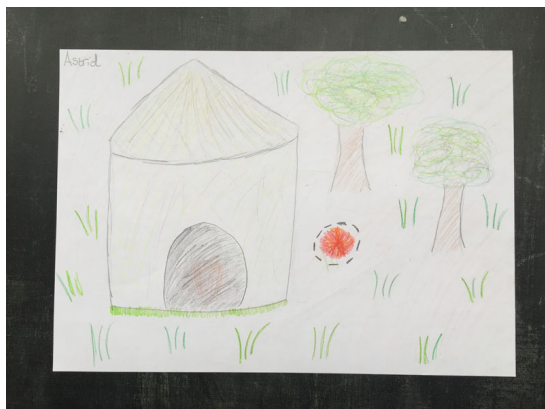
Researcher: What else are you going to draw?

Participant 12: I'm going to draw... ehh

Researcher: Your not sure?

Participant 12: No

Researcher: That doesn't matter. Carry on. It's a good drawing



Researcher: What are you doing there?

Participant 13: It's a hut

Researcher: What's your Anglo-Saxon name

Participant 13: Astrid

Researcher: Can we put the Astrid name somewhere so we know this is your drawing. [Not audible] That sounds very anglosaxony... Can you tell me something about it?

Participant 13: Eh, well, they made it out of hay and [NA]

Researcher: Right, how do you know that?

Participant 13: We've been learning about Anglo-Saxons, and doing research

Researcher: So you do research, so you know how the houses were.

Participant 13: Yeah

Researcher: Cool, and the houses were like this?

Participant 13: Yeah

Researcher: And what is there?

Participant 13: These trees... I just put them in there, and because... they have lot of trees

Researcher: Do you think there were more trees than now?

Participant 13: Yeah

Researcher: [...] because not as many people cut down as many trees as today

Participant 13: Yeah

Researcher: so there were more trees probably. How they build their houses?

Participant 13: they actually spotted people who know how to go... [Not audible]

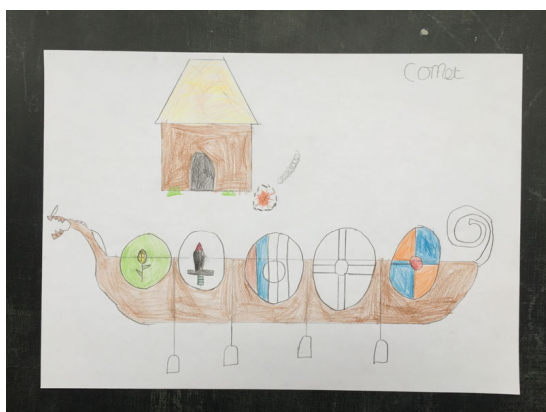
Researcher: Would you be working there, in the house?

Participant 13: Ehmm... I don't think so... we just have the people who build the house and know how to do it

Researcher: brilliant, are you drawing something else?

Participant 13: I don't know what else to put in

Researcher: Its a beautiful drawing, great



Researcher: Well, this has moved on. I can see a lot more stuff going on there. So you finished the sheep. This is Comet?

Participant 14: Yeah

Researcher: So you finished the sheep. And what is that?

Participant 14: That's a campfire

Researcher: Do you think the campfires were important at that time?

Participant 14: Yes, they would meet to tell stories

Researcher: How do you know that?

Participant 14: Because they didn't have... really write things down so is just on through wood... sometimes they meet on campfires to sing stories and tell stories

Researcher: Brilliant. How do you know all this?

Participant 14: well, I researched on the internet and I found some stuff in a book

Researcher: In a book? So campfires were important. Do you think we should have campfires in the game?

Participant 14: Mmm... I don't really know

Researcher: So the only source of light after dawn... they didn't have oil lamps or things like that so it was just campfires

Researcher: Yeah, fire was the lights. Something else?

Participant 14: They came for warm

Researcher: Yes, of course. warm, light, tell stories, lots of things happen in campfires. Have you been in a campsite?

Participant 14: Ehmm, yes

Researcher: On holidays?

Participant 14: yes

Researcher: Was that good?

Participant 14: Yes

Researcher: So do you think that on Anglo-Saxon time they have campfires every day almost

Participant 14: Yeah

Researcher: Is that cool?

Participant 14: Yeah

Researcher: Brilliant, Carry on, thank you



Researcher: There's a lot of things going on here. What's your Anglo-Saxon name?

Participant 15: Kalango

Researcher: Kalango? That's an Anglo-Saxon name... so tell me, what is going on here? This is a beautiful drawing

Participant 15: That's the village, that's the campfire in the middle of it and the logs and [Not audible]

Researcher: Wow, wow, what is this?

Participant 15: The crops

Researcher: So we have crops, we have houses, the village, the roads and a campfire. Do you think campfires were important?

Participant 15: Ah, yes

Researcher: Why is that?

to keep them warm and for cooking

Researcher: for cooking? Do you think they did campfires all the time?

Participant 15: Ahh, yes

Researcher: Have you been in a campfire?

Participant 15: Yes, we had one when we went to a school trip and when I went to camping once

Researcher: Brilliant. Do you think campfires are cool?

Participant 15: Yes

Researcher: So these guys were doing campfires all the time?

Participant 15: Ehh... most of the time

Researcher: How do you know all this about the Anglo-Saxons?

Participant 15: Because we researched and saw pictures in books and [...]

Researcher: Do you think it was cool to live in AS time?

Participant 15: Most of the time yes but when they did there other things [Not audible]

Researcher: Would you like to have lived in the Anglo-Saxon time?

Participant 15: Not really, No

Researcher: Why not?

Participant 15: I don't really know

Researcher: What things weren't so cool?

Participant 15: Waiting for crops to grow

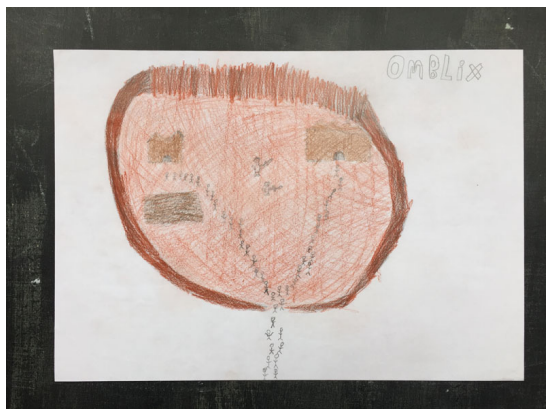
Researcher: That a lot of waiting? Do you think waiting was a bit boring?

Participant 15: Yeah

Researcher: Waiting and waiting

Participant 15: Yeah

Researcher: Looking great



Researcher: Ok, What are we looking here? This is great!

Participant 16: These are the people going out of the village, because they are scared of the Anglo-Saxons

Researcher: Who are they?

Participant 16: The British

Researcher: The British are running from the Anglo-Saxon?

Participant 16: No, this is a British village, and then... the Anglo-Saxons run into the village to scare them out so they can have the village

Researcher: Do you think that this happened?

Participant 16: Yeah

Researcher: So the Anglo-Saxons came and the British had to leave

Participant 16: Yeah

Researcher: There was a fight?

Participant 16: Yeah

Researcher: Omblix is your AS name?

Participant 16: Yes

Researcher: Tell me something, how do you know all this?

Participant 16: Because, we researched it... and we found out that the natives run away

Researcher: And, do you think it was cool to live at that time?

Participant 16: No

Researcher: No? Would you like to have lived at that time instead of now?

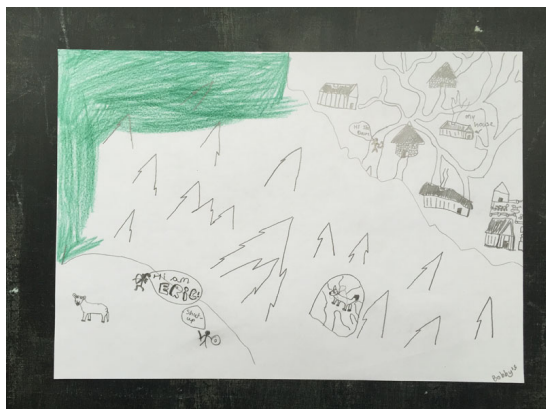
Participant 16: No

Researcher: Why not?

Participant 16: Because, then you didn't have all like the computers and didn't... you would have made to leave your village, or your home, so... by the Anglo-Saxons, so it wouldn't be that good

Researcher: so no iPads, and the AS coming, that sounds... not very cool

Participant 16: No, not very cool



Researcher: Right [Not audible], what happened here? Your name is Erik now?

Participant 17: Mmm [Affirmative]

Researcher: All right, why is he saying shut up? Right, so if you are hunting you don't want people to come... What is this? this is a whole village!

Participant 17: Yes, a village

Researcher: Who is this guy?

Participant 17: eh, a friend

Researcher: friend, and that's your house?

Participant 17: Yes

Researcher: Why is this your house?

Participant 17: Because is the best house I drew in this picture

Researcher: Is this the best house?

Participant 17: Yes

Researcher: And you would be living in the best house?

Participant 17: Yes

Researcher: Why? Why you would be living in the best house?

Participant 17: Because, Im thinking that I am respected []

Researcher: Ok, so you are like... if you are the best hunter, you are an important person. Why is that?

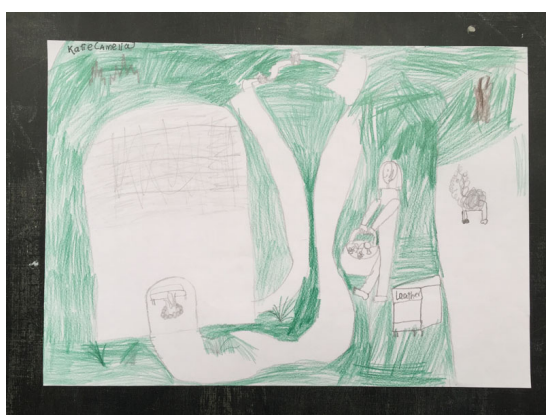
Participant 17: Because, food was an important thing for the saxons... and hardly any of it... there was quite a bit but it was hard to get... and if you were a good hunter that means you would have more money from selling the food that you caught and if you had family you were able to keep your family safe

Researcher: That's a good reflection, yes. They didn't have supermarkets, so they had to hunt and grow up things. Tell me something, what happened at this time? Do you remember any important thing? Did they had kings?

Participant 17: No... Yeah, they did, but no queens....

Researcher: No queens? Just kings, why not?

Participant 17: [NA an explanation is offered in why queens posed a problem in violent times]



Researcher: Oh this is a lot more elaborated now... what are you carrying there?

Participant 18: [Not audible]

Researcher: What is your Anglo-Saxon name?

Participant 18: Kaitie

Researcher: What are you doing here? What is this?

Participant 18: A leather worker

Researcher: Are you a leather worker?

Participant 18: Yes

Researcher: Why? do you think that leather working was important?

Participant 18: I just like the idea of being a leather worker... and working is important to do also

Researcher: You have a campfire there?

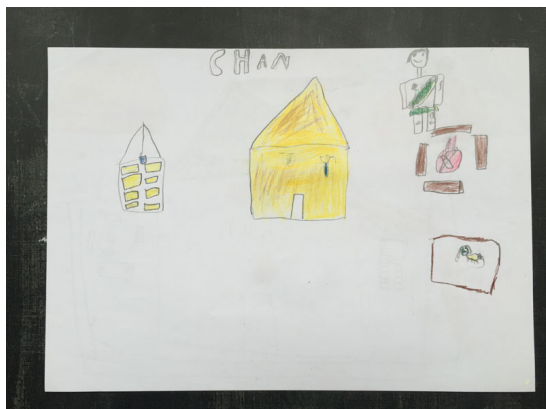
Participant 18: Yeah

Researcher: And what else? what is that?

Participant 18: It's a bench

Researcher: A bench? so you can sit down in a bench when you are in the fire

Participant 18: Yeah



Researcher: Right, what do we have here? What is going on there? So your name is Han?

Participant 19: Yeah

Researcher: That sounds anglosaxony. And what is this?

Participant 19: A well

Researcher: So they had wells to get water. Do you think that was important?

Participant 19: Yeah

Researcher: Yeah, Why was important?

Participant 19: Because you need to drink or you die

Researcher: Of course. You need to keep on drinking. What else? You have a house, a campfire, and what is that?

Participant 19: A wild dog

Researcher: Did they have wild dogs?

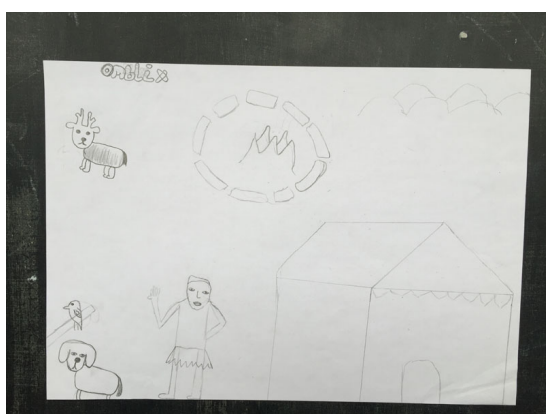
Participant 19: [Ask other children] Yes

Researcher: So you think dogs were important?

Participant 19: Yeah

Researcher: Why dogs were important?

Participant 19: [Not audible]



Researcher: Hello. What are we doing here? What is your Anglo-Saxon name?

Participant 20: Omblix

Researcher: Omblix. That sounds very anglosaxony. What is happening here

Participant 20: They are pointing at some [Nor audible]. With a spear

Researcher: That's super good. Do you think this was important in AS time?

Participant 20: Yes

Researcher: What is that?

Participant 20: Because they wouldn't be able to grow they crops as well... they could do on summer

Researcher: To survive?

Participant 20: Yeah

Researcher: How do you know that?

Participant 20: I don't know

Researcher: Have you seen that in any movie?

Participant 20: Yeah, [Not audible] related back to a long time ago.. with the romans and saxons... and winter and they couldn't grow their crops

Researcher: This is brilliant. This is very good

Researcher: You are OMBLIX

Researcher: To entertain the kids? Ahh, entertain the kids? Dogs. Do you have a dog?

Participant 20: No, but I want a dog

Researcher: You want a dog. What is going on here?

Participant 20: Send the wild dog away the village because... going around fighting people



Researcher: This is looking super good. Is that a house?

Participant 21: Yes. It meant to be a hall

Researcher: The hall, what was the hall?

Participant 21: Is where they met to have stories, meeting people

Researcher: How do you know that?

Participant 21: I read about it

Researcher: You read about halls? Have you seen halls in any movies

Participant 21: Yeah

Researcher: So we have halls. And what is going on inside the hall?

Participant 21: The meat is cooking. The would have probably do that here... when the bonfire was lit... and warriors would attend here, after battle...

Researcher: Wow, that's a full story there, so why there's blood, what happened?

Participant 21: They would have came back from war, to have come here to eat... they would have come injured after battle

Researcher: So they are coming from war and they are injured so that's why we have blood

Participant 21: And a bit of mud

Researcher: And mud, of course. Who they were fighting with?

Participant 21: [Asks other children]

Participant 21: warriors! other warriors. The pict's

Researcher: The pict's? They were fighting the pict's. So they used to fight a lot?

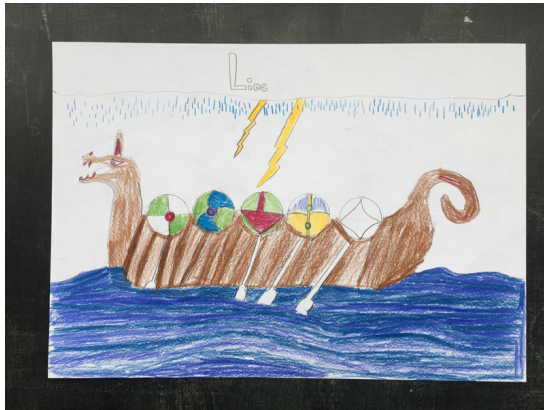
Participant 21: Yeah, they quite like fighting



Participant 22 (Not interviewed)



Participant 23 (Not interviewed)



Participant 24 (Not interviewed)



Participant 25 (Not interviewed)

F2. Drawings frequency

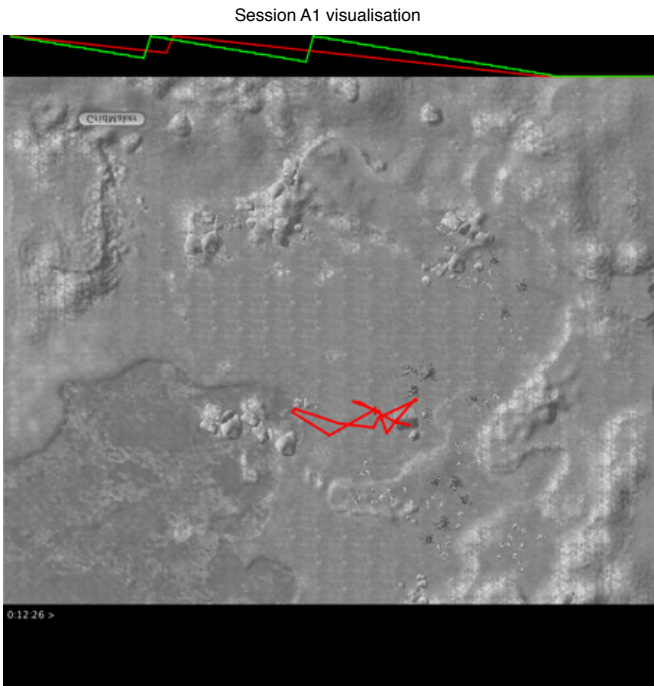
Frequency of elements and features in Pre-playtest drawings

	Category	Renn	Lanka	Chan	Kalen go	Chp'd ale	Ombl x	Astrid x2	Ombl Linc x2	Coloc Stok	Stig	Resoj e	Rem2	Anick ar	Elie	Astrid	Comet	Renn' J	Katie	Eric	Elfrick	
Avatar / self	Social		1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	15
Social / others	Social					1																3
Crops	Production					1		1		1	1	1	1									6
Sheep	Production																		1			5
Horse	Production	1												1	1							3
Cow/oxen	Production											1										2
Pig	Production																					0
Tree/forest	Natural	1								1		1	1	1	1	1	1					6
Bird	Natural							1														3
Dog	Natural							1														2
Hall	Material	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Campfire	Material		1	1	1	1	1								1	1	1					12
Sword	Material	1							1	1	1	1	1	1							1	7
Ship	Material								1	1	1	1	1	1			1					7
Fence	Material		1	1								1		1	1	1						6
Bow/arrows	Material					1	1			1	1			1		1	1	1				6
Circular place	Material					1	1	1				1				1	1					6
Shield	Material											1		1			1				1	4
Cart	Material									1	1	1										3
Road	Material		1			1																2
Well	Material		1																			2
Axe	Material											1		1								2
Furniture	Material									1		1										2
Helmet	Material												1									1
Enclosure	Material								1													1
Cauldron/ Kitchen	Material									1												1
Grubenhaus	Material																					0
Deer	Collection						1	1				1				1				1		5
Feasting/ socializing	Activity	1										1										2
Attacking/ fighting	Activity								1											1		2
Agricultural work	Activity										1								1			2
Hunting	Activity																1					1

APPENDIX G: PLAYTEST DATA

G1. Playing sessions

Session A1

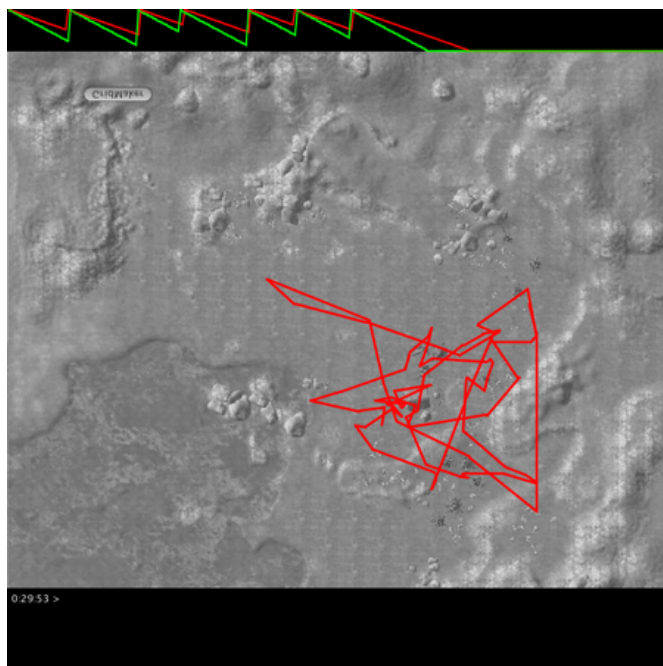


Session A1 summary

Start time	0m 0s
End time	12m 21s
Surviving time	12m 21s
Actions executed	17
Characters dead	3
Food collected	6
Food crafted	2
Resources collected	6
Resource crafted	1
Building	0
Farming	0
Tasks allocated	0
Empathic responses	0
Non-empathic responses	1

Session A2

Session A2 visualisation

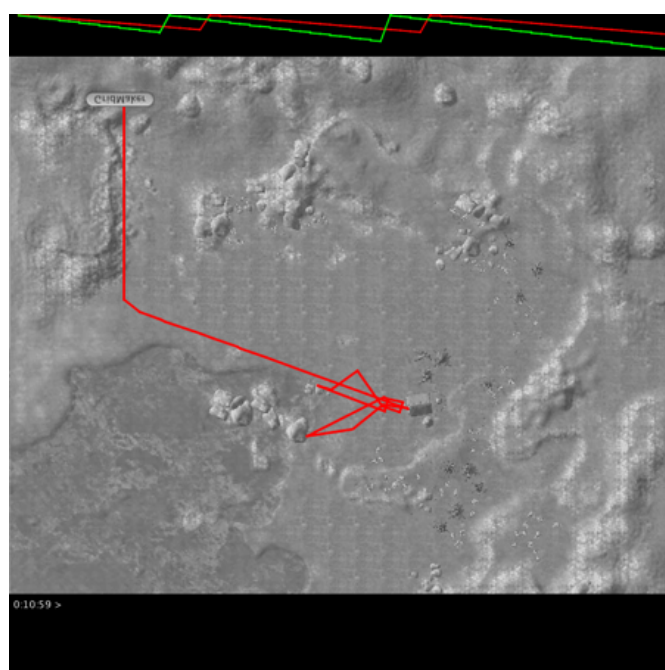


Session A2 summary

Start time	0m 0s
End time	29m 53s
Surviving time	29m 53s
Actions executed	24
Characters dead	3
Food collected	4
Food crafted	0
Resources collected	4
Resource crafted	6
Building	0
Farming	1
Task allocated	1
Empathic responses	0
Non-empathic responses	0

Session A3

Session A3 visualisation

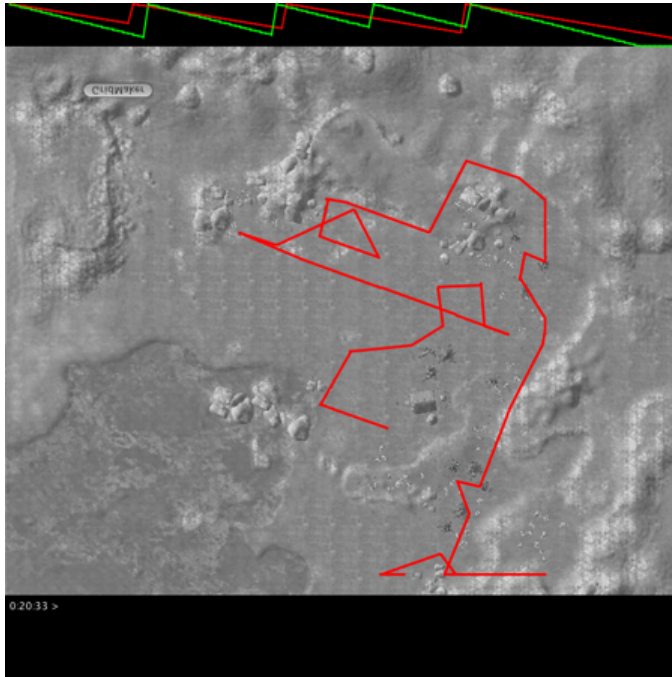


Session A3 summary

Start time	0m 0s
End time	10m 59s
Surviving time	10m 59s
Actions executed	9
Characters dead	3
Food collected	3
Food crafted	0
Resources collected	1
Resource crafted	1
Building	0
Farming	1
Task allocated	0
Empathic responses	0
Non-empathic responses	2

Session B1

Session B1 visualisation

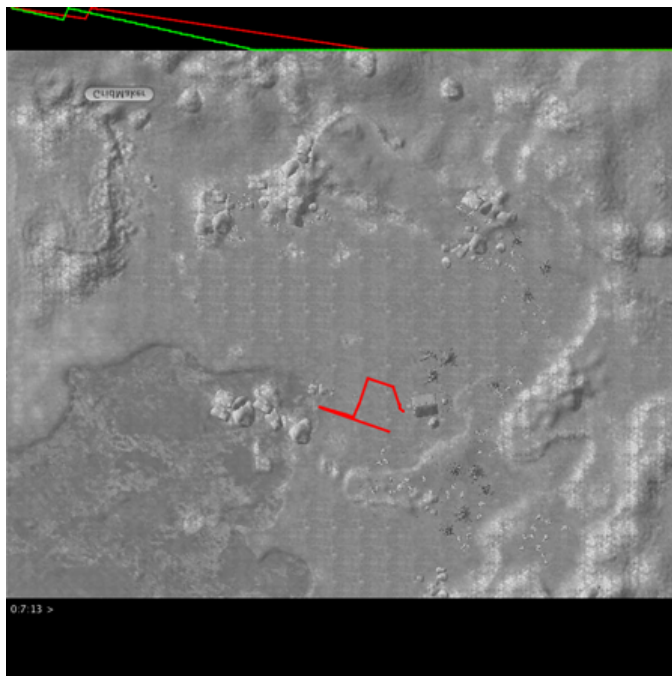


Session B1 summary

Start time	0m 0s
End time	20m 33s
Surviving time	20m 33s
Actions executed	7
Characters dead	3
Food collected	2
Food crafted	0
Resources collected	3
Resource crafted	1
Building	0
Farming	0
Task allocated	0
Empathic responses	0
Non-empathic responses	2

Session B2

Session B2 visualisation

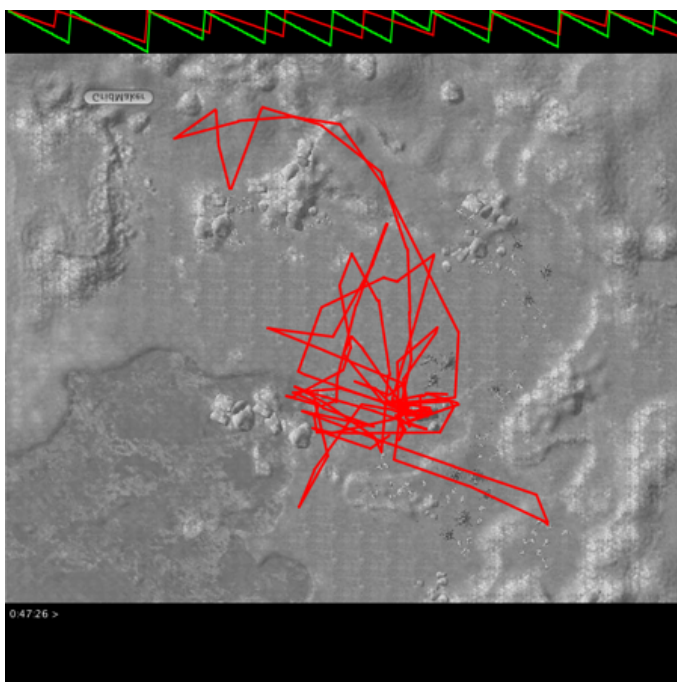


Session B2 summary

Start time	0m 0s
End time	7m 13s
Surviving time	7m 13s
Actions executed	3
Characters dead	3
Food collected	2
Food crafted	0
Resources collected	1
Resource crafted	0
Building	0
Farming	0
Task allocated	3
Empathic responses	0
Non-empathic responses	2

Session C1

Session C1 visualisation

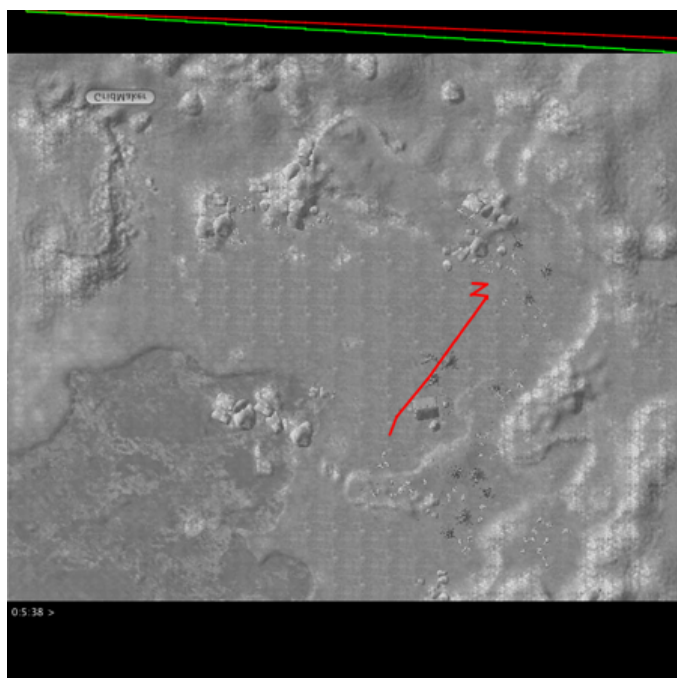


Session C1 summary

Start time	0m 0s
End time	47m 26s
Surviving time	47m 26s
Actions executed	27
Characters dead	3
Food collected	9
Food crafted	0
Resources collected	5
Resource crafted	1
Building	0
Farming	6
Task allocated	0
Empathic responses	0
Non-empathic responses	0

Session C2

Session C2 visualisation

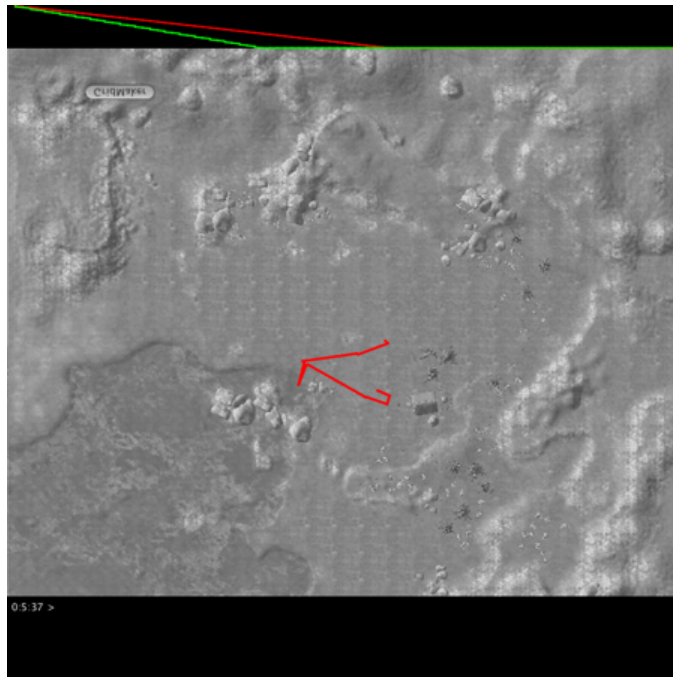


Session C2 summary

Start time	0m 0s
End time	5m 38s
Surviving time	5m 38s
Actions executed	4
Characters dead	1
Food collected	0
Food crafted	0
Resources collected	0
Resource crafted	0
Building	1
Farming	3
Task allocated	4
Empathic responses	0
Non-empathic responses	2

Session D1

Session D1 visualisation



Session D1 summary

Start time	0m 0s
End time	5m 37s
Surviving time	5m 37s
Actions executed	4
Characters dead	3
Food collected	2
Food crafted	0
Resources collected	1
Resource crafted	0
Building	0
Farming	0
Task allocated	0
Empathic responses	0
Non-empathic responses	1

Session E1

Session E1 visualisation

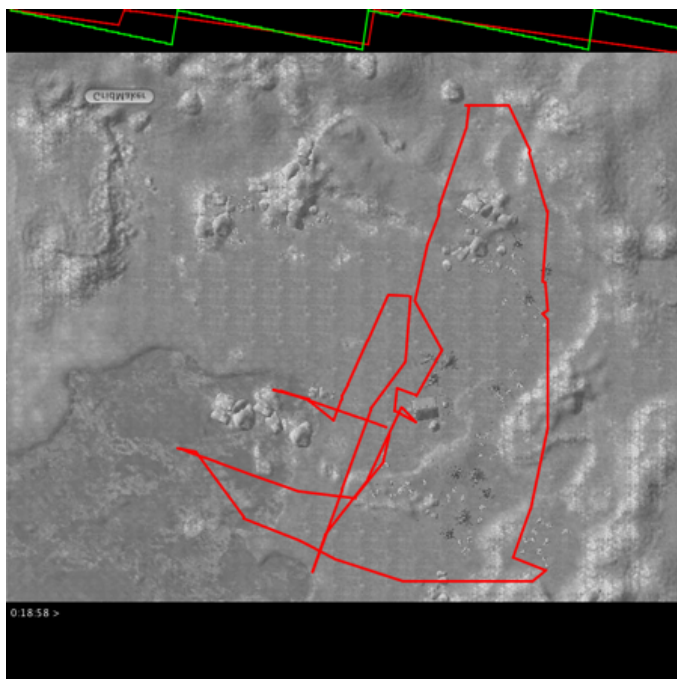


Session E1 summary

Start time	0m 0s
End time	4m 2s
Surviving time	4m 2s
Actions executed	0
Characters dead	0
Food collected	0
Food crafted	0
Resources collected	0
Resource crafted	0
Building	0
Farming	0
Task allocated	0
Empathic responses	0
Non-empathic responses	0

Session E2

Session E2 visualisation

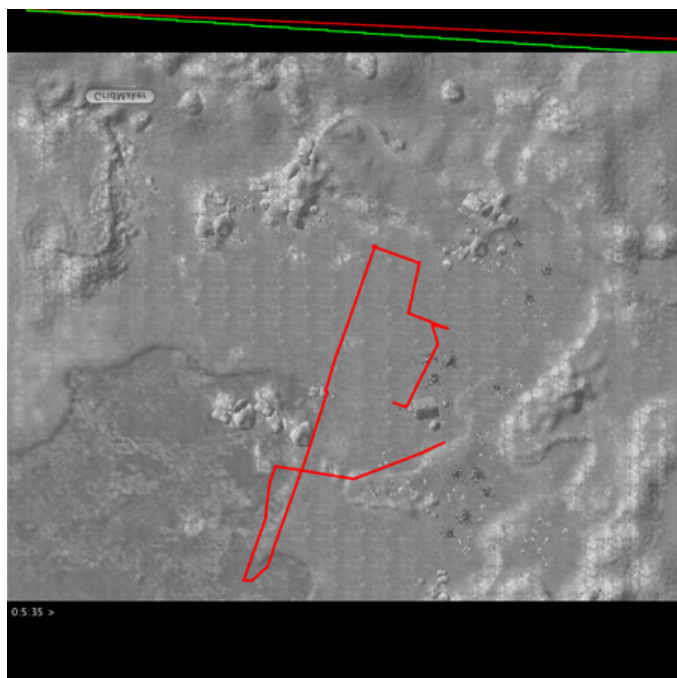


Session E2 summary

Start time	0m 0s
End time	18m 58s
Surviving time	18m 58s
Actions executed	12
Characters dead	3
Food collected	5
Food crafted	1
Resources collected	3
Resource crafted	0
Building	0
Farming	2
Task allocated	7
Empathic responses	0
Non-empathic responses	2

Session E3

Session E3 visualisation

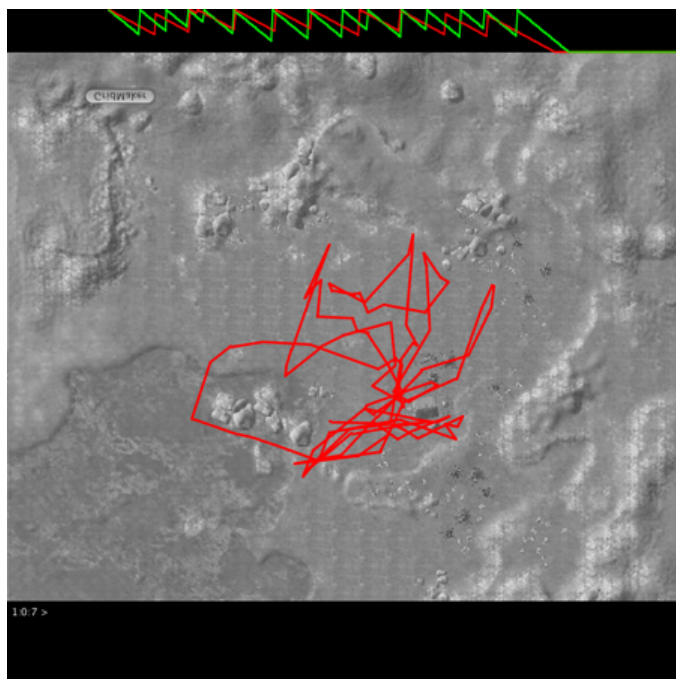


Session E3 summary

Start time	0m 0s
End time	5m 35s
Surviving time	5m 35s
Actions executed	6
Characters dead	1
Food collected	4
Food crafted	0
Resources collected	4
Resource crafted	1
Building	0
Farming	1
Task allocated	0
Empathic responses	0
Non-empathic responses	2

Session E4

Session E4 visualisation

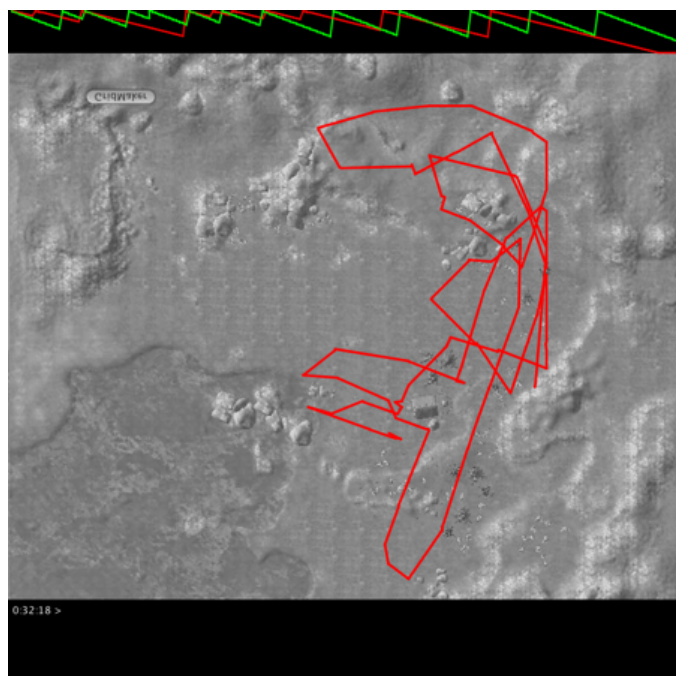


Session E4 summary

Start time	0m 0s
End time	1h 0m 7s
Surviving time	1h 0m 7s
Actions executed	66
Characters dead	3
Food collected	17
Food crafted	3
Resources collected	5
Resource crafted	1
Building	1
Farming	26
Task allocated	0
Empathic responses	0
Non-empathic responses	0

Session F1

Session F1 visualisation

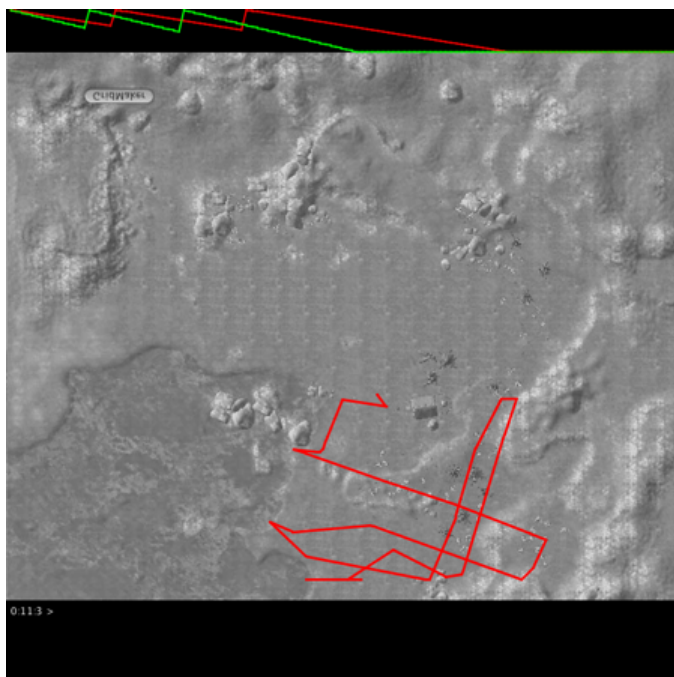


Session F1 summary

Start time	0m 0s
End time	0h 32m 18s
Surviving time	0h 32m 18s
Actions executed	33
Characters dead	3
Food collected	9
Food crafted	0
Resources collected	3
Resource crafted	2
Building	1
Farming	8
Task allocated	3
Empathic responses	0
Non-empathic responses	0

Session F2

Session F2 visualisation

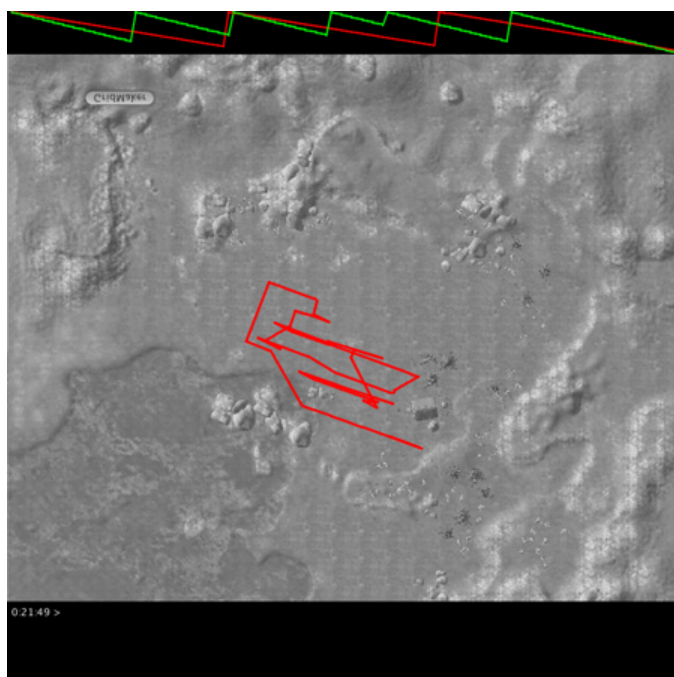


Session F2 summary

Start time	0m 0s
End time	0h 11m 3s
Surviving time	0h 11m 3s
Actions executed	5
Characters dead	3
Food collected	3
Food crafted	0
Resources collected	2
Resource crafted	0
Building	0
Farming	0
Task allocated	14
Empathic responses	0
Non-empathic responses	0

Session G1

Session G1 visualisation

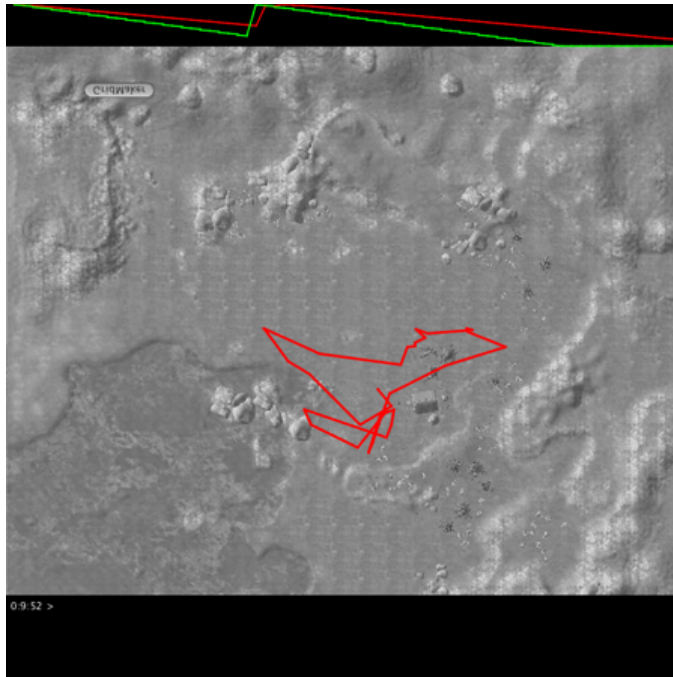


Session G1 summary

Start time	0m 0s
End time	0h 21m 49s
Surviving time	0h 21m 49s
Actions executed	21
Characters dead	1
Food collected	9
Food crafted	2
Resources collected	4
Resource crafted	1
Building	1
Farming	0
Task allocated	18
Empathic responses	0
Non-empathic responses	1

Session H1

Session H1 visualisation

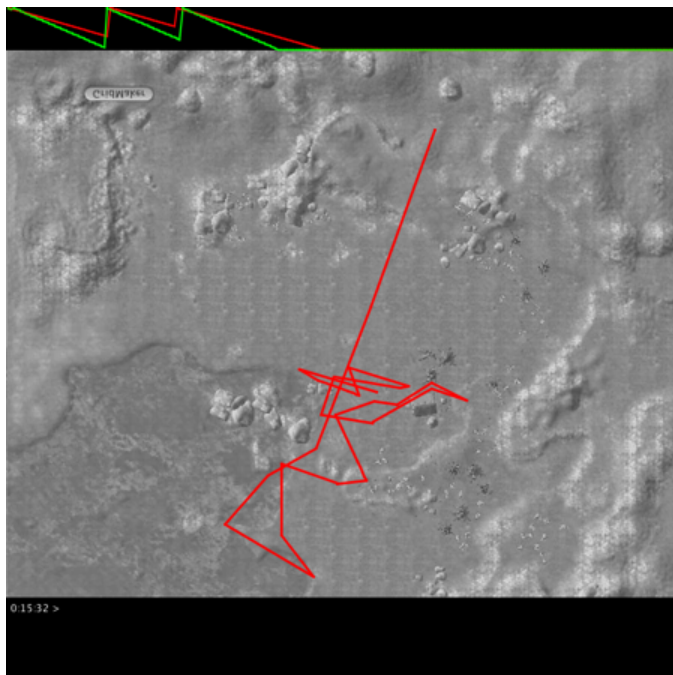


Session H1 summary

Start time	0m 0s
End time	0h 9m 52s
Surviving time	0h 9m 52s
Actions executed	10
Characters dead	2
Food collected	6
Food crafted	1
Resources collected	3
Resource crafted	1
Building	0
Farming	0
Task allocated	0
Empathic responses	0
Non-empathic responses	2

Session H2

Session H2 visualisation

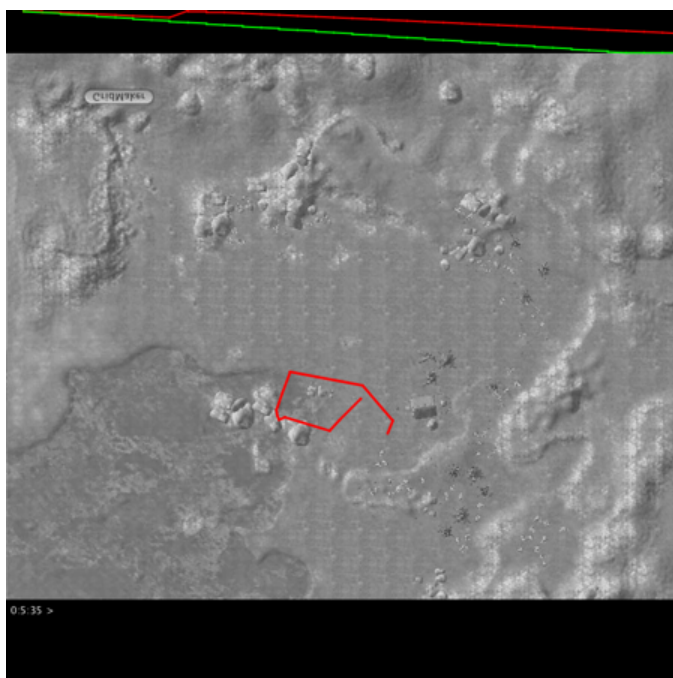


Session H2 summary

Start time	0m 0s
End time	0h 15m 32s
Surviving time	0h 15m 32s
Actions executed	10
Characters dead	2
Food collected	6
Food crafted	1
Resources collected	3
Resource crafted	1
Building	0
Farming	0
Task allocated	0
Empathic responses	0
Non-empathic responses	2

Session I1

Session I1 visualisation

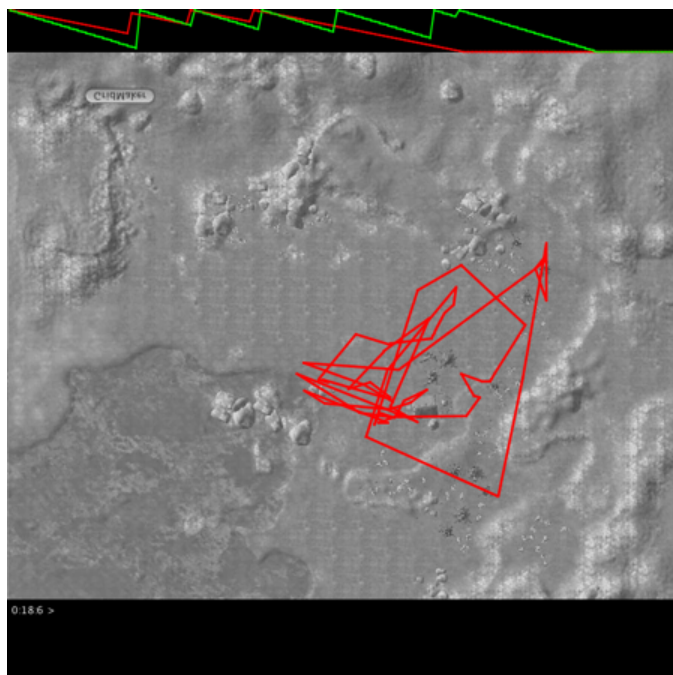


Session I1 summary

Start time	0m 0s
End time	0h 5m 35s
Surviving time	0h 5m 35s
Actions executed	5
Characters dead	0
Food collected	2
Food crafted	0
Resources collected	1
Resource crafted	0
Building	0
Farming	0
Task allocated	1
Empathic responses	0
Non-empathic responses	0

Session I2

Session I2 visualisation



Session I2 summary

Start time	0m 0s
End time	0h 18m 6s
Surviving time	0h 18m 6s
Actions executed	26
Characters dead	3
Food collected	15
Food crafted	0
Resources collected	4
Resource crafted	1
Building	0
Farming	4
Task allocated	14
Empathic responses	0
Non-empathic responses	1

G2. Summary of playing sessions

Summary playtest sessions

	A1	A2	A3	B1	B2	C1	C2	D1	E1	E2	E3	E4	F1	F2	G1	H1	H2	I1	I2	Total
Start time	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	0m 0s	
End time	12m 21s	29m 53s	10m 59s	20m 33s	7m 13s	47m 26s	5m 38s	5m 37s	4m 2s	18m 58s	5m 35s	1h 0m 7s	0h 32m 1	0h 11m 3	0h 21m 4	0h 9m 52	0h 15m 3	0h 5m 35	0h 18m 6	
Surviving time	12m 21s	29m 53s	10m 59s	20m 33s	7m 13s	47m 26s	5m 38s	5m 37s	4m 2s	18m 58s	5m 35s	60m 7s	32m 18s	11m 3s	21m 49s	9m 52s	15m 32s	5m 35s	18m 6s	0h 18m 2s
Actions executed	17	24	9	7	3	27	4	4	0	12	6	66	33	33	5	21	10	5	26	289
Characters dead	3	3	3	3	3	3	1	3	0	3	1	3	3	3	3	1	2	0	3	43
Food collected	6	4	3	2	2	9	0	2	0	5	4	17	9	9	3	9	6	2	15	104
Food crafted	2	0	0	0	0	0	0	0	0	1	0	3	0	0	2	2	1	0	0	10
Resources collected	6	4	1	3	1	5	0	1	0	3	4	5	3	2	4	3	3	1	4	53
Resource crafted	1	2	1	1	0	1	0	0	0	0	1	1	2	0	1	1	1	0	1	14
Building	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	1	0	0	0	4
Farming	0	1	1	1	0	6	3	0	0	2	1	26	8	8	0	0	0	0	4	52
Task allocated	0	1	0	0	3	0	4	0	0	7	0	0	3	4	18	0	0	1	14	55
Empathic responses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-empathic responses	1	0	2	2	2	0	2	1	0	2	2	0	0	0	1	2	2	0	1	20

G3. Teacher's final discussion of playing session

Teacher: The more you play it the more you... because, it was all very difficult to keep our family alive but if you kept on dying very quickly... so as long as you [Not audible] can increasing your lifespan then the more you play the game the more you learn to keep every body else alive, as well as yourself, really

Teacher: [CHILD NAME]

Child 1: On our first game, we actually killed everyone, so we didn't killed them but they all died... and in our very last game we only last the same

Teacher: Ah, you only last the same. What's you're thinking about having a slave?

Researcher: Do you remember what the slave said to you?

Children group: No

Researcher: Anybody talked with the slave?

Children group: No

Child 1: I didn't see him anywhere...

Child 1: There was a conversation with the slave, but only happened if the slave was alive

Teacher: Do you think is a good kind of think in life to have a slave?

Child 1: No

Teacher: Why do you think the saxons had a slave? Because if now someone comes and say: Oh, I have a new slave at home, we would a bit like... [CHILD NAME]?

Child 2: In the game... I think it was your... son said, would you give me as a slave and then I remember saying... clicking I would do anything to keep you alive

Teacher: Because some saxons may have to face the decision of... we don't got any food to feed you... so if you stay here you will die. We can't feed you or we can sell you to a better family and they will feed you. They won't pay you, maybe they maybe won't look after you very well, but they will feed you to keep you alive so you can work for them. So as a parent they have to make the decision between... you obviously have children and you want to care of them but if you can't do that maybe that have to make a better choice... if you can't keep your child alive maybe they are trying to make a different choice, weren't they? because they wouldn't have had other choices, and then with that money they might be been able then to keep other people or the rest of the family alive... maybe the oldest son...

Teacher: Do you think people still have slaves today?

Children group: No

Teacher: What being a slave mean, compared to servant? Because you maybe get the both words mixed up... a servant or a maid in a house, are different to a slave

Teacher: What's the difference between a slave and a Buttlar? A Buttlar is a profession. You can train to be a Buttlar. What's the difference then between being something like a servant, maid, slave, cleaner, butter

Teacher: The slave doesn't really get [Not audible] very well, but all the others do

Teacher: The others are jobs. You would be employed as a cleaner nowadays, wouldn't you? You would be employed, you would have a contract saying that in one hour, I will pay you

this much for you to do this things... and as employer you have to say, I will make sure you are in a safe working environment, I will make sure you have [Not audible] general rights... and if I go to work and somebody says, Oh, I'm not going to pay you, we can't afford to... if the school says, sorry we are not going to pay he teachers this month, that would be illegal, because they are breaking the contract. What do you think that slave has?

Teacher: Their rights, their contracts... keeping them alive, rather than paying us this much an hour. There wouldn't be a choice about what you did, if you are a slave you would have to do what you are told to do or face punishment... so there's a difference between doing jobs that you might think a slave does... if you are a slave you belong to a family, or you belong to an owner... I don't belong to a school, do I? I work for the school, I got a contract.

Teacher: A slave belongs... is almost like a pet in a way, that feeling of... you are my owner, I only eat what you give me to eat, I can only live where you allowed me to live... like you can't get out on your own, you have to take it out for walk. It won't eat in your house unless you put food out... and that was how slaves were treated, so there's a difference... don't you think now... somebody said, the Queen got slaves! The Queen has got people like staff who work in the house. They would drive the car... but they are paid well, they get paid a minimum wage, which every one has to be paid if not more. They are treated very fairly, they have working hours; you're not allowed to work [beyond] a certain number of hours a week. So jobs have rights, slaves is like being owned, and just do what your owner want you to do and you live how your owner decided you to live. You wouldn't be able go out to a party on the weekend if you are a slave, because your owner would like you to be doing something. You probably wouldn't be able to get out anyway. So don't get mixed up with today; slaves do exist today. It's very sad that today, not in local areas but in the world there are countries that still have slavery, and in England there still probably some form of not the same slavery in the way a Saxon would be enslaved, but forms of slavery in which people are not treated fairly. It's very very uncommon today but still exist which is very sad because we should know better now, shouldn't we? But back in the saxon times having a slave was a way to survive, and when you might not leave pass the age of 14 unless your slave does something then that's a different decision whereas today we don't have to make those decisions, do we?

Teacher: But don't get mixed up if you see a Buttlar on tv, and think: oh, its a slave... he would be paid, has a contract, he would make the choice to do this job... that's the difference. In a job you have the choice to do it. You might not always want to...

Teacher: So slaves in saxon time... we might not like the idea, you might not wanted to be a slave but it was part of how life had to go to tick over and turn around, but today, we should know better, shouldn't we? It shouldn't exists but it does still a little bit but gradually, the world will become a better place wont be? And this things will stop. They will disappear

Teacher: [CHILD NAME]?

Child 3: In the saxons, did the slaves [Not audible] because they wouldn't [Not audible] fighting

Teacher: If you had to create your own game, what you would create... a life game like that where you have to be in a life not like Star wars. What kind of lifetime would you like to create a game of

Teacher: [CHILD NAME]?

Child 4: Victorians

Teacher: Victorians, would you? Why would you like be doing that period?

Child 4: Because [Not audible] the school

Teacher: So life in Victorians was a lot more similar to life now than Saxons, wasn't it?, was completely different life style... Victorians was the start of what we now know as our day to day lifestyle: people get up, going to work, people get up, going to school...

Teacher: [CHILD NAME] what would you do?

Child 4: I would like to do in stone age time

Teacher: That's like the first of all the discoveries, isn't it? so making a fire wasn't so easy back then because might not have the same tools or the same knowledge...

Teacher: [CHILD NAME]?

Child 5: Ehrrr....

Teacher: Some many times to chose from... you can't remember? Put your hand up when you remember, ok?

Teacher: [CHILD NAME]?

Child 6: I would like to do the 22nd century

Teacher: The future?

Child 6: Yeah

Teacher: Interesting! wouldn't know what to do!

Teacher: [CHILD NAME], what would you do?

Child 7: I would probably do the middle ages, because if you could marry one of the kings or queens then you'll become the king or queen and rule the land.

Teacher: That was quite likely?

Child 7: Mmm, no

Teacher: How many people marry the king or queen?

Child 7: [Not audible]

Teacher: The only thing is if you were a royal, you would only marry someone from a royal family. Maybe not the royal family, but someone from another royal bloodline or from another very high up kind of house, wouldn't you? You wouldn't marry someone from the street, or from the town, someone from the local tavern. You had to marry into certain families because they probably didn't have much choice on who to marry a lot of the time didn't they? Even today I don't think... there are still some rules and stuff like that...

Teacher: [CHILD NAME]?

Teacher: Is either on Victorians or like in the royal house [Not audible]

Child 8: Ehm... I would do like in the dinosaur time, starting as baby dinosaur...

APPENDIX H: POST-PLAYTEST DATA

H1. Drawings and interviews



Researcher: Hello... Do you remember your name?

Participant 1: Jeff

Researcher: Do you feel like being an AS?

Participant 1: Because, when you are in the game feels is like you are very, very back in [...]

Researcher: Oh, really, that was cool then. And what kind of challenges you have to face when you were an AS?

Participant 1: To... emm... I forgot

Researcher: That's all right... do you had to farm, keep family alive, things like that?

Participant 1: Except for the sheep

Researcher: Except for the sheep, right... you killed them all?

Participant 1: Yes

Researcher: Can you remember any conversation with your family members?

Participant 1: No

Researcher: Do you remember the family members? The guys that were with you? Do you remember any task that you did?

Participant 1: Cutting down trees, growing crops, collecting water, growing sheep

Researcher: You did a lot! Did you cook?

Participant 1: A bit

Researcher: You were all the time making tasks, or you had time to do something else?

Participant 1: Pardon?

Researcher: Did you have time to explore the environment? walk around?

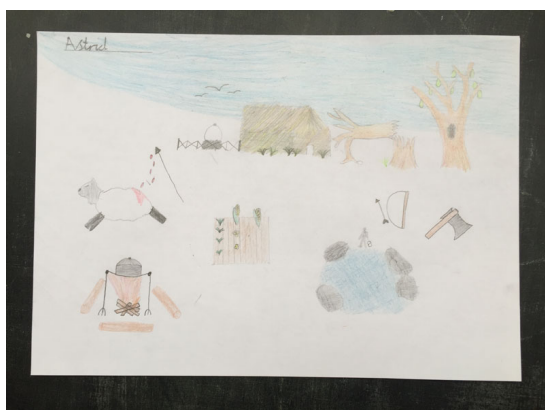
Participant 1: Yes... [...] I was lost every time...

Researcher: Right, you got lost. How would you make the game better?

Participant 1: Emm... putting a village in

Researcher: A village? Ah, all right, more people; people walking around

Participant 1: Yes



Researcher: Ok, Astrid, did you like the game?

Participant 2: Yes, it looks real!

Researcher: Looks real? how real?

Participant 2: [Explains that other games look cartoony]

Researcher: Ok, so you like the real stuff

Participant 2: I liked cutting down trees

Researcher: You liked cutting down trees? Did you cut a lot of trees?

Participant 2: A couple, to get wood for fire

Researcher: Ah, wood for fire... Did you feel like being an AS?

Participant 2: Yes, I had to go to get the water, and then go home and try to keep the family. I tried to look after the family but they just kept dying. A servant died first [...] and then I think the boy child... I didn't know he was a boy, because the boy looked like a girl

Researcher: Oh really? Ok

Participant 2: So then one of the girls died, and then the other child died... and I stayed alive

Researcher: So all of them died

Participant 2: Yes, apart from me, but eventually I died

Researcher: So you were the only survivor

Participant 2: The longest I had [...]

Researcher: What kind of challenges you had to face as an AS? What was challenging? Keeping yourself alive, for example

Participant 2: Yes that was challenging... it was hard to kill the cattle for food, because they kept on moving. You couldn't really get them... you had to chase them to kill them

Researcher: Yes you had to chase them, because they don't want to get killed. Do you remember any conversation with the characters?

Participant 2: Uh, it was something like... I remember the little boy, who came up to me and asked if it is true if your family don't have enough food and money they gave themselves and their children as slaves... and then I asked who told you that, and he said the neighbour... and then... I didn't know that before, that they had to sell their children as slaves

Researcher: You didn't know, but that happened, actually...

Participant 2: Yeah?

Researcher: Yeah. Do you remember any other conversation?

Participant 2: The messenger...

Researcher: Do you remember any task you did?

Participant 2: Yes, collecting water, and feed my family... trying keeping them alive... emm... when I went round to the back of the house and this massive egg thing... it was to make bread... I tried to make bread, but I couldn't do it... and making the houses

Researcher: And tell me, were the family members important to you?

Participant 2: Yeah, [name] wasn't that important [...] as long as they stay alive

Researcher: So you didn't care much about them

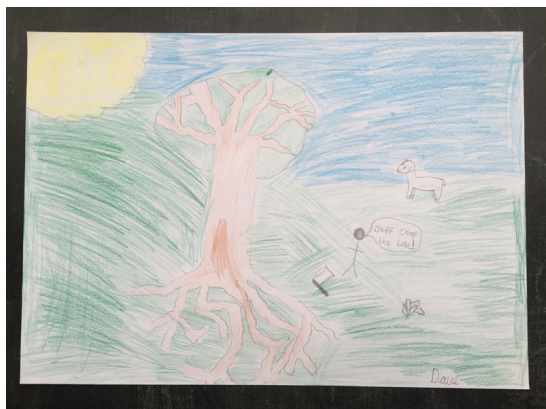
Participant 2: No. I tried to keep them alive, to save them... a 100 days... and they both died and I have 100 days on my own [not audible...]

Researcher: it was difficult enough. Do you remember anything about slavery?

Participant 2: [...]

Researcher: How would you make this game better?

Participant 2: Having a boat... and nighttime. Invade different lands and stuff



Researcher: What's your Anglo-Saxon name?

Participant 3: Dave

Researcher: Do you liked the game?

Participant 3: Yeah, I really like it

Researcher: Did you feel like being an Anglo-Saxon?

Participant 3: Yes, it was good because I actually felt like an AS and I learnt quite a bit...

Researcher: Did you? What kind of stuff you learnt?

Participant 3: I learnt how they actually chopped the trees to make it into the campfires... they made nettle soup

Researcher: Nettle soup... and what kind of things were the most challenging in the game?

Participant 3: I think it was going to the water when you were a quite long way away... because...[...] I was drinking when I died

Researcher: Ah, ok, you need to get close to the water and when you were exploring you couldn't get the water

Participant 3: mmm [affirmation]

Researcher: Right, that was challenging... and do you feel that was real?

Participant 3: It felt like it, yeah

Researcher: Do you remember any conversation with your family members?

Participant 3: I remember speaking to somebody about being a slave and being sent...

Researcher: That was your son?

Participant 3: Yeah

Researcher: Do you remember another conversation?

Participant 3: I think... somebody else says that they would [prefer?] in food, or something...

Researcher: And the one you remember, your son, was that important for you?

Participant 3: I think they would sell somebody... and I think it was quite [pity?] that they did sold somebody... so that we had more food to look after ourselves

Researcher: Do you remember which tasks you did?

Participant 3: Cutting trees, kill goats, fetch water, look after the family...

Researcher: And which tasks were the most important?

Participant 3: I think it was kill the sheep and making sure it was [rough?] and getting water

Researcher: Getting water was important?

Participant 3: Yeah, because that was the thing that ran out quick...

Researcher: How would you make this game better?

Participant 3: Maybe including more animals... animals that can kill you or something... maybe a wolf



Researcher: Ok, what do we have in here?

Participant 4: Reindeer, sheep, water, fire and the other person

Researcher: what's your name? your Anglo-Saxon name

Participant 4: No, I am just using my name

Researcher: Ok, but we don't have a reindeer - do you think is important to have a reindeer there?

Participant 4: Mmm. yes, because they needed food

Researcher: So you're going hunting - stuff like that - brilliant. Did you feel like being an Anglo-Saxon in the game?

Participant 4: Yes. Make you feel like [...] how they get their food and the water

Researcher: How the compares with other games you played?

Researcher: It was different compared with other games, because you don't get the food and the water [...] and you make sure they don't die but in some game you just don't die

Researcher: So you think that was better?

Participant 4: Yeah

Researcher: More real, maybe? What kind of challenges you have to do in the game? was it challenging? you managed to keep your family alive?

Participant 4: They died

Researcher: Can you remember any conversation with the family members?

Participant 4: Me and Henry told them to shut up, because, they kept on [appearing]

Researcher: Were the fm important to you in any way?

Participant 4: We tried to feed them but it didn't really work

Researcher: They kept on dying?

Participant 4: Yeah

Researcher: How would you make the game better? Any suggestions?

Participant 4: No

Researcher: Maybe something you would like to have in the game?

Participant 4: Hunting



Researcher: That's a really pretty drawing. very realistic

Participant 5: why am I putting orange on it?

Researcher: Looks like nice in orange...

Researcher: What's your name, your Anglo-Saxon name?

Participant 5: Renn

Researcher: That was your house, wasn't it?

Participant 5: Yeah

Researcher: Tell me, did you liked the game?

Participant 5: Yeah I really liked it

Researcher: Why did you liked it?

Participant 5: I liked running around telling my family what to do. it got a bit harder when my family members started to do all the jobs

Researcher: Do you think that was realistic

Participant 5: Yeah that was realistic

Researcher: You felt like being an as?

Participant 5: Is quite harsh

Researcher: The game?

Participant 5: It would have been quite harsh being an as. It was hard to find nettles

Researcher: What kind of challenges you had to do?

Participant 5: Looking after my family so they did not die

Researcher: They kept on dying?

Participant 5: Yeah, i think it was a lot like being in as time

Researcher: Can you remember any conversation with your family members?

Participant 5: I remember talking with the older girl about easter - i cant remember the whole thing

Researcher: Can you remember any other conversation?

Participant 5: No, not really

Researcher: What kind of task you remember you did?

Participant 5: Cut trees... I never killed sheep, because I cant kill sheep. i told others to do it... because...I cant do it

Researcher: You told them to kill the sheep, but you didn't do that yourself?

Participant 5: No. I don't like killing animals. so I got a family member to do it

Researcher: Really?

Participant 5: yeah

Researcher: Which tasks were more important to you?

Participant 5: Keeping myself alive. staying alive is meant [...] impossible

Researcher: Any family member was important to you?

Participant 5: Yes, there was one... the little girl. I liked the little girl. she didn't really do much. but I liked anyways because she could go and get things quicker than everyone else

Participant 5: I think you could have a village where you could see everyone

Researcher: Do you remember anything about slavery?

Participant 5: Yeah children have to turn off to be slaves... I had a slave

Researcher: You had a slave?

Participant 5: Yeah, he always died for us though

Researcher: What is this? is this a deer?

Participant 5: No, that's not a deer. its a goat. i mean a sheep

Researcher: Did you feel like being an as?

Participant 5: Yeah, I just liked what you have to do. the general all around. the fetching water for the whole family

Researcher: do you do tasks at home?

Participant 5: Yeah

Researcher: Was a bit like that?

Researcher: Do you think that was like the Anglo-Saxon time?

Participant 5: Yeah

Researcher: And tell me, do you remember any conversation with your family members?

Participant 5: No, because we skip though all

Researcher: What tasks you remember you did?

Participant 5: Making a house, cutting down trees, farming

Researcher: Farming?

Participant 5: Yeah, farming was really hard

Researcher: Why was hard?

Participant 5: Because you had to scare the birds to do that, and it could all go wrong

Researcher: Really?

Participant 5: Yeah I couldn't grow them because the land outside... because, I couldn't scare the birds out so i was running around to fetch some water

Researcher: So you were super busy?

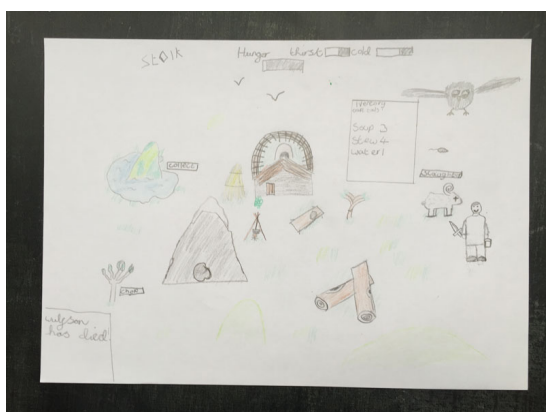
Participant 5: Yes

Researcher: Do you remember anything about slavery?

Participant 5: No

Researcher: How would you make this game better?

Participant 5: Having the sheep reproduce, and having invasions, you can go down to the coast and invade other countries



Researcher: What's your as name?

Participant 6: Stoic

Researcher: What is going on here?

Participant 6: [explains]

Researcher: You are making the whole system of the game. That's quite cool. do you think this was like being an as?

Participant 6: [...]

Researcher: do you think the game was challenging?

Participant 6: Yes

Researcher: Why was challenging?

Participant 6: Because, it was very hard to keep your family alive, because, most of the time you were trying to collect things and do things, and you could only check them very quickly, and was very tricky to find the time to do things

Researcher: So you were busy all the time

Participant 6: Yes

Researcher: And do you think that was like the as time?

Participant 6: Yes

Researcher: Do you remember any conversation with your family members?

Participant 6: [...]

Researcher: What tasks you remember you did?

Participant 6: Collect water and food. it was very hard to make bread, and we set the kitchen but couldn't light the fire

Researcher: Do you remember anything about slavery?

Researcher: What sort of things you would do to the game to make it better?

Participant 6: Would like to actually meet your family



Researcher: So what do we have in here? So your name is Astrid

Researcher: You liked the game?

Participant 7: Yes, is a really good game

Researcher: Do you think it was challenging?

Participant 7: Yeah it was quite challenging. It was challenging to try to keep your family alive as well as getting food and getting water and... yeah

Researcher: Do you think that was like being an as?

Participant 7: Yes

Researcher: Do you think it was hard?

Participant 7: Yes

Researcher: Do you think it was harder than today?

Participant 7: Yes, much harder

Researcher: Can you remember any conversation with your fm?

Participant 7: There was one about the boy... the little boy saying about the neighbours trying to... they were going to sell them... to be slave

Researcher: Do you remember that one?

Participant 7: Yeah

Researcher: That was important to you?

Participant 7: It was quite important to me because it was just... it was a family member

Researcher: Were the fm important to you?

Participant 7: Ehhh yeah they could help me with jobs

Researcher: Do you remember any task you did?

Participant 7: I did cut down a lot of trees, and the farm out the woods

Researcher: You managed to do some farming?

Participant 7: Yeah

Researcher: And making bread?

Participant 7: Yeah

Researcher: Do you remember anything about slavery?

Participant 7: Not exactly, no

Researcher: How would you make the game better?

Participant 7: I would add a bit more action to it, like other tribes, or the vikings or something invading



Researcher: so your name is Emiliana...

Participant 8: Emiliana

Researcher: That's a good name. sounds very anglo-saxony. Tell me what's in your picture

Participant 8: The house [...] a fluffy sheep
[another kid] she is in love with sheep!

Researcher: And what is in there?

Participant 8: that's the part of the game where there are bars...

Researcher: What is this?

Participant 8: That's the kitchen. That's a rock

Researcher: A rock?

Participant 8: Yes

Researcher: Do you think that the game was challenging?

Participant 8: Yes

Researcher: Why it was challenging?

Participant 8: I think it was challenging to keep the family alive and keeping yourself alive

Researcher: Do you think that this was like being an as?

Participant 8: I think it was very close to what was like in as time

Researcher: What kind of problems you had for keeping your self alive?

Participant 8: Finding the nettles to make nettle soup

Researcher: They were scarce?

Participant 8: Yes... and separate the food around and share it with your family

Researcher: Do you remember any conversations?

Participant 8: No because Julieta pass skip on every single one...

Researcher: Were the family guys important to you?

Participant 8: They kept on blocking my survival, because you had to share your water with the other people

Researcher: Did they help you in any way?

Participant 8: I don't really remember

Researcher: Anything you remember about slavery?

Participant 8: Its mean

Researcher: How would you make the game better?

Participant 8: I don't think there is anything to make it better

Participant 8: A pink fluffy unicorn

[another kid] maybe not... i don't think that would be anglo-saxony

Researcher: Do you remember anything about slavery?

Participant 8: Yes, the slaves were not treated very well, but they still got fed... and sometimes they did ok but not very much, and they did a lot of the jobs, and if you call them they come [...]

Researcher: How would you make this game better?

Participant 8: Maybe more animals, and maybe and you could... i think just more animals

Researcher: How would you make the game better?

Participant 8: I think when you run into a nettle you could lose health... otherwise i think is fine

Researcher: Something more realistic?

Participant 8: Yes

Participant 8: I have something that can make the game better

Researcher: Ok, tell me...

Participant 8: You could maybe zoom in to see things a little bit more. Zooming in or zooming out

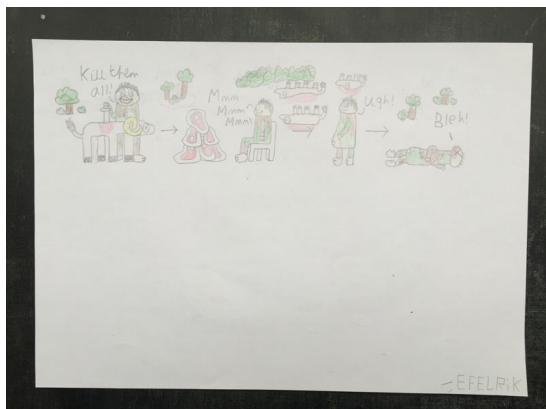
Researcher: Zooming in... and out

Participant 8: Is better than Minecraft

Researcher: Why is better than Minecraft?

Participant 8: It is more realistic and less blocky

Researcher: You don't like the blocks



Participant 13 (Not interviewed)



Participant 14 (Not interviewed)



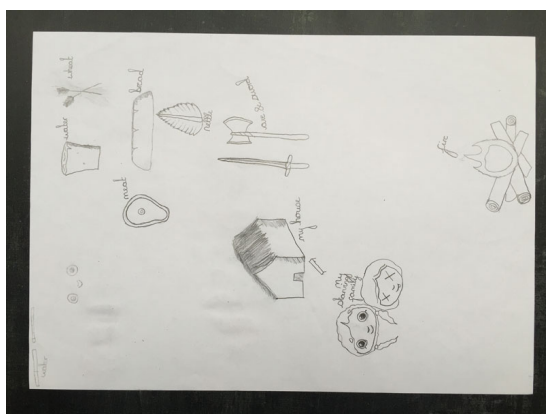
Participant 15 (Not interviewed)



Participant 16 (Not interviewed)



Participant 17 (Not interviewed)



Participant 18 (Not interviewed)



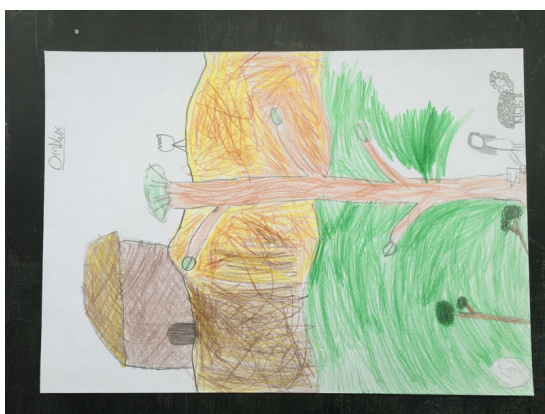
Participant 19 (Not interviewed)



Participant 20 (Not interviewed)



Participant 21 (Not interviewed)



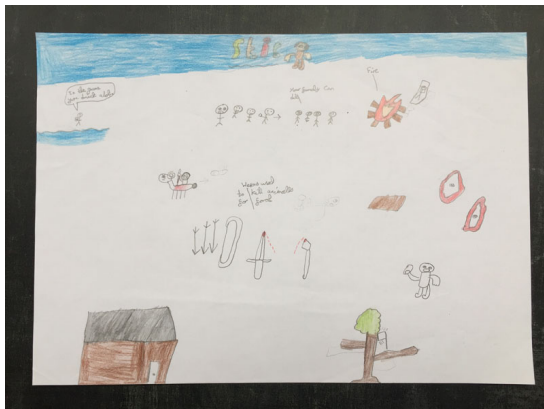
Participant 22 (Not interviewed)



Participant 23 (Not interviewed)



Participant 24 (Not interviewed)



Participant 25 (Not interviewed)

H2. Drawings frequency

[illegible]

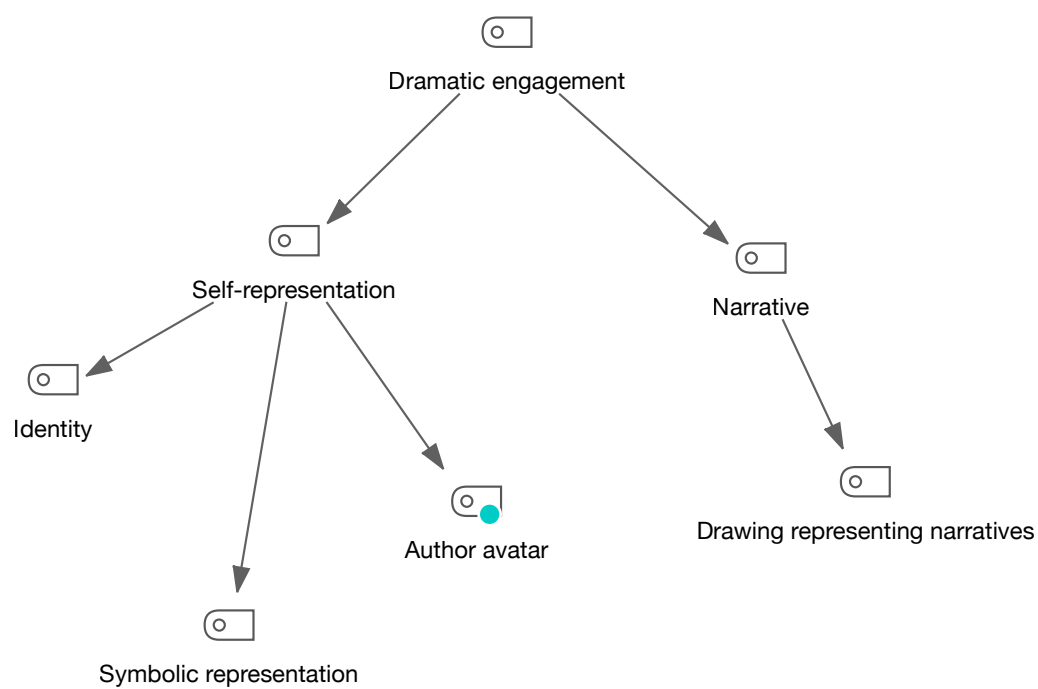
APPENDIX I: ANALYSIS FILES

I1. Overview of codes

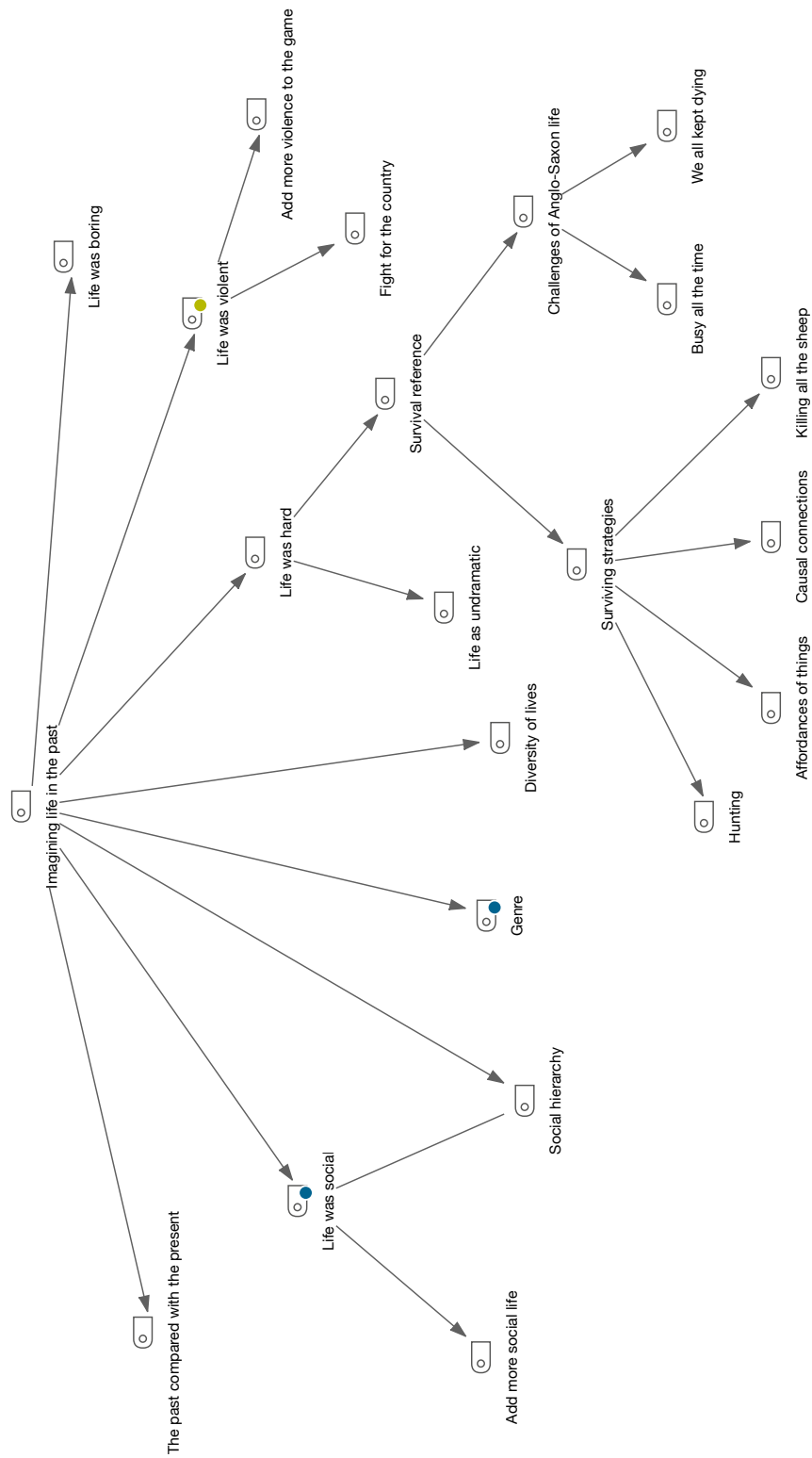
Parent code	Code	Coded segments of all documents	% Coded segments of all documents	Documents
Life was violent	Add more violence to the game	5	1.85	5
	Really liked the game	4	1.48	4
Empathic connections	Slavery in Anglo-Saxon time	5	1.85	5
Empathic connections	Caring for the family	7	2.59	6
Game as pastpresent	Projecting self identity	2	0.74	2
Game as pastpresent	Collapsing of past and present	2	0.74	1
Survival reference	Surviving strategies	5	1.85	2
Empathic connections	Conversations are boring	3	1.11	3
	Authoritative version of the past	0	0.00	0
	Game as pastpresent	0	0.00	0
Challenges of Anglo-Saxon life	Busy all the time	2	0.74	2
Life was social	Add more social life	3	1.11	3
Challenges of Anglo-Saxon life	We all kept dying	6	2.22	3
Surviving strategies	Causal connections	2	0.74	2
	Empathic connections	0	0.00	0
Surviving strategies	Affordances of things	1	0.37	1
	Material culture	0	0.00	0
	Dramatic engagement	0	0.00	0
	Temporality	1	0.37	1
Self-representation	Identity	2	0.74	2
Space	Discrete landscape	2	0.74	2
Placemaking	Discrete places	7	2.59	7
Space	Inside-outside	7	2.59	7
Placemaking	Space	0	0.00	0
Placemaking	Connected places	4	1.48	4
Dramatic engagement	Narrative	4	1.48	4
	Progression mechanics	3	1.11	1
	Religion representation	1	0.37	1
	Pastpresent	1	0.37	1
	Violent games	1	0.37	1
Imagining life in the past	Diversity of lives	1	0.37	1
Empathic connections	Contrasting interpretations	2	0.74	1
Slavery in Anglo-Saxon time	Game as trigger	2	0.74	1
Life was hard	Life as undramatic	1	0.37	1
Occupations	Agricultural production	4	1.48	1
	Travel in Anglo-Saxon time	1	0.37	1
	Cause and effect	2	0.74	2
Life was violent	Fight for the country	2	0.74	2
Significant things	Use of space	2	0.74	2
Imagining life in the past	Life was boring	2	0.74	1

	Wrong kind of building	2	0.74	2
Surviving strategies	Hunting	1	0.37	1
Authoritative version of the past	Feeling like being an Anglo-Saxon	7	2.59	6
Surviving strategies	Killing all the sheep	1	0.37	1
Significant things	Animal affordances	1	0.37	1
Significant things	Things and their uses	11	4.07	3
Authoritative version of the past	The game is real	12	4.44	8
Survival reference	Challenges of Anglo-Saxon life	6	2.22	4
	Getting lost	1	0.37	1
	Making the game better	2	0.74	2
Imagining life in the past	Life was violent	11	4.07	8
Occupations	Farming life	8	2.96	5
Things and their uses	Campfire	15	5.56	11
Empathic connections	Think on past in terms of present	5	1.85	2
Life was hard	Survival reference	5	1.85	2
Imagining life in the past	Life was social	8	2.96	7
Space	Top-down imagined space	1	0.37	1
Farming life	Livestock	5	1.85	5
Space	Planned space	2	0.74	2
Significant things	Occupations	2	0.74	2
Things and their uses	House	16	5.93	12
	Longship	2	0.74	2
Occupations	Weaving	1	0.37	1
Narrative	Drawing representing narratives	3	1.11	3
Farming life	Wild life	2	0.74	1
	Imagining life in the past	0	0.00	0
Self-representation	Author avatar	10	3.70	10
Significant things	Historical artefacts	3	1.11	3
Imagining life in the past	Life was hard	1	0.37	1
	Everyday life	1	0.37	1
	Invasion	3	1.11	3
Imagining life in the past	The past compared with the present	2	0.74	1
	Continuity and change	5	1.85	2
Occupations	Craftmanship	1	0.37	1
Dramatic engagement	Self-representation	2	0.74	2
Imagining life in the past	Genre	2	0.74	2
Imagining life in the past	Social hierarchy	1	0.37	1
Self-representation	Symbolic representation	2	0.74	2
Material culture	Placemaking	1	0.37	1
	Historical references	5	1.85	2
Material culture	Significant things	2	0.74	2

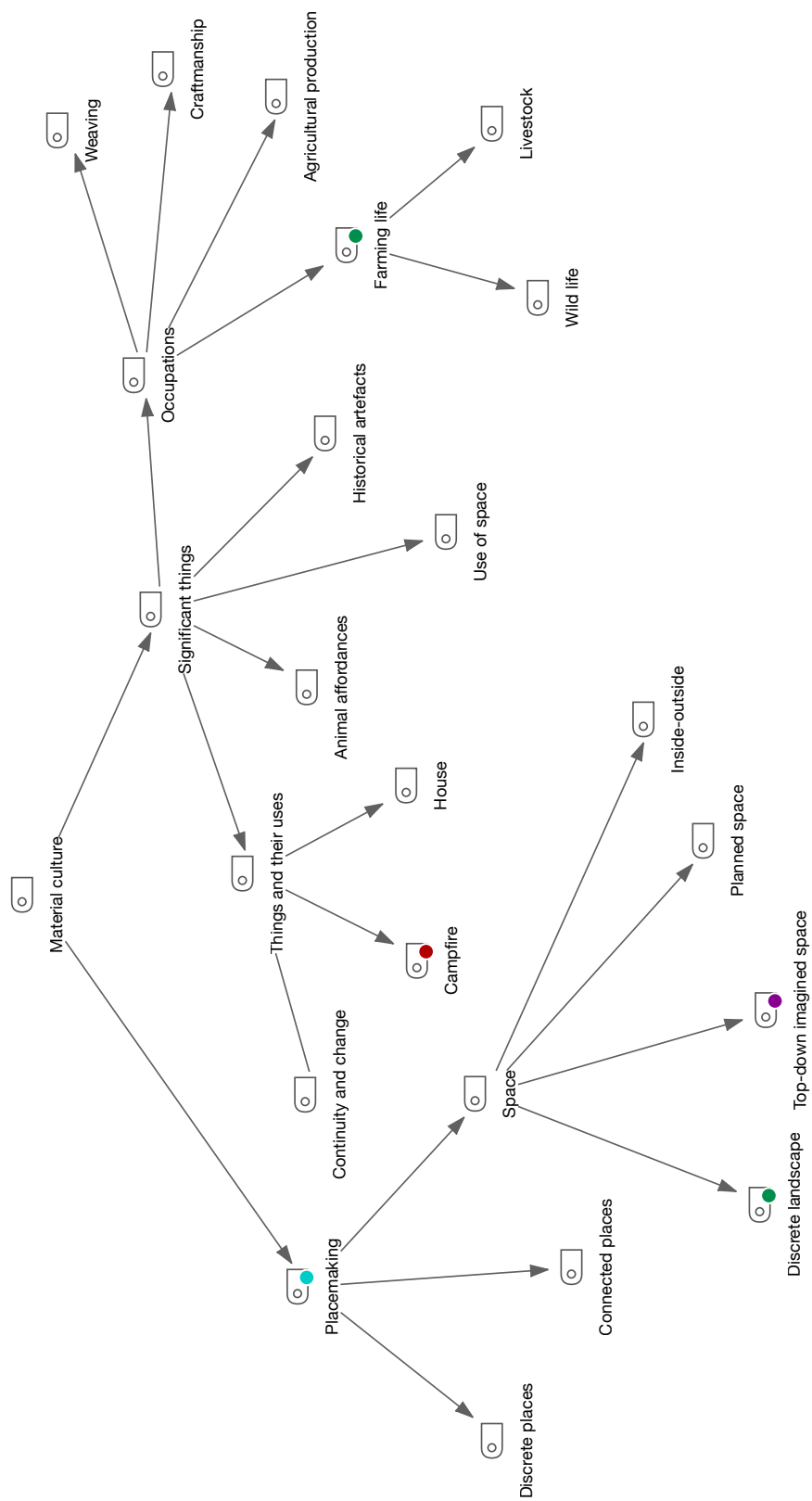
I2. Code relationships for theme 1

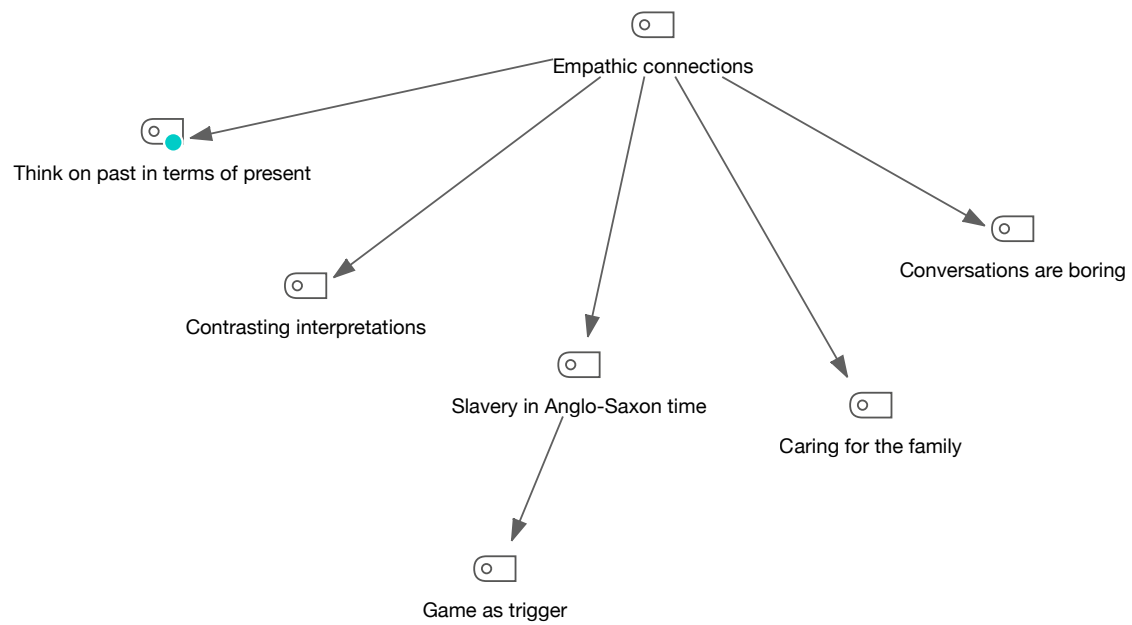


I3. Code relationships for theme 2



14. Code relationships for theme 3



15. Code relationships for theme 4

APPENDIX J: CONFERENCE PAPERS AND PUBLICATIONS

J1. The Interactive Past Conference 2

Hiriart, J. (2018). *Life was really hard! Designing and Using Digital Games to Explore Medieval Life in Primary Schools*. Paper presented at The Interactive Pasts Conference 2. October 2018. VALUE Project Foundation, Hilversum, Netherlands.

Abstract: https://www.dropbox.com/s/uifzy4ji7nfxjvr/InteractivePast2018_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/el3rs96roptorso/InteractivePast2_2018_JHiriart.pdf?dl=o

J2. Communicating the Past in the Digital Age: Digital Methods for Teaching and Learning Archæology

Hiriart, J. (2018). *Designing and Using Digital Games as Historical Learning Contexts*. Paper presented at Communicating the Past in the Digital Age: Digital Methods for Teaching and Learning Archaeology, University of Cologne, Cologne.

Abstract: https://www.dropbox.com/s/pk1ffhtkovrcvad/CommunicatingPast_2018_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/3o4pc26wx81j5fo/CommunicatingThePast_2018_JHiriart.pdf?dl=o

J3. PLAY/PAUSE Symposium

Hiriart, J. (2018). *Bringing Things to Life: Understanding Everyday Life Through the Procedural Representation of Material Culture in Historical Video games*. Paper presented at PLAY/PAUSE Symposium, University of Birmingham, Birmingham.

Abstract: https://www.dropbox.com/s/v5dhyvhf3a7p1xv/PlayPause2018_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/r7hslrkvtel41/PlayPause2018_Presentation_JHiriart.pdf?dl=o

J4. Computer Applications and Quantitive Methods in Archæology (CAA) International Conference 2018

Hiriart, J. (2018). *The Game of Making an Archaeological Game: Proposing a Design Framework for Historical Game Design*. Paper presented at Computer Applications and Quantitive Methods in Archaeology (CAA) International Conference, Tübingen. Germany.

Abstract: https://www.dropbox.com/s/nqokmv3d911zqyd/CAA2018_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/taki2741on2ljs6/CAA2018_Presentation_JHiriart.pdf?dl=o

J5. Historia Ludens. A one day conference on history and gaming

Hiriart, J. (2017). *Designing and Using Digital Games as Historical Learning Contexts for Primary School Classrooms*. Paper presented at Historia Ludens. A one day conference on history and gaming. University of Huddersfield. Huddersfield.

Abstract: https://www.dropbox.com/s/z4jd7l2lb2lt37f/HistoriaLudens2017_Abstract_JHiriart.pdf?dl=o

HistoriaLudens2017_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/d6f31aon7knn8gi/HistoriaLudens2017_Presentation_JHiriart.pdf?dl=o

HistoriaLudens2017_Presentation_JHiriart.pdf?dl=o

Book chapter (In Press): https://www.dropbox.com/s/rzedqdk74qz2djy/HistoriaLudens2017_Chapter_JHiriart.pdf?dl=o

HistoriaLudens2017_Chapter_JHiriart.pdf?dl=o

J6. The Middle Ages in the Modern World Conference

Hiriart, J. (2017). *Playing with Taskscapes: Representing Medieval Life Through Video Games Technologies*. Paper presented at The Middle Ages in the Modern World Conference. Manchester.

Abstract: https://www.dropbox.com/s/s2ncteq3p56olit/MAMO2017_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/grtqmzaqmlmon3u/MAMO2017_Presentation_JHiriart.pdf?dl=o

MAMO2017_Presentation_JHiriart.pdf?dl=o

Book chapter (In Press): https://www.dropbox.com/s/wu231uvebvefxgc/MAMO2017_Chapter_JHiriart.pdf?dl=o

MAMO2017_Chapter_JHiriart.pdf?dl=o

J7. Computer Applications and Quantitive Methods in Archæology (CAA)

International Conference 2017

Hiriart, J. (2017). *Designing and Using Game Environments as Historical Learning Contexts*. Paper presented at Computer Applications and Quantitive Methods in Archaeology (CAA) International Conference, Atlanta.

Abstract: https://www.dropbox.com/s/b7wohoydwe5hlnk/CAA2017_Abstract_JHiriart.pdf?dl=o

Presentation: https://www.dropbox.com/s/kxm58kta6lehrv6/CAA2017_Presentation_JHiriart.pdf?dl=o

CAA2017_Presentation_JHiriart.pdf?dl=o

Proceedings (In Press): https://www.dropbox.com/s/ykluts34kcnp3k8/CAA2017_Article%20Text_JHiriart.pdf?dl=o

CAA2017_Article%20Text_JHiriart.pdf?dl=o

J8. DIGRA UK Conference

Hiriart, J. (2017). *Exploring, Living and Imagining the Past: Studying the Role of Spatial Representation in Game-based Historical Learning*. Extended abstract presented at DIGRA UK Conference. Salford, Manchester.

Abstract: https://www.dropbox.com/s/ofyaqkdbiy61cr2/DIGRAUK2017_Abstract_JHiriart.pdf?dl=o

J9. The Society of American Archaeology Record. November 2016

Hiriart, J. (2016). Surviving the Middle Ages: Notes on Crafting Gameplay for a Digital Historical Game. *The SAA Archaeological Record*. 16(5).

Article: https://www.dropbox.com/s/n8so6zkzvnbp12/SAA2016_Article_JHiriart.pdf?dl=o

J10. DiGRA/FDG Workshop on Playing with History: Games, Antiquity and History

Hiriart, Juan (2016). *Can We Build It?: Using Experimental Prototyping and Iterative Development for Historical Game Design*. Paper presented at DiGRA/FDG Workshop on Playing with History: Games, Antiquity and History. Dundee.

Paper: https://www.dropbox.com/s/u5du8w76mfqtlh/FDG_DiGRA_PWH_2016_JHiriart.pdf?dl=o

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