



MONASH University

Minecraft as a game-based approach to literacy learning

David Elliott

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Abstract

***Minecraft* as a game-based approach to literacy learning**

Minecraft is a phenomenon amongst school-aged children and has become one of the most popular video games in the history of the medium, featuring a diverse content creation toolkit, and promoting collaborative thinking in a virtual environment. This study used a qualitative approach to explore the opportunities for digital learning generated from engaging with a commercial video game, *Minecraft*. The primary research question of this study asked how students can use *Minecraft* in order to generate literacy learning. Framed as a case study, this project involved the design, teaching and observation of a Year 8 *Minecraft*-based curriculum. Students engaged with a range of different literacy activities through improvised and often exploratory play. The student cohort presented a number of teaching challenges, and the game was used to re-engage students, including those from ESL (English as a Second Language) and with specific learning needs. The secondary research question considered the features of *Minecraft* which were best suited to the kind of curriculum design that can effectively mobilise these features in a purposeful way. Students in a combined Humanities/English class were asked to explore the learning potential of the game through an open-ended curriculum design, and data were generated using a range of game-based and paratextual products developed by students. The findings reflected *Minecraft's* power as a collaborative learning platform, with students engaging in improvised scenario building. Creative uses of the *Minecraft* software were also explored by students, using the game to engage with imaginative possibilities for the construction of complex art and design pieces, mobilising design, spatial, visual, and text-based literacies. During the course of this study, students developed ways to extend, augment, and subvert the authorised school curriculum, leading to a range of valuable and sometimes unpredictable outcomes.

The findings that emerged from this study contributed to the research on the integration of video games in formal learning spaces by investigating the learning potential of *Minecraft* as a valuable, albeit challenging, resource for secondary school literacy learning. In exploring the potential role of video game media in contemporary schooling, this study argued that *Minecraft* represented a powerful medium for situated learning, and for the rejuvenation of contemporary classrooms.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature:

A black rectangular box redacting the signature.

Print Name: David Elliott

Date: 26/11/2017

Publications during enrolment

Elliott, D. and Bulfin, S. (2014) 'Beyond "Beyond Schools": Young People's Unsanctioned Digital Media Use In and Around Schools and Classrooms' in Stocchetti, M. (2014). Media and Education in the Digital Age: Concepts, Assessments, Subversions: ERIC.

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1. Introduction

This is a study about *Minecraft*, a popular video game amongst many young people, and the ways that it can be used in schools as a generator of powerful knowledge. While video games have been used in classrooms since the 1980s with varying degrees of success, *Minecraft* represents a new set of opportunities for generating a digitally literate classroom. The game offers a suite of digital content creation and collaboration tools which students are often engaging with during their leisure time. In this opening chapter, I discuss the new participatory cultures of the 21st century, which many young people engage in, and provide an overview of the central study text, *Minecraft*. The literacy learning potential of this digital game is framed within a discussion of a contemporary western classroom, which is increasingly interested in the potential of digital texts. This includes video games, which are increasingly considered as potential tools for ensuring that students are being adequately prepared to enter the modern, digitally-powered worlds of work and study. ‘Powerful knowledge’ (Young, 2008; Young, 2013) is described by Young (2008) as:

... what the knowledge can do or what intellectual power it gives to those who have access to it. Powerful knowledge provides more reliable explanations and new ways of thinking about the world and can provide learners with a language for engaging in political, moral, and other kinds of debates (p.14)

‘Powerful knowledge’, then, enables young people to transcend the boundaries of their own experience, understand and explore the world in new ways, learn new ways of thinking, and consider alternative futures (Maude, 2015). In this study, I argue that *Minecraft* can be used as a generator of powerful knowledge, enabling students to consider themselves, and the world around them, in new and challenging ways through a range of digital literacy activities which draw together multiple disciplines, and ways of interacting with, and creating, new learning.

In this chapter, I articulate the research questions that focus the study, before providing a rationale which argues for the kinds of new knowledge that this research offers for literacy learning. The chapter concludes with an overview of the thesis design.

1.1 Background to the study

The digital literacy practices of school-aged children, who are growing up in an environment that is saturated with an amorphous, evolving arrangement of techno-cultures, often reside uncomfortably alongside traditional, school-based conceptions of literacy. There have, however, been ongoing attempts to ensure that mandated curriculum has the capacity to adopt new digital texts, and to transition the practice of teaching and learning towards a more fully realised alignment with the cultural environments of young people (Dezuanni, O'Mara, & Beavis, 2015; Apperley & Beavis, 2013).

The Australian Curriculum presents the following definition of literacy:

Literacy encompasses the knowledge and skills students need to access, understand, analyse and evaluate information, make meaning, express thoughts and emotions, present ideas and opinions, interact with others and participate in activities at school and in their lives beyond school. (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2017)

Literacy, in this sense, describes learning events in which students interact with others, as both consumers and producers, which empower them to participate effectively in their social, cultural, and school-based lives. In the 'Key Ideas' section of the literacy general capability of the Australian Curriculum, literacy in an Australian secondary education context refers to two overarching processes: comprehending texts through listening, reading and viewing, and composing texts through speaking, writing and creating.

Despite policy acknowledgement that literacy education must evolve, many schools have found shifting their focus to integration of digital learning technologies challenging. Kalantzis and Cope (2012) note that:

Literacy pedagogy has traditionally meant teaching and learning to read and write in page-bound, official, standard forms of the national language. Literacy pedagogy, in other words, has been a carefully restricted project – restricted to formalized, monolingual, monocultural, and rule-governed language. (pp. 60-61)

This critique of literacy pedagogies which positions the printed text as the primary focus of curriculum design, does not necessarily align with the contemporary reality of many young people's lives, in which the written word is distributed across multiple forms, spaces, and modalities. The shift towards multimodal, and in recent decades, digital and networked texts highlights a significant need for new approaches to literacy pedagogy. Kress (2003), when considering the relentless pace of change in 'the conditions surrounding literacy' (p. 37) that have occurred over the last 50 years, draws attention to the conceptualisation, and by extension the teaching, of literacy. The worlds of the digital text are composites of modalities, which young people navigate as both text consumers and producers. Kress notes that:

Writing, whether on the screen or on the page, is accompanied more and more by image, whether as 'picture', diagram or map. In these writing/image ensembles placement, the spatial positioning of the mode-elements, matters, it has meaning-effects. (p. 64)

Writing is often experienced by young people as one form of production occupying a digital multimodal space, in which colour, shape, image, video, and sound are equally privileged as digital affordances. The written word is composed by text participants as one of many digital assets which can be arranged on a page, as authors work in shifting and evolving digital spaces. Instead, texts authored in these new digital spaces are often contextual, platform-dependent, and arranged by purpose and design. Jenkins (2004) describes a 'convergence' (p. 34) of media technologies, in which these visual assets are fragmented, and manipulated across multiple devices and technological spaces, culminating in 'a reconfiguration of media power and a reshaping of media aesthetics and economics' (p. 35). A key space in which young people are often occupying this role of multimodal authorship exists in contemporary video game media. Video games are often texts in which a ludic (or game-based) design doubles as a highly sophisticated set of multimedia authoring tools which empower participants to sketch out their imaginings, through a range of rich literacy practices (Gee, 2003; 2007). Beavis (2000) notes that

if literacy is changing, in the context of the new technologies, schools and teachers need to find ways to work productively with students to help them become critical users and producers of new texts and literacies. (p. 8)

The Australian Curriculum refers to ‘visual and multimodal texts’ alongside more traditional, print-based definitions. This focus on multimedia reflects the shifting new media environment in which many young people now live, with digital literacy practices becoming an increasingly important dimension of classwork. Knobel and Lankshear (2007) note, however, that simply deploying a piece of new technology does not rank as a ‘new’ literacy practice, but that ‘new’ literacies are those that privilege

participation over publishing, distributed expertise over centralized expertise, collective intelligence over individual possessive intelligence, collaboration over individuated authorship, dispersion over scarcity, sharing over ownership. (p. 228)

It is, then, not simply the mobilisation of new technologies in schools which indicate the integration of ‘new’ literacy practices, but the accompanying cultural practices, and approaches to privileging interaction, collaboration, and knowledge distribution. Knobel and Lankshear (2007) note that ‘in contexts of using new technologies a lot of old wine comes in new bottles at the interfaces of literacy and new technologies’. (p. 223)

In this study, I explore a range of opportunities for using *Minecraft* as a study text in a classroom, in a way that integrates the new literacy practices afforded by 21st century digital culture. I position students as both consumers and producers of rich digital texts (Jenkins, 2006), and attempt to mobilise both the literacy practices promoted by the school’s regular classroom teacher, and the ‘game literacies’ (Burn & Durran, 2007) practised during their out-of-school lives. *Minecraft*’s suite of content generation and co-creation tools, and the game’s significant profile amongst many school-age children, presents an opportunity and challenge to researchers and teachers working in and around digital spaces. How can a commercial game like *Minecraft* be repurposed as a powerful tool for literacy learning, what evidence of learning will the game generate, and what will that evidence look like? By integrating *Minecraft* into a literacy/humanities space and seeking opportunities for innovative student uses of the game, I

explored the possibility for the game to generate the kinds of rich, multimodal literacy learning that many researchers currently pursue (Carroll, 2016; Mavridou & Sloan, 2013).

This study involves a group of students currently studying at Greendale College, a government-funded secondary school in a suburb of Melbourne, Australia. John, a student who has traditionally faced significant challenges as a student due to a number of health issues, Chaiya, an ESL (English as a Second Language) student, and Gabriel, a game enthusiast and amateur developer, engaged in a program of literacy learning using *Minecraft*. The game provides a rich techno-textual context in which literacy learning can occur, and each of these students used the game in different, self-directed ways, suggesting a range of pedagogical possibilities for integrating the game into formal learning spaces.

Gee (2011) noted that there is a significant knowledge gap around the ways that video games can best be integrated into classrooms, and their capacity to generate learning that is not simply a recitation of ‘facts’, but engages students in complex, situated thinking. He suggested a need for research that

showed that good games (actually, Games) that implemented sociocultural, situated, embodied, extended mind learning worked or did not work well for conceptual learning that led to problem solving and not just rote learning. (p. 9)

This study explores whether *Minecraft*, as a video game text, is able to respond significantly to Gee’s thinking around video game integration in classrooms, and has the capacity to generate the kind of situated, problem solving-based approach to learning that is central to his work on digital literacy.

1.1.1 Video games in the trajectory of youth techno-cultures

Schools are increasingly aware of the technologies which students are using during their leisure time, and often bring into classroom spaces (Selwyn, 2013). Schools have responded in a range of ways to the increased emphasis on student technology use, and the opportunities that it presents to educators and school administration. An example of this can be seen in the school in which this study took place, which used a significant Government grant to create the *Impact Center*, a technology-driven, open plan learning environment. This technology-rich space was

intended to provide an opportunity for teachers to experiment with techno-pedagogies through a deployment of iMacs and Windows PC systems. These kinds of technology-rich learning spaces represent an acknowledgement that the new digital practices of young people are of significant interest to education practitioners and researchers (see 5.1.3.1). Young people often develop information management, multitasking, and collaborative skills through digital technologies, including social media (Boyd, 2015), video games played across multiple platforms and configurations (Buckingham & Sefton-Green, 2003), and composites of the two, as described by Beavis, Walsh, Bradford, O'Mara, Apperley and Gutierrez (2015). Describing a research project involving a Year 11 media class, Beavis et al. (2015) note that while working with students through a game called *AFL SuperCoach*:

Students reflected on the kinds of life skills they were forming through gameplay (such as numerical skills, reading of statistics and critical reading of media), along with the ways their participation, consumption and production in and around the online game, and the various media sources they consulted, converged to create a particular online AFL game community. (pp. 32-33)

Video games, which initially featured simple point-based arcade games (*Space Invaders*, 1978; *Pac-Man*, 1980), have matured, and in the last two decades, have evolved into multimedia texts which draw from film, television, print media, and the fragmentary and participatory forms of emergent social media. As an art form, a genre of media product, and as consumer entertainment objects, their design is often, whether intentional or not, a realisation of 'participatory culture' (Jenkins, 2006). In this media form

rather than talking about media producers and consumers as occupying separate roles, we might now see them as participants who interact with each other according to a new set of rules that none of us fully understands'. (Jenkins, 2006, p. 3)

Media production has also evolved, and dedicated media production tools are no longer the sole methods of content generation available to young people. The video game industry has responded to an ongoing interest in participatory culture by adopting a number of the approaches of traditional media production, integrating suites of content generation into the

games themselves, and integrating distribution functionality across content sharing spaces such as *Twitch* and *Youtube*. *Minecraft* represents a significant entry in the canon of video games which have been adopted as defacto content authoring packages, with the game continuing to evolve as a media production tool that is driven by a youthful audience, and is used by players as a significant opportunity for engagement with participatory culture.

1.1.2 *Minecraft* and young people

Minecraft (Mojang, 2011) is a video game title which has risen to prominence as a significant popular culture text amongst young people. It is currently the second highest selling game of all time, across platforms, with 55 million monthly players and 122 million copies sold as of April 2017 (Blake, 2017). Initially, *Minecraft* was an exclusive PC game, created by Markus 'Notch' Persson, an amateur programmer operating in Sweden, in 2010. Originally a block based game of exploration, *Minecraft* has grown in many directions as a result of fan communities who have augmented, modified, and deconstructed and reconstructed the game, resulting in a seemingly endless constellation of modes, variants, and supporting paratexts. The game itself spawns a randomly generated landscape of blocks, 'biomes' (themed ecological environments such as forests and deserts), and antagonists, all of which a player must navigate. The game's play consists of harvesting resources, building objects, weapons and assets, fighting enemies, and exploring the block-based landscape.

Minecraft was quickly identified as a game-based text which could function as a powerful generator of multimodal learning opportunities. Education projects involving *Minecraft* began to emerge, including *MinecraftEDU*, an education-focused version of the game featuring a range of tools designed to facilitate classroom instruction, and a range of STEM-based initiatives which featured the game. While this study began prior to *Minecraft's* broader adoption as a learning and literacy tool, the study focus remains current and relevant, building on prior research by focusing specifically on the game's application in formal literacy spaces.

The implantation of a game-based curriculum in secondary school spaces remains contentious, with competing perspectives on how best to make use of video game texts such as *Minecraft*, how effective they are as teaching and learning tools, and how powerful they are as agents of

digital literacy education. There has, in recent decades, been a profound shift within the traditional architectures of schooling towards an acceptance of the role that digital media plays in the lives of young people. As a result, conceptions of what it means to be 'literate' must similarly evolve in order to ensure that schools retain their currency, and make students ready to enter the worlds of work and study that have similarly been transformed by digital media. Student use of the game, then, may constitute a cultural adoption of a learning tool which has profound possibilities for furthering these agendas, and making connections between the worlds of home, school, and the techno-cultures in which students are situated. Considering *Minecraft*'s popularity among many young people, and the potential that research suggests that the game has as an educational tool (see 2.2, 2.3), the following research questions emerged to frame the study's aims and objectives.

1.2 Research Questions

The study's main research question is:

- How can students use *Minecraft* to generate rich literacy learning?

The study also pursues the following sub-question:

- What are the implications and challenges when using *Minecraft* for literacy learning in schools?

1.3 Study rationale

Minecraft represents a unique teaching and learning opportunity for educators working in secondary school literacy spaces. At the time of writing there has been a number of studies which have explored the potential of *Minecraft* as a study text in formal learning spaces, (Dezuanni et al., 2015; Ellison & Evans, 2016; Nebel, Schneider, & Rey, 2016). This research indicates that it is a game which has significant educational potential as a digital study text, but it is also a game that is very popular amongst young people, who often play the game as part of their out-of-school lives. Papert (1993) made a prescient observation in *The Children's Machine*:

Every maker of video games knows something that the makers of curriculum don't seem to understand. You'll never see a video game being advertised as being easy. Kids who

do not like school will tell you it's not because it's too hard. It's because it's boring. (p. 193)

In recent research literature, *Minecraft* has been cited as an example of a commercial video game which has the power to rejuvenate a range of separate disciplinary classroom spaces. Teachers and researchers have used the game to explore specific disciplinary curriculum such as spatial geometry (Förster, 2012), language and literacy (Bebbington, 2014; Garcia Martinez, 2014; Hanghøj, Hautopp, Jessen, & Denning, 2014), and ecology (Ekaputra, Lim, & Eng, 2013). This study contributes to the body of scholarly work which uses *Minecraft* as a study by exploring the collaborative, interdisciplinary literacies of the game. Interdisciplinary learning differs from transdisciplinary or multidisciplinary learning, and is described by Dyer (2003) as:

An organizational support infrastructure that promotes work interdependence, increases self-management, and increases responsibility on the part of team members for group performance and student outcomes. (p. 186)

An interdisciplinary approach requires a curriculum which is capable of supporting multiple overlapping disciplines, matched with teaching strategies which are sensitive to individual student learning situations such as attitudes, behavioural issues, and negotiation abilities (Crow & Pounder, 2000). An interdisciplinary approach in pedagogy and curriculum design is significant from the perspective of literacy education, as it allows literacy practices traditionally associated with single disciplines (writing, visual design, mathematics) to be articulated across multiple curriculum areas. This study contributes to understandings regarding the interdisciplinary potential of *Minecraft* as a secondary school literacy text by exploring data generated by a literacy/humanities classroom in which students engaged in literacy events which typically occur outside of dedicated disciplinary spaces. The study argues that *Minecraft* is a commercial video game text which features a robust and highly adaptable set of content generation and distribution features. When applied in school environments, the game can empower students to engage in digital literacy practices that are collaborative, creative, and are able to generate connections between their school and home lives. The study represents a range of applications for *Minecraft* in a classroom, allowing for new kinds of literacy practices

to manifest in classrooms by engaging with the game's possibilities for content creation, distributed learning, and a merging of formal and informal literacy practices. These approaches may amplify student engagement with formal study, while allowing student-led learning to occur within a digital, game-based learning space. For teachers, these insights into *Minecraft*'s value as a digital teaching and learning tool may prove valuable in augmenting their own digital classroom practice and developing an understanding of the benefits of a game-based approach to literacy learning.

1.3.1 Contribution to knowledge

This study argues that *Minecraft* represents a significant and powerful tool for literacy learning which merges both formal and informal digital literacy practices. An ongoing conversation has occurred over the last few decades regarding the best practice approach for integrating video games in formal study spaces. While it is largely impossible to achieve a universal consensus on the best approach for using video games as study texts or learning tools, researchers are engaged in an ongoing interrogation of teachers, pedagogies and technologies, locating new opportunities for further study, and seeking to generate a deeper and more granular understanding of how young people are engaging with electronic media and video games, and what the implications of that engagement may be for teaching and learning. This study argues that *Minecraft* represents a new opportunity for educators working in digital game-based learning spaces, in that it is a robust, flexible platform for cross-disciplinary digital literacy learning.

This study contributes to this discussion by offering an analysis of the data generated during a secondary school literacy program involving the use of *Minecraft* as a central study text. Rather than using the game as a piece of stimulus material around which students may create essays, reflective pieces, short films, or models, *Minecraft* itself is positioned as the digital environment in which learning and literacy events are occurring, and as a self-contained tool which allows students to author, and co-author, new texts which represent evidence of learning and skill development. I position video game play as an activity which, while being enjoyable for many of the participants involved in this study, is also a significant and valuable learning activity, and the traditional paratexts which students may be required to produce as assessable content (essays,

argumentative pieces) in a school context have been jettisoned in favour of an approach which argues that the playing of the game involves the creation of new digital texts, and those texts represent assessable content and evidence of skill development.

While prior studies have touched on these themes and have used a range of video games, including *Minecraft*, in formal study spaces, this research claims a new contribution to the body of work surrounding game-based learning by using a commercial digital game as both a consumable text, and as a tool for the authoring of new student texts. This study embraces the non-linearity of emerging video game genres, of which *Minecraft* represents a pioneering title, and mobilises the open-ended nature of the text in order to allow students to occupy both media consumer and media producer roles (Jenkins, 2006), in the service of literacy learning in a school setting.

1.3.2 Study limitations

This study does, however, feature a set of constraints in which it was designed and executed which impacted the kind of data that was generated and, subsequently, the kind of analysis that was credibly ready to be conducted. Data generation was limited to a single cohort of students, and a single subject. I was not given access to students outside of these scheduled classes and subsequently was not able to provide a comprehensive context for their schooling. There were significant technical limitations that were unable to be overcome at the school, including network quality and access, consistency of hardware, and students were not able to access the *Minecraft* environment outside of the school due to concerns regarding privacy and security expressed by the principal.

I was also limited in the students that I was given access to. Doing this work in a school context at that time was contentious, and I was only given access to the 20 students that comprised the study teacher's literacy cohort. Data generation was limited to a single hour per week, across three months, and I was not given access to the students to follow up on their experiences after the study's conclusion.

These limitations will be described in more detail in Chapter 8.

1.4 Organisation of the thesis

This thesis is presented in nine chapters. The first chapter provides a background and rationale for the thesis and introduces a range of key ideas and debates which will be developed throughout the proceeding chapters.

The following chapter (Chapter 2) is the first of two literature reviews which frame the study in terms of contemporary and historical research. In the first section of Chapter 2, I will provide a theoretical overview of literacy studies, which attempts to unpack the term 'literacy', examining it from a range of theoretical approaches, and seeking to locate a useful set of definitions for 'literacy' around which the study design can be meaningfully constructed. Beginning with an ideological model of situated literacies, I move through a range of models for understanding what it is to be literate, expanding the focus to incorporate multiliteracies, and Discourses, as a way of moving the focus more specifically towards digital literacies and techno-textual literacy practices. This second section traces an evolution of literacy from print to digital, describing a multiliteracies approach to understanding the composition of new media, then describing a theoretical backdrop for the participatory medias that have arisen from the new techno-cultures.

Chapter 3 is the second of the two literature reviews, and it provides a theoretical background upon which a video game-based study can be designed and implemented. The chapter begins by constructing video games as significant techno-texts in the lives of young people, describing research which advocates for their purposeful use in schools, and exploring some of the criticisms and concerns that have been expressed by scholars, writers, and journalists who question the safety of game play, and the validity of a game-based approach to learning. I then describe some of the responses to these criticisms provided by game makers in the form of educational (or 'edutainment') software, as a way of providing a historical overview of the ways that games have been used in classrooms. I then describe the new pedagogical possibilities of video games, discussing the role of participatory media as a method of skill development, and highlighting the significance of an approach to game-based learning which involves the production of material artefacts. The focus then shifts to the role of content creation in contemporary video game titles, and I explore two significant themes of the study which

provide useful analytical frames through which to interrogate video game play: collaborative learning and creative learning.

Chapter 4 outlines the methodology and study design, or methods, employed in the study. This includes a case for a qualitative approach, a rationale for the decision to design this research as a case study, and descriptions of the process that was undertaken regarding site and participant selection. I then describe the approach to analysis that is specific to video games and digital media, describing the potential uses of visual analysis, multimodal analysis, game analysis, and game systems analysis, before focusing specifically on video game-based methodologies. The focus then shifts to a methodological approach to literacy analysis, describing Bill Green's 3D model of literacy (1988), and Beghetto and Kaufman's model of creativity (2007). The chapter concludes with an outline of the study design itself, including descriptions of the site and participant selection process, approaches to data generation, and the kinds of artefacts that were collected at the study site, concluding with a brief description of the role of the researcher journal as an instrument of reflexivity.

Chapter 5 describes the research site, and provides descriptions of participant teachers and students. These descriptions of the study environment are designed to generate a contextual understanding of the conditions under which this study was conducted, and of the range of personalities who influenced and shaped the course of data generation.

Chapters 6 and 7 explore the major themes which emerged from the data: collaboration (Chapter 6) and creativity (Chapter 7). The analysis of collaborative learning occurring throughout the study covers a range of collaborative situations which involved the study curriculum and the playing of *Minecraft* in a formal study environment. In positioning *Minecraft* as a participatory text, I explore the game's role as a facilitator of collaboration through its promotion of communication and paratextual engagement. Creativity in game-based learning (Chapter 7) is then explored, focusing more closely on 'little-C' and 'mini-C' creativities. These ideas will be used in the succeeding analysis to explore the ways in which creative play heightens student engagement. The discussion then shifts to the question of aesthetic design in

game play, moving through cultural appropriation and representation of pop-culture images in student-generated *Minecraft* content.

Chapter 8 explores the findings described by the preceding chapters in terms of the research questions. I go on to explore the social aspects of emergent gameplay, of player choice and agency, and the alignments that can be interpreted from the play choices that participants make. I discuss distributed learning (Gee, 2017) and the ways that schools might better engage with student expertise. I then discuss the implications of creative learning more broadly, and consider their capacity for collaborative literacy practices.

In the concluding chapter (Chapter 8), I will explore some of the strengths and limitations of the study, beginning with a reflection on the study design itself, including the choice of text, curriculum design, and study approach. This section evaluates aspects of research which were selected, but also those which the study did not draw on, describing the possible future research opportunities. The chapter considers the changing models of video game development and consumption, before considering the role of the teacher in this kind of learning environment, drawing from emerging models of literacy education and current research. The chapter concludes with some discussion of what strategies might be best employed to capitalise on in-game literacy events in order to power game-based literacy learning.

2. Literature review: From print to multiliteracies

This is the first of two literature review chapters that frame the study, and will focus on a range of different approaches toward understanding and conceptualising literacy, drawing from the body of literacy research. The chapter begins with an acknowledgement that ‘literacy’ is a contested term, and that a single, unified definition of ‘literacy’ is elusive. I will, instead, draw on a range of literacy theorists who have contributed significantly to the field of literacy studies, delivering a range of perspectives on how to understand and articulate literacy, and what it means to be literate. I will move from the print literacies described by the historical literacy research, to multiliteracies and the New London Group (1996), drawing attention to the cultural shift towards hypermedia and digital texts containing multimodal elements in their composition. I will then describe the work of James Paul Gee in detail, before introducing Green’s (1988) 3D model of literacy, as a way of moving the chapter towards digital literacies, participatory culture, and techno-textual co-authorship. This will lead into a second literature review chapter, which provides a theoretical context for the use of video games in classroom spaces, as a way of enabling students to engage in rich, digital multiliterate practices.

2.1 Understanding literacy: historical perspectives

The field of digital literacy studies, to which this study aims to contribute, is framed by a historical field of inquiry located around attempts to conceptualise and define literacy and what it means to be literate. In this section, I will briefly provide a theoretical context for this study by exploring a range of perspectives on the ways that literacy can be potentially conceptualised. Luke and Freebody (1999) note that

from work on the history of literacy pedagogy, literacy curricula, and the manufacture of “literacy crises” by governments, we agreed that there was no single definitive, truthful, scientific, universally effective, or culturally appropriate way of teaching or even defining literacy. History taught us that literacy refers to a malleable set of cultural practices shaped and reshaped by different - often competing and contending -- social institutions, social classes, and cultural interests. (p. 2)

It is, then, difficult to provide a single statement, model, or approach to understanding and summarising literacy that can be interpreted as generalisable or universal. Instead of attempting to locate a simple, universal definition of literacy, I will draw from multiple examples of historical research which seeks to theorise a range of perspectives on how literacy may be constructed and articulated.

2.1.1 Situated literacies: An ideological model

Situated literacies (Street, 1984) exist as an ideological model which provides a significant theoretical backdrop to much contemporary research on multimodality and digital literacy. This approach opposes a traditional view of literacy, in which reading and writing are positioned as separate, essential practices which operate in isolation from the cultural, political, and social contexts in which they are enacted (Street, 1984; Barton, Hamilton, & Ivanic, 2000). Instead, the ideological model of literacy describes multiple, intersecting literacies that are mediated by the contexts in which they operate, and the institutions (particularly educational institutions) in which they are practised. Street (2003) describes literacy practices as ‘particular ways of thinking about and doing reading and writing in cultural contexts’ (p. 79). In the modern era, many of the cultural contexts in which young people engage in situated literacy practices involve digital technologies, in both their home and school lives.

Barton and Hamilton (2000) note that schools ‘find it very difficult to realise that there are other literacies outside the classroom’ (p. 8). Street (1995) argues that participation in a community requires the development and execution of a range of literacy practices that are collaboratively developed by members of that community (Mantei & Kervin, 2009). The literacy events which may indicate participation, interaction, and meaning-making within affinity spaces (Gee, 2003) may involve reading, writing, talking, or listening (Heath, 1983). Barton and Hamilton (2000) use a cooking metaphor to illustrate the ways that literacy events change in composition, expectation, and design as the context in which they occur changes; for example, cooking in the home requires a significantly different set of skills, behaviours, and routines from those of a professional chef who is cooking in a restaurant. The context in which literacy events occur, and the ways that those literacy events may be interpreted and understood as demonstrations of skills or practices, are entwined.

2.1.2 Cultural literacy as community participation

Green and Beavis (2012) note that the learning of language and the learning of culture are reciprocal and interrelated, observing that ‘as the young child learns to use the resources of firstly the spoken language and then its written forms, they learn culture – how to be within that community, that culture, how to participate in it’ (p. 28). Green (1988) argues that there is a cultural dimension of literacy in which text participants must make meaning through both context and content, and that the practices of enculturation require the learning of language and its mobilisation as a ‘resource for meaning’ (p. 161). This language may involve spoken or the printed word, but may also involve the cultural language of video games (Latorre, 2015), social media (Bourgonjon, Vandermeersche, Weever, Soetaert, & Valcke, 2016) and hypertexts (Ojamaa & Torop, 2015). In order to develop the capacities to engage in this kind of literacy work, text participants are required to develop additional operational and critical literacy skills in order to fully participate in an affinity space (Gee, 2003). Gee describes the spaces in which this kind of informal knowledge acquisition occurs as ‘affinity spaces’, which are ‘a place or set of places where people affiliate with others based primarily on shared activities, interests, and goals, not shared race, class culture, ethnicity or gender’ (p. 67).

2.1.3 Discourses: Understanding the acquisition of new literacies

Gee (1996) argues that to understand and define ‘literacy’, it is imperative to first define the term ‘Discourse’. Gee notes that there is a distinction between ‘discourses’ (connected stretches of language) and ‘Discourses’. Gee defines ‘a Discourse’ as

a socially accepted association among ways of using language, other symbolic expressions, and artifacts, of thinking, feeling, believing, valuing and acting that can be used to identify oneself as a member of a socially meaningful group or “social network”.
(p. 131)

In this context, a ‘Discourse’ describes a way of constructing identity which draws on community-defined ways of behavior and speech. When describing the Discourse of linguistics, Gee (1990) notes that

every act of speaking, writing and behaving as a linguist does as a linguist is meaningful only against the background of the whole social institution of linguistics, and that institution is made up of concrete things like people, books and buildings; abstract things like bodies of knowledge, values, norms and beliefs. (p. 143)

Individuals participate in one or more Discourses by adopting, appropriating, and mobilising the elements of the Discourse which are thought to define it, using two approaches: 'acquisition' and 'learning' (Krashen & Terrell, 1983). 'Acquisition' involves an individual developing knowledge subconsciously, through exposure to it, and a process of trial and error, separate from the formal learning context. The development of a primary language is thought to generally occur, initially, through acquisition, as the acquirer recognises that in order to function and participate in a Discourse, she or he must develop the ability to reflect the speech and behaviour of the social context. By contrast, 'learning' involves knowledge that is consciously and deliberately developed through teaching, across both formal and informal contexts. 'Learning' involves 'explanation and analysis' (Gee, 1989, p. 3), and is a process in which an individual's capacities are developed through an often measured and deliberate process.

In different contexts, and at different stages in life, individuals may develop knowledge through some mixture of acquisition and learning, and in different contexts, one may be privileged over the other. For instance, in a formal educational context, 'learning' is often the focus over 'acquisition' of skills and knowledge. Similarly, in different Discourses, acquisition and learning may be prioritised depending on the ways that the identity of the Discourse has been constructed. Instead, identities that are situated in Discourses are developed informally, and subconsciously, through our participation in them. The Discourse of an English student, by contrast, involves conscious and deliberate 'learning', in which knowledge is constructed for a specific purpose, in a specific context, rather than being subconsciously acquired through exposure and enculturation.

The contexts in which both acquisition and learning occur are described by Gee as 'primary' and 'secondary' discourses, which define the contexts in which Discourse participation occurs, and

the ways that literacy is constructed. This study argues that *Minecraft* offers opportunities for literacy education which allow students to both *learn* and *acquire* new knowledge. Teachers have historically used video games as tools for specific kinds of context-based, disciplinary learning (see 3.3), with games chosen which align thematically and pedagogically with the study discipline ('Mathletics'). In these instances, teachers are engaging in the development of knowledge through 'learning' in a formal educational space, in a way that satisfies the requirements of assessment and the objectives of school curriculum. *Minecraft*, however, represents a form of video game-based teaching and learning which, while capable of being used as a tool for 'learning', also allows students to engage in the acquisition of Discourses, and the Discourse-specific knowledge that such an approach offers. By allowing students to engage in the acquisition of the Discourse of video game play, in both classroom and leisure contexts, students acquire the knowledge that is required for participation in the Discourse. Gee (2001) describes this as being made an 'apprentice' in the Discourse, in which participants will acquire a range of knowledge, skills, and understandings that facilitate participation. I argue that in the process of acquiring the Discourse of video game play which *Minecraft* facilitates, students engage in the acquisition of new literacy learnings which are often highly prized by curriculum designers and classroom teachers.

2.1.3.1 Literacy and institutional Discourses

Literacy is then, according to Gee, the capacity of an individual to control the secondary uses of language, as products of secondary Discourses, which are seen occurring in institutional contexts beyond the primary, family-based Discourse. Gee defines 'control' as the ability to 'use', and to 'function' with, noting that 'control' is a concept that exists on a spectrum (p. 7).

A further, useful distinction that Gee makes involves 'dominant literacy' and 'powerful literacy'. 'Dominant literacy' is described as the control of a secondary use of language occurring in a 'dominant discourse', or a secondary Discourse which 'brings with it social goods such as money, prestige, and status' (Gee, 1989, p. 8). These are the secondary Discourses which enable social mobility, and allow individuals to gain access to institutions. A nondominant Discourse, by contrast, is a Discourse which 'often brings solidarity with a particular social network, but not wider status and social goods in society at large' (p. 8). Thus, the use of

language in a school, or workplace, may be considered a dominant Discourse, while the language used at a social club or group is nondominant.

‘Powerful literacy’ (Gee, 1989) involves ‘control of a secondary use of language used in a secondary discourse that can serve as a meta-discourse to critique the primary discourse or other secondary discourses, including dominant discourses’ (p. 6). A meta-level knowledge in both Discourses must exist in order to critique one Discourse with another, and Gee argues that this kind of meta-knowledge is a function of learning, rather than acquisition. ‘Powerful literacy’ is not a function simply of acquisition, as it ‘is best developed through learning, though often learning applied to a discourse one has to a certain extent already acquired. Thus, powerful literacy, as defined above, almost always involves learning, and not just acquisition’ (p. 6).

‘Literacy’, in this sense, describes an individual’s capacity to control, and master, secondary uses of language within secondary Discourses. This may involve the use of language as an instrument of social mobility and institutional access (dominant literacy), or the use of language as a tool through which both primary and secondary literacy practices can be critiqued through meta-level analysis (powerful literacy). As described in 2.1.1, individuals enter cultural and social Discourses through the appropriation of language and practices. Participation in these Discourses may involve the acquisition of cultural literacies in order to enable participation in community spaces. To understand the ways that literacy, in this sense, may be understood through observation and interpretation, a model of analysis that is specific to literacy activity becomes necessary. Thus, while Gee’s work allows us to understand the composition of literacies within Discourses, interrogating them requires a further theoretical approach, and in order to do this, I have selected Green’s 3D model of literacy (1988).

2.1.4 The 3D model of literacy

Green’s 3D model of literacy (1988) describes literacy as an overlapping set of social practices which can be articulated as three overlapping, concurrent, and interdependent dimensions. The 3D model of literacy can be used to understand the ways that literacy functions in both primary and secondary Discourses, and views literacy, in an educational context, as being threaded throughout the curriculum, rather than being considered an isolated, dedicated disciplinary

area. Durrant (2012, p. 93) describes the 3D model of literacy using the metaphor of a three-bladed fan, with each blade representing a dimension of literacy. The blades can be viewed in isolation when they are not in operation, but during literacy events, the separation of the blades becomes blurred, and they are indivisible. The 3D model, then, describes literacy as integrated and intersectional dimensions, occurring simultaneously when enacted. The three dimensions of the 3D model include the operational, cultural, and critical dimensions of literacy.

2.1.4.1 Operational literacy

The *operational dimension* refers to the language system, and the degree of adequacy with which individuals are able to engage with it. The operational dimension describes the ability to encode and decode language, to be able to recognise, identify, and react to spoken language and written text. It describes the ability to create content in addition to consuming content, and focuses on the mechanical processes by which language content is generated by individual authors. The operational dimension can also be used to describe the processes by which individuals are able to execute complex tasks within systems, such as computer operation, software operation, information access, and the manipulation of acquired material.

2.1.4.2 Cultural literacy

The *cultural dimension* of literacy refers to an individual's capacity to understand and make meaning of texts in various ways, from within specific contexts. The contextual aspects of literacy practices are described by the cultural dimension, which articulates the ways in which individuals write, read, and participate in particular contexts in ways that conform, or challenge, the accepted expectations of the expected contextual literacy practice.

2.1.4.3 Critical literacy

The *critical dimension* of the model refers to the ability to critique language, texts, software and hardware, and the uses of texts and technologies in specific contexts in order to mobilise them for particular purposes. This describes a process by which critical literacy involves the translation and transformation of existing practices into new, contextually valuable practices and meanings by one or more participants in the literacy event. Lankshear & Knobel (1998)

note that ‘the critical dimension of literacy is the basis for ensuring that participants can not merely participate in a practice and make meanings within it, but can in various ways transform and actively produce it’ (p.5). In many cases, this is a participatory and collaborative dimension of literacy, with the active construction of new literacy activities and practices being core, but critical literacy practices may also be individualistic, and must be approached in terms of how critical literacy events can occur without multiple participants.

While the 3D model was initially developed to understand the ways that writing operated in the context of the three dimensions of literacy, it was ‘gradually adapted to incorporate literacy within technological changes in communication’ (Green and Beavis, 2013). Luke and Dooley (2011) note that

the term ‘literacy’ traditionally refers to mastery of capabilities in reading and writing print text. With the rapid expansion of new modes of information technology, definitions of literacy have pluralized, expanding to include engagement with a range of semiotic forms. Visual, aural, and digital multimodal texts are now integral to language education, and to literacy education more generally. (p. 1)

An approach to literacy which acknowledges the rapid advancement of communications and media technologies, it is now necessary in order to accurately reflect the progression of the techno-culture. This is described through a multiliteracies approach to conceptualising literacy, as outlined in 1996 by the New London Group.

2.1.5 Multiliteracies and the New London Group

The term ‘multiliteracies’ was coined by the New London Group (1996) and argues that a multimodal combination of audio, visual, gestural, and spatial aspects now represents a critical aspect of what it means to be literate. Kalantzis and Cope (2009) note that in multiliteracies spaces, all forms of representation are not simple acts of reproduction, but are necessarily transformative and interpretive. Text participants are not passive consumers of signs and signifiers, but are engaged in an ongoing discourse between themselves and formal text producers in pursuit of new patterns, interpretations, and designs. In this sense

meaning makers are not simply replicators of representational conventions. Their meaning-making resources may be found in representational objects, patterned in familiar and thus recognisable ways. However, they rework these objects. Meaning makers don't simply use what they have been given; they are fully makers and remakers of signs and transformers of meaning. (p. 10)

Doloughan (2011) argues that in a multiliteracies space, non-linguistic modalities are afforded equal or elevated status:

In respect of multimodality, the emphasis has been on a move away from the primacy of the verbal towards an interest in exploring the impact of other modalities on verbal or written communication, most notably, though not exclusively, the influence of the visual. (p. 128)

As a result of this emphasis on the interpretive nature of literacy work, the co-constructed nature of multimodal texts, and a shifting balance between the verbal and non-verbal elements of text construction, literacy pedagogies must now draw on the emergent text forms generated by the information and multimedia technologies which rely heavily on this multiliteracies approach (Kalantzis, Cope, and Fehring, 2002). This rapidly increasing plurality of text forms suggests that an increasing importance may be placed in formal schooling for 'literacy' to be reimagined through the prism of multimodal culture. Teachers and researchers may find a deeper connection to the evolving techno-cultures if 'literacy' is expanded to not only include the written and spoken word, but the hybridity of modes which underpins multimodal culture also.

A key aspect of a multiliteracies approach highlights the increasing prominence of cultural and linguistic diversity (New London Group, 1996). As societies become globally connected via the online world, there is need for a greater sensitivity to cultural and linguistic diversity (Cope & Kalantzis, 2000). In a multiliteracies approach, while the multiplicity of differentiated, possibly regional dialects and subcultural framings has traditionally been positioned in terms of geography, local dialects are becoming increasingly fragmented through the increasing connectedness of both regional and global communities, who are often trans-global in form and

function. This shifting global context has ‘important consequences for the goals and pedagogies of literacy education, which should reflect the textual practices of the wider community’ (Mills, 2006, p. 62).

2.1.6 A multiplicity of literacies: new texts, new approaches

Gee (2003) describes 'multiplicity' (p. 14) as a defining characteristic of 21st century literacy, and in this sense, he refers to the ways in which the strict, static rules of using a text (for instance, tightly defined authors and spectators) are being changed by digital media. Young people continue to consume texts, but also to produce and distribute them, with both the final product and the potential audience often equalling traditional forms of professional media. This process of production and distribution is very much located in social practice, with student approaches to social learning, communication, and collaborating being driven by new technologies such as social media, and the democratisation of content creation tools. Learners require a vastly expanded set of tools to make use of the new forms of communication and content generated and offered to them, and identified as having significant cultural value amongst their peers. This expanded skill set is intrinsically linked with the changes to reading, writing, and communication that have come about since the advent of the Internet. While this kind of text production and consumption work has long been a feature of young people's engagement with texts and culture, the internet has offered a vastly expanded universe of opportunities for the creation, co-creation, and distribution of new content. As Gee writes: ‘In the modern world, print literacy is not enough’ (p. 19).

As described in 2.1.5, a multiliteracies approach (New London Group, 1996) attempts to shift the focus of literacy research away from traditional conceptions of literacy:

Literacy pedagogy, in other words, has been a carefully restricted project – restricted to formalized, monolingual, monocultural, and rule-governed forms of language. (p. 61)

Multiliteracies, then, view literacy as necessarily fragmented by the opportunities for language and literacy that have been generated by the advent of digital media. Multiliteracies describes

two important arguments we might have with the emerging cultural, institutional, and global order: the multiplicity of communications channels and media, and the increasing

saliency of cultural and linguistic diversity. The notion of multiliteracies supplements traditional literacy pedagogy by addressing these two related aspects of textual literacy. (pp. 63-64)

The New London Group point out that the increasing multiplicity of literacies is particularly important 'in the mass media, multi-media, and in an electronic hypermedia' (p. 64). This focus on digital platforms suggests that a specific kind of literacy is required to describe multiliteracy practices occurring in techno-textual spaces. Specifically, digital literacies (see 2.2). Literacy research which attempts to incorporate the emerging primacy of digital literacies has often focused on extending the pre-existing developmental and cognitive aims of traditional literacy curriculum. Studies have involved examining new reading practices in hyperlinked environments (Coiro, 2003), examining the ways that mobilising digital literacies has assisted in the development of cognitive reading strategies (Horning, 2004; Schmar-Dobler, 2003), and employing hypertext to support struggling readers (Coiro, 2003; Johnson & Hegarty, 2003).

While digital literacy often describes the new ways of reading that have been necessitated by the mass adoption of techno-texts and the internet, content creation and authorship represent a significant aspect of being digitally literate. Collaborative authorship is a significant aspect of digital literacy practices, which has been described extensively by Jenkins (2006) as an aspect of 'media convergence' (p. 2).

The communities of many 21st century learners have transitioned to online, digital community spaces. These include social media spaces such as Twitter, Facebook, and Reddit, which require specific grammars in order to communicate effectively, but also virtual worlds, and video games, which often require a complex array of digital literacies to be demonstrated in order to foster effective participation. In the next section, I develop a theoretical framing for the new digital literacies, describing the ways that they facilitate the creation, and co-creation, of digital texts in new media spaces, and empower individuals to meaningfully participate in the digital communities.

2.2 Digital literacies: techno-textual practices and the new medias

Digital literacy is, like literacy, an elusive term which describes a range of approaches for viewing and understanding multiliteracy practices (see 2.1.5 and 2.1.6). A digital literacy approach is, however, conducted through the prism of computers, the internet, and the specific kinds of literacies required to operate in techno-textual contexts. This is not to suggest that digital literacy represents an abandonment of the literacy practices described in 2.1, but rather, a set of new approaches powered by new media technologies.

Lankshear and Knobel (2006) note that

we should think of digital literacy as shorthand for the myriad social practices and conceptions of engaging in meaning making mediated by texts that are produced, received, distributed, exchanged etc., via digital codification. Digital literacy is really digital literacies. (p. 17)

Digital literacy, then, can be considered a set of multiliteracies which engage with emerging new media platforms and technologies, in which meaning making involves an arrangement of social practices, text consumption, text production, and text manipulation that are indigenous to digital hypermedia. Hafner, Chik, and Jones (2015) note that while there are a range of definitions for digital literacy that seek to understand 'what it means to be a literate member of society in the digital age' (p. 2). Noting that while 'digital literacy' has, thus far, resisted a precise or universal definition, there are cultural, operational, and social approaches to defining the term, which seek to understand the cultures and practices of digital communities and consider the ways that these literacies operate, evolve, and are replicated across groups of participants.

2.2.1 New literacies and the evolving techno-culture

Kress (2003) writes that "the *book* has now been superseded by the *screen* in the role of dominant medium of communication – using screen as a shorthand term for the new communication and information technologies" (p. 12). This comment points to a new definition, driven by mass media technologies, of what we consider 'literacy' to be. Traditionally, literacy has referred specifically to a meaning-making interaction with an alphabetic text which

operates through the medium of print, but modern learners require an expanded definition of 'literacy' which takes advantage of technological shifts in wider culture. New kinds of digital literacy practices are often requirements for tertiary study and employment, and are often developed during the out-of-school lives of students, who might turn to self-directed, digital learning through gaming and other forms of digital, participatory media. This may be because they “think and process information in fundamentally different ways than we, their predecessors (who grew up in a much more analog world) do” (p. 28). If, as Kress argues, the screen has eclipsed print as the dominant way learners experience language, it is important when considering the idea of 21st literacies to acknowledge “the media of communication: the effects of the ubiquity and dominance of the 'screen', and its effect on writing” (p. 19).

Knobel and Lankshear (2007) describe ‘new’ Web 2.0 literacies as consisting of ‘technical stuff’ and ‘ethos stuff’ (p. 7). The new ‘technical stuff’ describes the affordances of emerging technological trends, resources, and devices which enable the production of multimodal texts beyond ‘typographic means of text production as well as beyond analog forms of sound and image production’ (p. 9) - for instance, a manipulated image uploaded to Flickr, or an animated birthday card generated online and posted to a Facebook wall.

The ‘ethos stuff’ differs from the kinds of literacy activities and events associated with conventional means of text production as they are

more “participatory”, “collaborative” and “distributed” in nature than conventional literacies. That is, they are less “published,” “individuated,” and “author-centric” than conventional literacies. They are also less “expert-dominated” than conventional literacies. The rules and norms that govern them are more fluid and less abiding than those we typically associate with established literacies. (p. 9)

Thus, the new literacies of the 21st century do not simply refer to approaches to text production that are advanced or extended by access to consumer technological tools. Instead, they are a nexus of the ‘technical stuff’ of new technologies, software, and devices which empower users to engage in new approaches to text design and distribution, and the ‘ethos stuff’. The ‘ethos stuff’ of the new literacies represents a shift in mindset away from solo authorship and

industrial publishing, towards a new understanding of text construction. This often involves a collaborative approach towards the co-construction of new texts, with multiple participating authors, distributed via the new channels offered by emerging 'technical stuff' such as Facebook, photo hosting sites, and social media.

Modern consumer culture has been profoundly complicated by the emergence of digital media, and by mass adoption of the internet. Kress's assertion that the book has been displaced by the screen (2003; 2009) requires extension; the screen, as the interface between monologic culture and the consumer, is increasingly complicated by the rise of convergent media. Jenkins (2004) posits that *media convergence* refers to the process by which the traditional demarcations separating technologies are rendered unstable, and a single, designed function becomes increasingly obsolete:

Our cell phones are not simply telecommunications devices; they also allow us to play games, download information from the internet and receive and send photographs or text messages. Any of these functions can also be performed through other media appliances. One can listen to The Dixie Chicks through a DVD player, car radio, Walkman, computer MP3 files, a web radio station, or a music cable station. (Jenkins, 2004, p. 35)

The pervasiveness of this new transmedia environment is emphasised consistently throughout much new media research (Webb, 2010; Bolter, 2005; Kress, 2009), with the hybrid nature of convergence emerging as an important facet of modern technologised life. In this environment of composite digital texts, the singular nature of a legacy media object (a media product generated using the processes, technologies, and cultures of the pre-digital era) like a printed book or a single purpose video may be perceived as an anachronism. Participatory culture, in this context, demands a redrawing of the boundaries between producer/consumer, and spectator/participant. This collapsing of content and interaction is deeply pervasive:

Convergence is taking place within the same appliances... within the same franchise... within the same company... within the brain of the consumer. (Jenkins, 2004, p. 34)

This sense of fusion has led to legacy media producers attempting to redefine film and literature by 'appropriating and refashioning the representational practices of these older forms' (Bolter, 2005, p. 14). This attempt at rejuvenation has, in many ways, proved challenging due to the resistance of content creators to enter into a convergent relationship with both medium and audience, and to quite deliberately position the medium as being necessarily conservative and traditional:

If computer games and interactive television appear to offer new narrative possibilities, film has largely rejected these possibilities (or at least reinterpreted them) and constructed itself (ironically) as a popular, cultural rearguard. (Bolter, 2005, p. 14)

As a result, a number of media theorists have emphasised the necessity for new media, in this case digital games, to abandon the 'constraining traditions of film and television' (Bolter, 2005, p. 15), and to embrace cultural forms which more closely reflect the realities, and opportunities, of convergent culture (Bolter & Grusin 2000). While this has occurred in progressive technological media spaces, for instance the agile and user-driven Netflix, and in the opportunities for independent content creation and distribution presented by Youtube, legacy spaces forged in legacy media have struggled to similarly adapt. This does, however, raise a number of important questions regarding the legal, cultural, political, and social economies which students will be required to navigate in order to enter the global, convergent Discourse. New media increasingly casts audiences in both creator *and* consumer roles, requiring a commitment to ongoing participation in order to fully experience the content, and potential, of individual texts. These shifts in the ways that young people engage with content as both producers and consumers represents a pivot away from the traditional orthodoxies of media spectatorship, towards an environment in which the creation and distribution of media objects involves multiple authors.

Levy (1997) describes the mass-scale, global systems of information collection, storage, and access as 'collective intelligence'. The generative potential of digital human knowledge communities represents a profound ideological and epistemological shift away from the Industrial Revolution-era conception of mass education occurring in the west (Shaffer, 2006, p.

37), which often rejects collectivism and prizes high-stakes standardised testing. Brown and Duguid (2002) note that future economies will rely heavily on a convergent package of knowledge-based skills:

These are, rather, areas where making sense, interpreting, and understanding are both problematic and highly valued areas where, above all, meaning and knowledge are at a premium. (p. 95)

Many formal learning spaces have not been capable of updating their curriculum, and have struggled to align pedagogy and text selection with the new cultural realities of a changing media landscape. Instead, legacy media objects such as printed textbooks and screens often drive a curriculum which represents a significant pivot away from the new media environments which many young people inhabit. In order to ensure currency and opportunity in the classrooms of the 21st century, approaches to curriculum which ensure that students are being prepared for the technological realities of the modern workplace are increasingly crucial. This requires an ongoing conversation around the nature of 21st century schooling, as an environment which prepares students to enter further study and the workforce. Shaffer acknowledges this challenge, noting that:

The problem, however, is that industrial schools don't particularly encourage innovative thinking. We live in an era where global competition is sending overseas any job that relies on standardized skills and knowledge. (Shaffer, 2006, p. 38)

In this sense, classrooms that rely solely on non-convergent legacy content are attempting to teach 21st century learners through anachronistic and, often, irrelevant forms of media. As a response, Gee (2003) suggests that an expanded understanding of 'literacy' is crucial to analysing the ways in which students are engaged with new media, and that mobilising the array of emergent 'digital literacies' is necessary for engaging with modern economies, and modern workplaces. More specifically, Gee points to a need for an understanding of digital 21st century literacy which acknowledges the transition away from the limitations of print media, towards digital spaces which problematise the rules that define text use and interaction; a multiliteracies approach.

2.2.2 Media convergence and digital texts

As the technology-driven cultures of the 21st century invite audience participation, and integration, in the authoring process of digital texts, it becomes imperative that researchers focus their attention on the ways that young people are being prepared to effectively engage with new media (Flew, 2009; Hutchinson, 2015). The rise of participatory media has placed a new emphasis on preparing young people to engage with complex media texts by focusing on 'media literacy' (Burn & Durran, 2007), who note that 'media literacy, then, may be best conceived as a subset of multiliteracies, applicable to mass media forms in particular' (p. 5). 'Media literacy' is often a contested term, with writers preferring the term 'media competence' (Vered, 2008), or 'media education' (Buckingham, 2003) to describe the practice of teaching young people to navigate complex, convergent media spaces. Potter (2012) notes that media literacy is not comfortably analogous with print literacy, echoing earlier claims made by Buckingham (2003) who highlighted an important distinction between the two regarding production. Buckingham (2003; 2007) argues that the term 'literacy' is critical, as while it describes the interpretation and manipulation of media, it also describes the *production* of new media objects:

Media literacy involves 'writing' the media as well as 'reading' them; and here again, digital technology presents some important new challenges and possibilities. The growing accessibility of this technology means that quite young children can easily produce multimedia texts, and even interactive hypermedia – and increasing numbers of children have access to such technology in their homes. (2007, p. 49)

It is critical that the literacies engaged during the creation of new creative and intellectual works using the content generations applications are explored as examples of convergence culture, and understood through the prism of media literacy. It is, however, equally critical to understand the role of participatory culture in 21st century media, and the relationship that it has with media education.

2.2.3 Participatory culture and creative labour

Jenkins (2006) used the term 'participatory culture' to frame the contours of children's interactions with technology, and the connectivity offered by the internet, focusing on their roles as active producers of multimedia content. He posited that this kind of culture, incorporating email, text chat, and video games, was neglected by policy makers, despite their growing primacy in the social and intellectual worlds of young people. He claimed that 'these communication and entertainment-focused activities, by contrast with the information-focused uses at the centre of public and policy agendas, are driving emerging media literacy' (p. 5).

New media literacies involve the traditional literacy practices of print media, but also encompass the newer forms of literacy activity promoted by emerging digital media. Jenkins (2006) argues that our relationships with written language will evolve as different opportunities for engagement with new media texts become available (p. 29). For example, blogs, Facebook posts, and Twitter conversations do not 'replace' reading and writing, but are recontextualised practices which power new forms of digital communication (Lohnes-Watulak, 2010; Mills, 2009). The reconfiguration of student participation in digital culture from one of consumption to a production-oriented model has significant implications for classroom pedagogy and the design of formal learning spaces (Scardamalia & Bereiter, 2006). Erstad (2013) describes remix culture in the Norwegian education system as an example of how formal schooling is able to invite the fluidity of content generation which occurs throughout informal learning spaces into the classroom, as a vehicle for digital media production. He notes:

The question that arises is how media production practices in schools today indicate a change of what it means to read and write, building on the experiences of young people from outside of schools, and the importance of media production through all subjects and levels and not only as part of specific media-related subject domains. (p. 190)

Selwyn (2016) describes remix culture as having significant impact on teachers in addition to students, citing the re-use and modification of PowerPoint slides made by other educators as a common practice in classroom teaching. Selwyn argues that traditional notions of 'ownership'

of learning materials have been rendered vulnerable by the rise of ‘co-creative labour practices’ (Banks & Deuze, 2009).

2.2.4 Media participation through media production

As described in 2.2, for many young people effective engagement with the increasingly technologised media environment of the 21st century requires them to operate as both consumers and producers of multimedia content. Social media’s reliance on the authoring and co-authoring of posts, comment threads, galleries, and videos suggest that for young people, their capacity to engage with these platforms is often shaped by their ability to manipulate texts, generate new assets, remix and recontextualise found content. The acquisition of these skills as tools for engaging in the new forms of participatory culture suggests that it is increasingly necessary to consider the role of media literacies in the intellectual lives of young people. Students are often now required to navigate shared media spaces, working as content authors alongside the traditional, ‘professional’ culture industries (Hesmondhalgh, 2007). As consumers of more conventional legacy media are asked to begin operating as amateur content creators themselves, Bruns (2008) describes this new hybrid role as a *produser*; a portmanteau of ‘production’ and ‘usage’:

These produsers engage not in a traditional form of content production, but are instead involved in produsage – the collaborative and continuous building and extending of existing content in pursuit of further improvement. (p. 1)

Jenkins and Bertozzi (2008) describe the transformative power of participatory culture in remaking the production, distribution, and consumption of public art, highlighting the ways in which these media literacy practices also involve community-led knowledge and role fluidity (p. 161). Aspects of the creative processes of community-driven produser engagements have been described by Banaji and Burn (2007), who describe a range of Discourses associated with ‘creativity’ in both digital and non-digital contexts. Burn (2010) emphasises the potential for rich analytical work inherent in student-led media production, arguing that media production is inherently interpretive, citing a case involving a group of students creating their own filmed sequences from *Romeo and Juliet*. Burn argues that during the process of production, students

acquire ‘new understandings not only from close attention to the Shakespeare text, but by ‘anatomising’ the filming text in order to remake it’ (p. 3). Durrant (as cited in Green & Beavis, 2013) identifies the value of this approach which allows students to develop an understanding of the production process, noting that

critical understanding, rather than encouraged solely as a theoretical concept, is better achieved when students have some grasp of how media texts are actually produced. (p. 76)

Media production often requires the engagement of multiple, simultaneous dimensions of literacy, and Green’s 3D model has often been used as an analytical device for understanding their simultaneous and integrated operation (Marsh, 2016). These examples of media production are, however, closely tied to participant expertise, and it is the new forms of skill acquisition which may prove particularly fruitful for educators and policy makers. The new knowledge economy of the 21st century offers a different landscape for the creation and co-creation of new skills and knowledge (Horning, 2004; Lemke, 2013), which has significant implications for the shape of media education. This new landscape must be articulated by school curriculum which is sensitive to the changing nature of literacy. This affords students the opportunity to engage in the development of situated literacies affording participation in digital community spaces.

This study is, however, interested in the potential of digital games to enhance and extend the efficacy of formal schooling through the generation of rich literacy learning. In the following chapter (Chapter 3), I will focus specifically on video games, drawing on the literature which currently frames our understanding of game-based learning, and considers the potential for video game-based learning as a feature of a digitally responsive classroom.

3. Video games and learning

The culture of young people is increasingly defined and articulated by an evolving constellation of digital texts. Video games, as one kind of digital text that comprises a significant space in youth culture, represent a rich opportunity for educators and researchers to locate new

opportunities in the techno-landscape of young people (Salen, 2007). In this chapter, I present an overview of the research which positions video game texts as valuable resources for the kind of powerful literacy learning described in 2.1.2. This chapter will explore of the historical use of video games in schools, and will then shift to a review of the literature which interrogates the potential of video game-based teaching and learning in a contemporary school context.

Chapter 2 argued that the nature of literacy practices has changed with the advent of digital consumer technologies and the mass adoption of the internet. While significant progress has been made in terms of school pedagogies supporting the new literacy practices of the emerging techno-culture, I argue that the rise of convergence culture, with a focus on participatory media, represents a significant opportunity for educators and policy makers. I argued that while there are remaining challenges in terms of articulating a comprehensive vision for digital education, digital texts such as video games represent generative learning resources.

Commercial video games represent a new challenge to educators who want to work in emerging digital spaces, and *Minecraft* can be used as an effective environment for the production literacies described in Chapter 2 (see 2.2.3 and 2.2.4). After an initial framing section which provides an overview of the literature that advocates for video game texts as purpose-built tools for new media education, I draw on the literature which critiques the use of video games in schools, and questions the value of video game play. I describe a range of studies that outline historical approaches to video game-based education, including ‘edutainment’ software packages, and the use of commercial simulators. I then shift the focus towards research which attempts to position video games as generators of new pedagogical options for educators working in new media spaces. I explore the literature which describes strategies intended to effectively integrate video games into formal curriculum spaces. I also unpack some of the questions around skill and knowledge development occurring through video game-based teaching and learning, by drawing on literature which specifically addresses these aspects of a game-based approach to education.

The chapter moves to a focus on practical implementation of games as curriculum. I outline a range of studies suggesting that video games are well aligned with a digital literacy focus on

content generation and media production, describing *Minecraft's* specific features which position it as an ideal production tool. I explore video game-based strategies for content authoring, and I discuss features inherent in the playing of video games which has implications for literacy teaching. The chapter concludes through exploring potential capabilities linked to literacy education, and leads into the description of study methodology found in Chapter 4.

3.1 Video games and new possibilities for digital education

James Gee (2003) posits that recreational computer games require the mobilisation of effective learning strategies in order to be successfully played, and to be experienced pleurably. In analysing the structure and interactivity of a range of contemporary computer games across a range of genres, he found that successful games draw on a number of learning principles which can be more commonly seen in traditional curriculum objectives. Gee and others (Squire, 2006; Shaffer, 2006; de Freitas & Maharg, 2011) have noted a number of identifying factors pointing to the validity of game-based learning, including the experiential nature of game learning, the motivating nature of the gaming medium, and the provision of educationally-rich contexts which facilitate participatory, collaborative knowledge communities of practice, both real and digital (Wideman et al., 2007, p. 12).

Cordova and Lepper (1996) note that secondary school separates certain forms of knowledge and understanding from a context which is engaging for young people, raising the potential for student disengagement:

In fact, it may be quite adaptive for students to seek out activities that they find inherently pleasurable while simultaneously paying attention to the extrinsic consequences of those activities in any specific context. Seeking only immediate enjoyment with no attention to external contingencies and constraints may substantially reduce a student's future outcomes and opportunities. Conversely, attending only to extrinsic constraints and incentives can substantially undermine intrinsic interest and the enjoyment that can come from learning itself. (p. 8)

Computer games have the potential to recontextualise knowledge-based learning by using a situated, context-driven pedagogy. Games present a psychological reality for players that may

appear 'virtual' from an outsider's perspective, but which allow players to develop new, situated understandings through experiences in otherwise inaccessible, complex domains (Gee, 2003). This form of learning can be conducted across multiple contexts, with skill and knowledge development occurring through a multi-disciplinary, multiliteracies framework. This anchors abstract knowledge and complex concepts in a platform which prizes performance of competence, the self-auditing of progress, and collaborative knowledge sharing:

In virtual worlds, learners experience the concrete realities that words and symbols describe. Through such experiences, across multiple contexts, learners can understand complex concepts without losing the connection between abstract ideas and the real problems they can be used to solve. In other words, the virtual worlds of games are powerful because they make it possible to develop situated understanding. (Shaffer, Squire, Halverson, & Gee, 2005, p. 5)

Research has indicated that a game-based curriculum design may offer students and teachers a range of opportunities for engaging digital learning. There are a number of cited attributes seen as contributing to this, including the immersive quality of video game narratives (de Freitas and Maharg, 2011), and the complex identity work conducted through the fantasy and role-playing elements of game design (Slator, 2006). The use of advanced graphics, audio, and video content to heighten the immersive elements of the text (Rigby & Ryan, 2011), and the sense of competence and achievement through the incrementally increasing difficulty of tasks and challenges, has also led to these kinds of outcomes (Buckingham & Sefton-Green, 2003). These elements have all been demonstrated to directly contribute to learner motivation and engagement (Blumenfield et al., 1991; Stipek, 1998), with Blumenfield pointing out the primacy of techno-cultural learning environments as effecting heightened engagement and collaborative, modular pedagogies:

For teachers, technology can provide the knowledge and resources necessary to implement projects in their classrooms; software programs give teachers a means of illustrating and storing information about individual students, individual projects and their activities, and methods of helping students understand ideas or concepts; and

electronic networks offer ways for teachers to share information with other teachers; technology provides teachers with support for planning and designing activities and for carrying out these plans. (pp. 389-92)

The cultural contexts in which computer and video games operate often draw heavily on affinity spaces (see 2.1.3), in which knowledge, skills, resources, information and tools are shared amongst players in order to achieve common learning. These communities of practice may occur as a part of the playing of the game, but are often conducted through online forums, websites, social media, and instant messaging. Information is often shared, technical problems are often collaboratively overcome, and tasks are deconstructed and analysed by multiple participants in order to locate optimal solutions (Backe, 2012). In other games, such as Blizzard's *World of Warcraft*, the community of practice is supported within the game, with players creating self-run "guilds" in order to mutually achieve in-game goals (Steinkuehler, 2004; Martin and Steinkuehler, 2010). The importance of communities of practice as intrinsic elements of the modern experience of video game playing has not gone unnoticed by producers and designers, with Sony including a range of proposed knowledge-sharing opportunities built into the *Playstation 4*. For example, players being able to invite one another into their games, via the internet, and collaborating in real-time to complete in-game goals. A similar example of this kind of community-driven activity can be seen in 'longplays' presented on Youtube, in which people narrate footage of their game play, or in the phenomenon of sites such as Twitch, where video games are played live via streaming video. The pervasiveness of these knowledge communities is increasingly highlighted by research literature as leading to the development of professional-level expertise in a range of disciplines (Wideman et al., 2007; Shaffer et. al, 2005; Gee, 2003; Ferdig, 2009) which are valued in both formal schooling and informal learning contexts. Many games allow learners to engage in activities conducted through a virtual 'practice field' (Senge, Kleiner, & Roberts 1994), in which the authentic activities of real-world communities can be exercised using the same problem-solving and analytical skills (Squire, 2006). A significant modern example of this kind of gameplay can be seen in Mojang's *Minecraft* (2009).

3.1.1 *Minecraft*: a global techno-cultural phenomenon

This study uses *Minecraft* (Mojang, 2009), a cross-platform video game currently enjoying significant popularity among young people (Gilbert, 2017). Originally an independent, self-published software title created by Markus 'Notch' Persson, later published by his company Mojang, *Minecraft* was purchased by Microsoft in 2014 for \$US2.5 billion (Yarow, 2014).

Minecraft is a building game with light adventuring and role-playing elements, including enemies and combat, in which players explore a vast, randomly generated virtual world created from geometric blocks, each with a specific value assigned (dirt, stone, water, etc.). *Minecraft* is considered a global cultural phenomenon, with 106,759,714 copies sold as of 2016 (Callaghan, 2016), and a significant commercial power amongst young people (Weinberger, 2017; Thompson, 2016). *Minecraft* is currently available on most consumer digital platforms, including Microsoft Windows, Windows 10, Playstation 4, Xbox One, iOS, and Android, with Microsoft committed to expanding the cross-platform compatibility of the game, ensuring that created content carries between devices and platforms seamlessly (Sarkar, 2017).

While *Minecraft* has a significant focus on the traditionally ludic dimensions of the game's construction, it has also been appropriated as a significant and powerful educational tool (Dezuanni, 2017; Haxton, 2015), with applications across a range of disciplines. The game features an 'Adventure' mode, in which a player must battle monsters and enemies while collecting resources and building structures and tools, and a 'Creative' mode, which allows players to simply focus on the creative potential of the game's engine. Microsoft has oriented *Minecraft's* development towards educational contexts significantly in recent years, with a purpose-build 'Education edition' of *Minecraft*, with supporting resources, available to teachers and researchers (Mojang, 2017).

Minecraft represents a significant advancement in the history of video game implementation in schools. While the game was not designed with educational utility in mind, the game's potential as an educational instrument has not gone unnoticed by research communities, and this study attempts to contribute to that discussion by exploring the use of the game in a literacy context. The implementation of video games in schools is not, however, a new concept, and has existed in various forms since the introduction of consumer personal computers in the late 1970s –

early 1980s. The design and delivery of computer and video games which were designed around their educational utility has changed with the shift in the culture, and affordances of emerging technologies.

3.1.2 Critique of children's engagement with video game media

Video games do, however, remain contentious among many sectors of the community, and their presence in schools is not necessarily considered a valuable or desirable addition to the curriculum. Tassi (2012, 2013) describes controversies occurring globally in which video games have been blamed for real-world gun violence, with the mainstream media endorsing and promoting a view of the medium as being unhealthy, and capable of negatively influencing young people's behaviour. Ruddock (2013) suggests that 'gaming violence isn't the major cause of real-world violence, but it probably is enough of a catalyst to warrant concern', noting that 'there is reliable evidence that a long-term diet of violent game playing leads to an increase in real-life aggression'. Tortolero et al. (2014) claim that excessive exposure to video games can result in elevated levels of depression, particularly among pre-adolescent children. Schreier (2015) refutes these claims, criticising a number of studies that have found an increase in violent behavior in children as a result of video game play, citing problematic aspects of methodology and study design, notably the short term, rather than longitudinal nature of data generation, and the dismissal of competitive play as a contributing factor to the outcomes.

The alarmism which often surrounds children and video game play has impacted negatively on the way that games are received in formal school contexts. Khomami (2015) describes 16 schools in the U.K which issued a statement threatening to report parents to police and social services if their children were allowed to play violent video games, citing the popular *Grand Theft Auto*, *Gears of War*, and *Call of Duty* series of games as being particularly unhealthy. Harradine (2016) cites the negatives of game play in schools as relating to physical health, including elevated levels of obesity resulting from inactivity. Oppenheimer (2003) suggests that the broader implementation of technology in schools has failed and represents a legacy of uncritical planning, poor implementation, and badly allocated funding that has not provided a clear link to increased outcomes, with technology advocates overestimating the benefits of a

technological model. Palmer (2006) goes one step further, attributing obesity, dyslexia, and ADHD to 'our modern lifestyle of TV, computer games, and cell phones', citing compromised listening and communication skills, and a reduction in face-to-face interaction being directly attributable to the saturation of video games in the lives of children.

These concerns frame an ongoing debate around the suitability of video games in the lives of children, which is often articulated as educational policy designed to police use and provide teachers with resources necessary to orient their classrooms towards a less contentious mode of instruction (see 8.3.2). The gaming industry has, however, responded by attempting to create games that address some of the concerns of anxious parents and administrators, which often eliminate controversial content (violence, sexuality, etc.), and make explicit the intended educational utility of the games. In the following section, I explore a range of educational software titles, considering their contribution to the field of game studies, and framing this study by arranging them as historical precedents to work now being done with games such as *Minecraft*.

3.2 Educational software: a historical context

Schools frequently draw on dedicated educational titles in order to introduce gaming literacies to their classrooms in a way that may be perceived as purposeful. In this study, I argue that dedicated educational titles are often poorly designed games, and that the learning systems offered in commercial video game titles often provide educators, and learners, with a richer, more expansive, and more culturally relevant study text. Rice (2005) notes that game-based education research continues to be an iterative research project, with emerging evidence for the value of gaming as a pedagogical approach. He notes that there are often misconceptions amongst teachers, administrators, and curriculum developers regarding the kinds of titles available to consumers of modern video games. With storytelling and visual budgets which rival those of Hollywood cinema, the modern video game bears little resemblance to the more traditional point-based arcade machines of the past. Many adults may remember *Pong*, *Tetris*, or *Space Invaders*, and while they are important in terms of the medium's history, contemporary video game media does not resemble these embryonic titles. Gee (2003) views

video games in a similar fashion, emphasising the need for video games to be played ‘critically’ in order to unlock their learning potential:

The content of video games, when they are played actively and critically, is something like this: They situate meaning in a multimodal space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships and identities in the modern world. (p. 48)

Education-specific software is often created in a way that attempts to make explicit and visible the critical nature of video game play, by bringing the educational aims of the software to the forefront of the game’s design. Since the dawn of personal computing, much education software has been created which pursues a range of different literacy-based goals. Historically, these games were often limited in scope, and while appearing primitive in retrospect, a number of successful educational titles were released during the 1970s and 1980s, such as *The Oregon Trail* (1971), and *Where in The World Is Carmen Sandiego* (1985). These titles have both been heavily referenced in research literature pertaining to game-based curriculum, and are now positioned as ground breaking and influential educational titles, despite obvious limitations owing to their historical context (Charsky, 2010; Kafai, 2006; DiSalvo, Crowley, & Norwood, 2008). *Sim City* (1989), by contrast, is a game which was not designed with a specific pedagogical utility, but has nonetheless been similarly used as a tool for teaching and learning, with a particular focus on urban planning, design, and policy formulation. Research into game-based pedagogies has increased in sophistication, with research exploring the pedagogical power of virtual worlds (Steinkuehler, Squire, & Barab 2012), games as tools for rejuvenating disadvantaged classrooms (Steinkuehler 2010), and the modular nature of PC games in constructing a participatory, user content driven classroom space (Postigo 2008). Ito (2012) notes that ‘current research on games and learning has clearly moved beyond many of the conceptual paradigms that structured early educational games, and the field has been enriched and expanded in a way that would have been difficult to imagine in those initial years’ (p.9). A significant shift in the thinking which frames the original wave of ‘edutainment’ developers

involves an increasing awareness of the limitations, and challenges, of a game-based learning tool, and an ongoing conversation regarding best practice in design and implementation.

3.2.1 The limitations of 'edutainment'

Leddo (1996) notes that most 'educational games', or games which are designed specifically for educational purposes, would never be voluntarily played beyond the classroom, regardless of the varying levels of their adherence to both the pedagogical and game playing potential of the video game medium. In the intervening years, advances in technology have not radically improved the educational software industry; it still remains separate from mainstream game development, and does not equal the production qualities of a commercial title. This is a view shared by Egenfeldt-Nielsen (2006) who also notes that

criticism also addresses the low quality of technology, gameplay, and graphics which relates more directly to the actual edutainment product. Still, the criticism of these titles resting on behaviourist principles has led to an overall negative attitude towards edutainment titles. (p. 193)

'Edutainment' titles are often perceived as being inauthentic and limited imaginings of computer and video game culture by students (Gee, 2007), which 'neither *educated* or *entertained*' (p. 206). Most educational games to date remain unsupported by significant research (Shaffer et al., 2005), and are often cheaply and poorly made, with little understanding of the fundamentals of game design or ludological theory (Apperley, 2010). As noted by Wideman et al. (2007):

There is skepticism in the educational community regarding the applicability of gaming to education, which can only be addressed through basic research, design experiments, and successful demonstration projects that are rigorously evaluated and show clearly documented benefits. (p. 15)

In order to reconstruct this perception of gaming and education, it is necessary to observe and understand the cultural currency of gaming among young people; that is, the positioning of computer and video games as cultural objects, designed to function in a broad range of nonetheless specific cultural contexts (Gee, 2010; Chen, 2009). This new intellectual and

cultural currency is one which exercises a specific form of intellectual inquiry, in a specific cultural context; the utility of knowledge performed through active learning, through digital platforms which authentically engage with the cultural realities of 21st century life. The video game, then, is one potential generator of this new kind of currency:

Computer gaming offers the possibility of developing important skills for the knowledge economy— computer and information literacy, database development and management, knowledge networks, data analysis— as well as more traditional skills associated with reading, writing, arithmetic, and social interactions. (Davidson, Goldberg, & Jones, 2010; p. 25)

The knowledge economy is an increasingly relevant aspect of the contemporary job market as the manufacturing and production sectors shift their focus to developing countries, and new technologies continue to generate new employment opportunities. It is, then, critical that the education sector can adapt to these changing conditions in the vocational preparation offered to students. Edutainment software, for the most part, is problematic as a mechanism for meeting both the commercial expectations of young people and the broader learning imperatives of school curriculum.

3.2.2 Simulation-based learning

The potential for video games to act as simulators is an aspect of game-based learning that has been identified in the literature, using commercial game software, rather than industrial or military simulators. Squire (2004) focused on a low-SES classroom, and noted that despite a slow, challenging beginning, students began to demonstrate a range of positive responses to his experimental curriculum, and that *Civilization III* was allowing history to be taught in a far more engaging, generative way. He began to identify a range of positive pedagogical outcomes emerging from study participation, of which many mirrored the traditional objectives of legacy curriculum:

Not only do players learn specific terminology (names, places, and dates), but they also develop understanding about how the model itself works as a means for representing history. Some players turned the game into a colonial simulation tool, using it as a

context for asking under what conditions might have Native Americans held off European colonists. Others were interested in playing as Egypt, and seeing if they could fend off the Greeks, Persians, and Romans. (p. 4)

Squire also noted that the game provided a rich context for identity work, and was a flexible and adaptable platform for supporting the development of co-constructed knowledge and collaborative skill development, while allowing for content generation via the game's ability to be modified. He also observed the game's unique abilities as a tool of historical re-enactment and simulation, and posited that as the game contains a host of user-defined variables which can have dramatic effects on the game's narrative, and on the styles of play, it presents a form of gameplay based around 'historiographic choices':

In creating or modifying a scenario, players view historical facts as modifiable variables in the scenarios they create in order to instantiate specific historical simulation... in many ways, developing the skill to design historically relevant scenarios relies heavily on the ability to identify in-game factors such as, rates of cultural expansion, as well as a thorough understanding of how factors like say, economic interdependence and organized religion play in to civilization conquests. (p. 7)

This approach defines *Civilization III* as part of ergodic literature (Aarseth, 1997). Non-ergodic literature describes a text, such as a printed book, which does not require a significant amount of effort during consumption, for example, moving one's eyes along the lines of text and turning the pages (p. 1), and consuming the text in a linear, sequential, monologic mode. An ergodic text, by contrast, is one in which the reader/participant is recast in a co-constructing role, making choices and shaping the course of the narrative. In *Civilization III*, the game's narrative emerges through a co-authorship relationship existing between the developers of the software, the game's systems of simulation, and the player who is providing ongoing mechanisms for the animation of story, narrative, and intertextual outcomes. This is an approach which renders texts unstable and unpredictable; the ergodic text is one that is unwritten, with readers (or, in this case, players) able to pursue possibilities, outcomes, and aspects of play that would otherwise be unavailable in a non-ergodic, traditional printed text.

Civilization III can be considered an ergodic cybertext, as the medium – a video game – presents a set of tools which recast the reader as an active participant in the generation of a personal story, driven by their desires and interests. These choices will emphasise one or more themes, dimensions, or narrative threads, while de-emphasising others. Aarseth notes that

when you read from a cybertext, you are constantly reminded of inaccessible strategies and paths not taken, voices not heard. Each decision will make some parts of the text more, and others less, accessible, and you may never know the exact results of your choices; that is, exactly what you missed. This is very different from the ambiguities of a linear text. (p. 2)

Civilization III's status as an ergodic cybertext indicates that in order for students to fully mobilise it as a study tool, they must be empowered to make the kinds of decisions described by Aarseth in a way that is purposeful and well connected to curriculum. Thus, the game requires specific forms of complex thinking about historical concepts and facts in order to effectively manipulate in-game variables, leading to greater control over their outcomes. This requires extensive factual knowledge gathering regarding the chronology, politics, economics, and societies of specific historical periods, and the ways these systems interact with one another. In *Civilization III*, these understandings are supported by documentation within the game, and manifest through player ability to understand both the ways that the game simulates history, and how these systems may be manipulated to create alternate timelines, user-generated scenarios, and to heighten the authenticity of re-enactment.

Similarly, 'scenario-based virtual environments' (Kennedy-Clark & Thompson 2011) have been developed for specific use in classroom contexts. These differ from games such as *Civilization III*, as they are not necessarily developed for commercial purposes, and are instead intended to meet a specific learning objective:

These games differ from commercial games in that their purpose is usually focused on a skill or content area that students tend to find difficult, for example, inquiry learning or physics. (p. 515)

Examples of these kinds of games include *River City* (Ketelhut, Nelson, Clarke, & Dede, 2006), *Quest Atlantis* (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005), and *Whyville* (Kafai & Ching, 2001). The specificity of this approach, in which a particular, context-appropriate skill is a subject of teaching focus, may align with the structures and imperatives of school-mandated curriculum development, particularly in terms of the capacity for assessment, and the production of student achievement data. There are, however, approaches to game-based learning which resemble the traditional study of a book, poem or film, in which a video game is used as a piece of ‘stimulus’ material around which activities and assessments may be clustered.

The examples of video game-based learning described in this section are examples of best practice in terms of the cultural, social, and technological contexts of their time. While elements of these early attempts at mobilising video games in learning contexts continue to influence contemporary practice, as in the ongoing success of the broader ‘edutainment’ industry, the new techno-cultural literacies described by Chapter 2 present a range of possibilities for game-based teaching and learning which embrace different styles of games and play. These games often access the literacy practices of digital media culture, and in a classroom context, may present educators with a range of highly engaging avenues for technology-based teaching.

3.3 Video games and new pedagogical possibilities

The need to develop a broad range of digitally-based skills in order to interact with the social, cultural, and economic environments of the 21st century has shaped the way many students value knowledge. Traditional understandings of employment and education are becoming increasingly unstable, as much of the western world continues to transition into fragmented, globalised, knowledge-based economies. Davidson, Goldberg and Jones (2010) also note this lingering disconnect between the realities of 21st century life, and the often anachronistic practices of formal schooling:

Modes of learning have changed dramatically over the past two decades— our sources of information, the ways we exchange and interact with information, how information

informs and shapes us. But our schools— how we teach, where we teach, whom we teach, who teaches, who administers, and who services— have changed mostly around the edges. The fundamental aspects of learning institutions remain remarkably familiar and have been for around two hundred years or more. (p. 2)

Young people, who as social media users act as producers as well as consumers, and as players of video games are required to engage in complex multiliterate, multidisciplinary thinking, are using digital technologies to act in the adult realm, an arena traditionally denied them in economic and social terms...there are many apocryphal and true stories in circulation about young people being asked to design web pages or program machines or act as computer consultants. (Sefton-Green, 1998, p. 4)

In the out-of-school lives of many young people, 'leisure' time often involves the acquisition and development of a range knowledge, skills, and competencies essential for the 21st century workplace. Papert (2002) describes this use of learning through engaging activities as *hard fun*, or a recreational activity which simultaneously possess a strong educational benefit. Despite the pedagogical potential in the ways young people are using digital media as learning tools, schools have been reluctant to augment formal learning with these emergent paradigms. This form of learning is generally perceived as lightweight, non-scholarly, and distracting to classrooms, regardless of the ways it may prepare students for modern workplaces:

During secondary school and in universities, knowledge is presented as primordial (lectures, tests, reading, essays) and action is mostly seen as undesirable (students sit quietly behind desks, instead of moving around the room and making a noise). What academia seems to have done is to hive off knowledge and theory as some kind of object of worship, and as if action and practice were unworthy of research or effort. (Crookall & Thorngate, 2009; p. 10)

Computer and video games present a kind of multidisciplinary learning which can often be a valuable and engaging platform for preparing students to enter the schools and workplaces of the 21st century. This has given rise to a new intellectual and cultural currency that is driven by emergent digital media, which interprets learner-centred, action-based learning as the equal of

theory-driven, knowledge-based learning. These approaches to teaching and learning, however, require the development of strategies for ensuring that integration of video game texts in schools is purposeful, aligned with curriculum, and cognitively rich for both students and teachers.

3.3.1 Integrating video games into formal learning spaces

Gee (2007) writes that, “good game designers are practical theoreticians of learning, since what makes games deep is that players are exercising their learning muscles” (p. 29). In his view, “the designers of many good games have hit on profoundly good methods of getting people to learn and to enjoy learning” (p. 29). Gee has written extensively on the different elements of video games that contribute to their value as learning tools, describing 36 principles of good learning, which he aligns with his work in game-based instruction (Gee, 2003). There is, however, an ongoing scepticism and a lack of understanding regarding the best practice for, and value of, integrating video games into classrooms. Games are often designed, from the outset, as learning experiences which maximise and maintain engagement and enthusiasm, develop critical literacies and situated meaning-making, and promote the co-construction and collaborative authoring of new knowledge. These aspects of their design may position them as valuable classroom resources. Video games, as learning tools, require the mastery of multiple, simultaneous systems which simulate or emulate real world behaviours and activities, as players often consume significant volumes of text, and multimedia content. They require an operational engagement which is demanding and involves the development of new skills and competencies. Aldrich (2009) notes:

The early evidence, both rigorous and anecdotal, seems to strongly suggest that highly interactive virtual learning is a permanent transformation of the educational landscape, coming out of its somewhat awkward adolescence and entering early maturity. This is due in part to interactive environments' ability to produce better traditional academic results. (p. 4)

This focus on optimising educational outcomes through the deployment of digital software and platforms is often articulated by the ways that students demonstrate an elevated capacity to

engage in skill development and demonstration. The literacy practices described by Chapter 2 often involve the development of new skills, knowledge and understanding as students engage with increasingly complex and sophisticated techno-texts and techno-cultural communities. This is particularly evident when considering the role of participatory and co-authored media in the landscape of new media literacies.

3.3.2 Skill development in 21st century media

Researchers and scholars have been exploring the changing roles that new technologies occupy in the lives of young people since the mainstreaming of consumer electronics that occurred during the twentieth century. This line of inquiry has increasingly become oriented towards an interrogation of the kinds of skills, competencies, and opportunities for cognitive development that are offered by digital tools, platforms, and environments. The field of new media studies is increasingly aware of the diffuse, elusive nature of skill development that is nested in digital participatory cultures, and is constantly adapting to the new landscapes afforded by emergent technologies. Previous work in the field has often explored the affordances of technologies for skill and knowledge development located in examples such as editable 'wikis' (Lankshear & Knobel, 2006), or social networks in online communities (Black, 2006). These examples consider the utility of new technologies by considering the ways in which young people are actively engaged with these platforms and understand them to be tools for content generation, reflecting on their own digital literacy practices, from within a range of practitioner identities (student, enthusiast) and contexts (school, home). This work typically adopts a socio-cultural theoretical approach (Burn & Parker, 2003), exploring the ways in which students read and write in order to develop a more nuanced understanding of how they learn while engaging with digital media. (Merchant, 2009)

Dezuanni et al. (2015) argue that critical reading and media production, commonly accepted as the two major approaches to media education, are unsatisfactory in allowing scholars to explore the ways in which students curate and develop media literacies. Dezuanni et al. (2015) criticise the reliance on a socio-cultural approach to understanding media literacy practices, arguing for 'socio-material' practices, or an emphasis on the materiality of production, processes, and artefacts which can be observed during media literacy events. They note that

isolating and understanding the role of skill development in media education necessarily requires an engagement with the materiality of digital media learning, which allows teachers and researchers to focus on the literacies and discourses demonstrated by student-authored media products. This is of particular significance in an analysis of student-created multimedia content which uses *Minecraft*, in which the focus of analysis is on the skills and literacy practices evidenced by the socio-material discourse of student-generated media products. They suggest that four 'building blocks' (digital materials, production, conceptual understandings, analysis) provide a useful model for developing a deeper awareness of skill development occurring through digital media learning. They identify two 'locations of material relations in digital media learning: 1) producing and assembling digital materials through interacting with software and hardware and 2) working in school and classroom spaces and places' (p. 15). This is particularly relevant when considering the ways that *Minecraft* can be used in a formal learning space as a tool for media production and multimedia literacy development (see 3.1.1). The 'software and hardware' described by the first location of material relations includes student laptops (or iPads, if *Minecraft Pocket Edition* is being used), and the *Minecraft* software itself. The second location of material relations involves the school and classroom context, and involves the impact of the context on socio-material literacy practices such as multimedia authoring. The ways that students and teachers negotiate the school spaces which host socio-material discourses are influenced by the environments in which they occur. Dezuanni et al. (2015) note:

The spaces available to the students and teachers had a profound effect on the kinds of digital materials they could produce as these spaces translated students and teachers by enrolling and mobilising them as teachers and students, rather than as film makers, science presenters and video auto biographers. (p. 21)

Despite the affordances of a game-based curriculum (see 3.1), and the power that it has to generate new kinds of multimodal literacy learnings through a socio-material approach, the 'spaces and places' (p. 153) of the classroom, and the social, political, and cultural frames through which it can be understood, is an ongoing influence on the contours of play, and the complexity and effectiveness of the learning which can follow.

Toomey (2017) adopts a similar socio-material stance, in a study which involved a Year 9 English classroom using video game play as stimulus material for the authoring of new material artefacts. Toomey notes that it remains challenging to articulate the kinds of learnings that can occur in the 'embodied, sensory nature of literacy learning in a digital environment' (p. 5), and subsequently employed a phenomenological approach (van Manen, 1990), in which the lived experience of a phenomenon, as understood by an individual, is the focus. In Toomey's study, students who were already comfortable with the language and culture of video games were selected as participants, and were asked to create a new computer game concept, a design brief for their game, and a multimodal artefact promoting it. This multimodal artefact could be a poster, video trailer, or game preview, and students were encouraged to share their work. Using a combination of classroom observations, interviews, and the material artefacts generated as a method of mobilising video game literacies in the formal learning space, Toomey drew on a phenomenological approach to situate material production in the 'complex constellation of literacy practice' (Steinkuehler, 2010, p. 61) which occurred during video game play:

(Her student's) writing exemplifies and points to literacy practices involving sensory, embodied engagement as game player, actively constructing stories during and after gameplay and reading, viewing, writing and producing print and multimodal texts. (p. 10)

The material production described in this study is reflective, occurring after video game play has occurred. Skill development through video game based learning, in this context, is captured paratextually, through reflective socio-material production of new multimodal assets (posters, videos, etc.). Carr, Schott, Burn and Buckingham (2004) propose an approach to designing a game studies research project which draws on dimensions of this approach, in that it attempts to locate skill development that can be articulated through meta-game artefacts (interviews, authored artefacts, etc.). They do, however, also propose that generated artefacts which involve the play of the games themselves can yield significant opportunities for generating a deeper understanding of the literacy work and skill development that can occur as study participants engage with video games. In their approach

digital recording equipment was therefore left with participant gamers, with instructions to record their gameplay over a one-week period. All participant gamers were given instructions on the positioning of the camera (usually a wide-angle over-the-shoulder shot that would enable the player and their on-screen action to be viewed) in order to guarantee standardisation of footage and to avoid impeding the mobility of console systems. (p. 26)

Leander and Boldt (2013) note that ‘texts are artefacts of literacy practice but do not describe practice itself. Texts are participants in the world, one piece of our ever-changing assemblage, along with material objects, bodies, and sensations’ (p. 36). An approach which is situated in the immediacy of the moment, described by Leander and Boldt as ‘the practice itself’, as it is experienced by participants, is one which yields a dataset of significant composition and potential for analytical approaches which locate skill development and literacy activity. This is an approach which was heavily influential on my study design (see 4.6.6), pursuing notions of digital authorship as occurring in-game, through the collaborative work of student authors.

In both approaches, students need to be engaged with digital authorship and the continuing skill development required to reach their self-directed production goals. This will empower them to produce content which is appropriate for their projected audiences, particularly as audiences become increasingly fragmented, and require an additional focus as a strategy for shaping content production and distribution. Korobkova and Rafalow (2016) argue that while young people working in online communities are often aware of the presence of an audience, they often work across many ‘digital publics’ (p. 78) as a part of the process of content development and distribution. Each of these publics, whether real or imagined, is informing the development processes of the digital projects that young people are often engaged in producing. Video game media increasingly draw on collaborative communities and participatory culture, as games are released with tools and resources designed to streamline the process of content generation, and provide working opportunities for participants to identify, develop, and engage in an ongoing conversation with an audience.

3.3.3 Game-based approaches to teaching and learning

Hutchison (2007) presents a range of potential learning activities which mobilise video games as classroom texts. Many of these activities are designed to replicate the pedagogical structures of legacy media activities, but with video games as the study texts. Analysis of representations of masculinity and femininity in media, for example, can be conducted through close readings of the protagonists of *Gears of War* and *Tomb Raider*. Hutchison suggests that students can 'discuss the relationship between body image and the physiques of both male and female video game characters' (p. 17). He also offers an activity in which students 'review an academic book about video games. A chosen book might explore the history of video games, the ethics of video games, the issue of violence in video games, or another video-game related topic' (p. 20). This is, again, a replication of the kinds of activities that students are regularly required to participate in during formal learning, while being recast in a game-centred context. These are, however, not necessarily games which are designed pedagogical tools. Rather, this approach recognises and attempts to leverage the social and cultural currencies of the video game medium, by elevating it to a similar status as that of literature or film.

Similarly, Cuddon (2012) describes using video game media as a 'stimulus' (p. 41). He emphasises the aspects of his work which attempt to destabilise the privileged position of legacy media in classrooms, and attempts to reframe video game media as equally well suited to deep, scholarly analysis:

(I will) give credence to the idea that console games and computer games are indeed worthwhile 'texts' to use in the classroom. While some teachers and schools may reel in horror, it is less alarming to discover that traditional pedagogical techniques can be applied to this new form of entertainment and leisure pursuit and that such use of these 'texts' is not at the expense of traditional literacy and analysis. (p. 42)

This use of video game texts as 'stimulus' material is a common approach to integrating video games in classrooms, as it allows many of the pedagogical approaches that have been applied to literature and film to retain currency in learning spaces which privilege techno-cultural forms. Murphy (2004) presents an expanded framing of this idea, by suggesting that while

traditional vehicles for visual and textual analysis can be applied to video game texts, there is simultaneously a tension between the 'navigable space' (Manovich, 2001) of video game worlds, in which the autonomy of the player's avatar is continually compromised by a prescribed, propulsive narrative.

Precedents for a game-based curriculum and pedagogical design have been attempted, with unique and experimental learning spaces like the Quest to Learn school, a New York and Chicago-based learning space which attempts to use the lessons of gaming and game design in new learning paradigms which engage students and facilitate powerful literacy practices. Salen (2011) notes that at Quest to Learn, students work in a learning environment 'in which they act within situated learning contexts to solve complex-problems in math, science, English language arts (ELA), and social studies in game-like way' (p.11). The school is also dedicated to generating collaborations between students and teachers, with student-led knowledge being viewed as a critical feature of a learning experience which allows both students and teachers to engage in complex knowledge development. In the school, 'the bar to student achievement is set high, with the expectation that students and teachers together will gain the skills necessary to meet these requirements and even surpass them' (p.12). At Quest to Learn, this knowledge distribution extends to teachers, who are expected to learn from their students, and to view them as agents and problem-solvers intended to produce deeper understanding and ways of knowing. Gee (2017) notes that:

In a distributed teaching and learning system there need not be, and rarely is, one mentor/teacher. Rather, for different activities and skills there are different people to serve as mentors/teachers; there are different places to go; and there are different sorts of tools, technologies, and media to act as surrogate mentors/teachers. (p.78)

The Quest to Learn approach articulates a potential model for doing this kind of work, and the school represents a unique, well-resourced opportunity for disruptive and exploratory approaches to curriculum design and game-based pedagogy. This requires the building of co-teaching opportunities, with traditional print-based teachers working with teaching staff who

are more experienced in young people's techno-culture and can assist them to more fully integrate into the in-class distributed knowledge networks.

A critical approach in mobilising video games in classroom context, as suggested by the kinds of literacy practices highlighted in Chapter 2, involves student uses of video game media as sites of media production and content creation. This approach, in which students either use a game's native toolset for the purposes of content authorship or modify the game using unauthorised, third party software, is one which draws on many critical new media literacies. Students are required to consider the role of the audience, recontextualise existing cultural objects, draw on and curate paratexts, and engage in co-constructed, collaborative knowledge generation.

3.4 Video games and content creation

An expanding body of work exists describing film and video production as sites of media literacy education, and an ongoing conversation within the field of new media study positions social and collaborative digital media as a key form of media authorship for many 21st century learners. As a key form of participatory media, video games also have much to offer in terms of our understanding of skill development through media literacy contexts. Comunello and Mulargia (2015) highlight the potential for skill development through collaborative media which is promoted by Sony's *Little Big Planet*, a Playstation game which asks users to engage in remix and content co-creation activities as a part of an embedded content generation and distribution toolkit. *Little Big Planet* differs from the established understandings of *Minecraft* modification communities as *Little Big Planet* is a console game; modification is only possibly with the permission of publishers and a publisher-provided set of tools and distribution channels. Participants in *Little Big Planet*'s user-generation communities do not access the same paratextual, fan-driven communities as those which exist in *Minecraft*'s, and as Comunello and Mulargia note, 'users appear to be less oriented toward a strong engagement with small communities, and their activity is no longer situated within such communities; moreover, even the common user can be involved in such cocreating practices' (p. 64). In *Little Big Planet*, users may create their own levels for the game which are distributed to the Playstation Network. These levels may be simple side-scrolling platform-based experiences, but *Little Big Planet*'s native content generation tools have allowed users to breach the assumed limitations of the

game, creating complex machines, computers, and systems using the game's physics and design engines. Players may download levels from the Playstation Network that have been uploaded from other users, and remix those levels into new, unique creations which may then be redistributed, continuing the remix cycle. A unique feature of *Little Big Planet* is the game's ease of use and accessibility; no programming or content generation skills are needed to participate in the game's user generated content communities. This indicates an early mainstreaming of participatory, user-driven content which found mass acceptance through community-oriented games such as *Minecraft*.

Curation, in addition to production, is a significant dimension of participatory media practice. Potter (2015; 2012) describes curatorship as a critical new literacy practice, noting that the act of digital curation 'is now a metaphorical new literacy practice which incorporates the collection, production and exhibition of markers of identity through time in both digital production and social media' (2015, p. 123). Potter's description of digital content curation, whether *Minecraft* or *Little Big Planet* objects created using in-game or unauthorised content generation tools, or digital objects distributed via social/participatory media networks, underscores a key aspect of skill development through participatory media. Namely, the representation of identity, and of learner, social, and community lives, as expressions of an ongoing conversation between young people and their own skill and knowledge development. Erstad, Gilje and Arnseth (2012) describe this conversation as occurring in multiple spaces, often simultaneously. This may include intra-institutional contexts, such as the playing of *Minecraft* as part of classroom instruction, to those which span multiple affinity spaces (see 2.1.3). This includes the subsequent distribution of that *Minecraft* content for use in home, school, and virtual play contexts.

For Dezuanni, et al. (2015) this curatorship of content which indicates rich identity work occurring through expressions of skill and knowledge development is one which moves between contexts as participants operate software, adapt to new skill requirements, and develop literacies in different physical spaces, unified by the affordances of digital media and collaborative participation. This study describes the use of *Minecraft* similarly, focusing on the ways that the primary school girls who participated in this project position themselves, both

inside and outside of the game, in terms of perceived notions of expertise and skill development within an affinity group. Students used a range of approaches to demonstrate skills, knowledge and expertise through *Minecraft* play, which shifted according to the mode (creative, survival) that the game was being played in. These examples included the design and construction of impressive structures, knowledge of *Minecraft*'s ludology expressed through using the correct *Minecraft*-specific jargon, skilful play of the game through combat, and, significantly, the effective curation and mobilisation of paratextual resources (YouTube videos, etc.) to extend game knowledge. Dezuanni et al. argue that these girls 'aim to become recognisable to each other as knowledgeable *Minecraft* players, they aim to repeat and vary *Minecraft* norms through spoken language, digital creation and curation' (p. 153).

Digital, game-based content creation in these examples describe an approach to media literacy education which results in the authorship of new works, the curation of existing works, and the co-construction of new media knowledge. The literacy practices engaged during these examples point to a need for an expanded repertoire of new media literacy education in formal learning spaces, which will allow young people to take advantage of the changing realities of the global technoculture, while ensuring that they are ready to enter a workforce which may be heavily influenced by the new knowledge economies.

During data analysis, a number of themes emerged which could have provided substantial opportunities for data analysis. An approach which identifies the role that gender played during the study, for instance, would have provided a significantly different analytical focus. Similarly, an analytical theme which involved the role of disadvantage in student backgrounds, and the opportunities for the remediation of disadvantage through the in-school use of a video game was considered, but would have been beyond the scope of the literacy focus that was selected. I decided to shift the focus more fully towards the literacy learning occurring through the playing of *Minecraft*, and how this could be broadly categorised in terms of the skills and competencies engaged during the creation of new student texts. Two significant themes began to emerge as data analysis commenced. The first involved the ways that students interacted with each other through *Minecraft*, and what these interactions indicate regarding the ways that literacy learning was occurring in a digital, game-based context. The second involved a

more detailed exploration of the ways that students individually engaged in the act of creation, and what creative literacies looked like in the context of a digital game. These two themes overlapped during data generation, with collaborative literacy events being simultaneously creative, and with many examples of rich creative work being the products of a student-centred, co-creative arrangement.

The process of co-creation, whether at a classroom level or through community engagement with digital enthusiast spaces, requires a capacity to work collaboratively, and to engage with multiple participants across multiple contexts. Collaborative learning when using a video game like *Minecraft*, which was designed to facilitate multiplayer experiences and shared content generation, is an essential feature of digital pedagogy. Rigby and Przybylski (2009) note that the design of multiplayer video games ‘often require[s] large groups of players to come together for collaborative problem solving, fostering trust and reliance on others while giving everyone a meaningful role to play’ (p. 219). This design feature of games requiring multiple participants working collaboratively, with clearly defined role definition and the co-construction of new knowledge, is a core aspect of the kinds of teaching approaches which may use a digital text like *Minecraft*. Collaborative learning is a core pedagogy which must be understood for such an approach to be successful.

3.4.1 Collaborative learning

Collaborative learning describes a form of knowledge and skill development which ‘emphasises that learning and knowledge construction is enhanced by interaction and collaboration’ (Birkeland, Drange, & Tønnessen, 2015; Vuopala, Hyvönen, & Järvelä, 2016). Roschelle and Teasley (1995) note that ‘collaborative’ differs from ‘cooperative’ work:

We make a distinction between ‘collaborative’ versus ‘cooperative’ problem solving. Cooperative work is accomplished by the division of labour among participants, as an activity where each person is responsible for a portion of the problem solving. We focus on collaboration as the mutual engagement of participants in a coordinated effort to solve the problem together. (p. 70)

Collaborative learning often refers to the co-creation of shared knowledge achieved through mutual participation in group activities, with all contributors engaged in the pursuit of shared goals, and the development of solutions intended to achieve them (Oksanen and Hämäläinen, 2014). In the following section, I will define collaborative learning in terms of the classroom space, and will then move the focus towards the ways that the core features of collaborative learning can be replicated and extended in digital environments.

3.4.1.1 Dimensions of collaborative learning

Szewkis et al. (2011) and Rosen, Nussbaum, Alario-Hoyos, Read, & Hernandez (2014) described a range of conditions which must be implemented in a classroom setting which facilitate and optimise the potential for positive social interaction and collaborative activities (Oksanen & Hämäläinen, 2014). These conditions include a common goal, positive interdependence, coordination and communication, individual accountability, awareness, and joint rewards.

The group must develop a common goal which they are in the process of pursuing, which will foster a range of opportunities for social interaction and collaborative thinking. This can be a single objective, or as is often the case in a formal curriculum, a cluster of diverse activities which link together in order to reach a particular pedagogical goal (Carron, Marty, & Heraud, 2008).

Laal (2013) describes positive interdependence, another dimension of collaborative learning, as the belief that only when the goals of the team are met can the goals of the individual be achieved. This may be achieved via the establishing of a common goal (Wang, 2009), which is a key method for linking group members. Similarly, collaboration requires coordination and communication, a dimension which describes the management of participants' interdependent activities through speech, text, and visual languages, which may or may not conform to the formal structures and processes of language (Lewis, Pea, & Rosen, 2010). Simultaneously, individual collaborators must be responsible for their contributions to the group's aims and objectives. Individual accountability refers to the need for each member of the participating group to play a meaningful role in the process of generating solutions to problems which will assist in meeting common goals. Ideally, individual accountability ensures that each participant

is assigned a critical role in the learning pathway, ensuring that no single participant is responsible for an unbalanced portion of the work (Stanton & Fairfax, 2007).

Szewkis et al. (2011) suggest that an awareness of the performance, state of mind, and contributions to group activities is a critical aspect of successful collaboration and progress towards the common goal. Finally, Oksanen and Hämäläinen (2014) note that joint rewards are critical for unifying the group's objectives, creating a feel of both winning – and losing – as a result of the collaborative journey. This encourages participants to work closely and formulate strategies for maximising their working potential in order to most effectively complete common goals and acquire their rewards (Zagal, Rick & Hsi, 2006).

The public, particularly young people of school age, are often engaged in a dialogue which seeks to better understand the nature, conditions, and purposes of digital interaction. These changes occurring in the ways that these interactions are designed and experienced are often iterative and require flexibility, as the unpredictability of their trajectory, adoption and eventual obsolescence makes fixed statements problematic (Birkeland et al., 2015). Jewitt (2008) notes that classrooms must be agile, flexible, and inclusive when it comes to building meaningful connections between the activities and artefacts offered legitimacy by formal learning spaces, and the 'multimodal spaces of leisure' inhabited by many students during their out-of-school lives:

Indeed, the classroom may increasingly involve, as it does currently in relation to some online spaces, the remaking of the connections and boundaries of different spaces of learning and literacy. A key issue then becomes what kinds of artefacts, modes, and literacy are legitimated in different spaces, and what is enabled to flow and move across these spaces? This is particularly important in the contemporary digital era (at least in some global contexts) where the modal dominance of writing- and print-based medium of school stands in stark contrast to the multimodal spaces of leisure (e.g., games, film, online spaces) out of school. (p. 262)

Digital collaboration can be supported with a range of technologies in both secondary and higher education which have the potential to significantly optimise and extend student learning

(Turney, Robinson, Lee, & Soutar, 2009; Vuopala et al., 2016). This involves collaborative approaches which allow students to move seamlessly across multiple, overlapping affinity spaces, animated by shared interests and goals (Gee, 2003). There is an ongoing global debate regarding the best kinds of instructional technologies used for optimising the scope and potential of digital collaboration (Buzzard, Crittenden, Crittenden, & McCarty, 2011). The use of VLEs (Virtual Learning Environments) in formal learning space has proven effective in fostering digital collaborative learning, as participants are required to develop a range of skills, both academic and practical, to complete common goals (Orsini-Jones & Jones, 2007). The learning potential offered by formal online courses, in comparison with their traditional, paper-based predecessors, is the subject of ongoing consideration (Hansen, 2008). Simultaneously, the affordances of social media as a space for digital collaboration have come under considerable critical scrutiny, in both academic and professional spaces with a view to heightening engagement and participation (Thomas & Akdere, 2013).

In the context of young people, the collaborative opportunities afforded by particular types of video games are critical to understanding how formal learning spaces may be realigned more intensely with the emerging technologies often used by students during their out-of-school lives (Rigby & Przybylski, 2009).

3.4.1.3 Using video games as sites of collaborative learning

Robertson and Miller (2009) notes that a range of gains were made once Nintendo game consoles were introduced to a study classroom, including improvements in academic work, truancy, and critically, improvements in interpersonal relationships, with ‘children taking a supportive interest in the performance of peers’ (p. 3). While there has been a considerable amount of research attention paid to the educational potential of ‘serious games’ and associated education-focused software (e.g. Egenfeldt-Nielsen, Smith, & Tosca, 2008), commercial video game titles have not received the same level of critical attention (Checa-Romero, 2016), as they have not been developed with their educational potential prioritised, and their contents, configuration, and purpose are often considered antithetical to the objectives of formal learning spaces.

The relationship between collaboration and video game play is often more nebulous and ephemeral than that of traditional VLE/social media -based digital collaboration, as participant roles blur and combine, reacting to the contexts presented by each game (Kwon, Kim, & Woo, 2016). The paratextual universe which envelops titles furthers this, as the collaborative literacy activities engaged in during game play can often breach the boundaries of the game, and can spill out onto forums, message boards and wikis (Kwon et al., 2016).

Lemke (2013) describes the unique, highly contextual collaborative potential of video game play by observing a number of study participants working during a video game-based research scenario:

The kids mostly played with each other and used the game and its virtual world as a springboard, a virtual play-space and inspiration for many kinds of play not specifically imagined by the creators of the game. In this, the undergraduates became their accomplices and play partners, as well as being their mentors and friends. The research team joined in to the extent we could do so and still manage to come away with some useful video records... We also saw a lot of learning, a lot of collaboration on tasks, serious problem solving in the pursuit of play goals, and the energy, determination, creativity, and free spirit of kids at play. (pp. 41-42)

In this example, collaborative video game play describes participants fulfilling a number of the criteria for successful collaboration (Szewkis et al. (2011)). Students are working towards a common goal (pleasure, creative play), they have defined an ecology of roles and responsibilities (accomplices, play partners, mentors, friends), they are coordinating and communicating, and they are pursuing joint rewards (play goals). A critical aspect of this example is the role of creativity in play, as students repurpose various aspects of the technology in order to expand the contours and capacities of the virtual play-space, seeking out new opportunities for knowledge development, and pursuing common goals to their resolution.

3.4.2 Creative learning

Historically, video games are anchored in the cultures, traditions, and conventions of competitive game playing. Card games, board games, and ball sports all influenced design

methodologies employed by early video game designers, who used numerical scoring systems, points, ranks and leagues, and sets of complex and often difficult to master rules. Most of these core features continue to be used by video game developers working in competitive spaces; particularly as the industry has shifted a focus more directly towards online multiplayer titles. There are, however, a growing number of titles which provide alternatives to this traditional model of competitive game playing. As the concept of a 'video game' has taken on influences from television, film, literature, and the new medias, many of these traditional approaches and conceptions of a 'game' have been rendered unstable, with non-competitive forms of game playing assuming prominence as both alternative and primary modes of engagement across many popular titles.

Minecraft's popularity is, in many ways, a result of the game's status as an entry in the latter genre of non-competitive, free-form games which encourage the engagement of visual, spatial, and design literacies; this often results in an expansion of the game's possibilities, with user-created content demonstrating new possibilities that the game's developers may not have considered. *Minecraft's* engine and content design features position it as a particularly powerful facilitator of this kind of experimental creative work.

3.4.2.1 A creative approach to video game play

Creativity, and creative play, are concepts central to many of the expectations of modern video games, whether implicit in the branching, user-driven narratives of modern role-playing games, or explicit in content generators like *Minecraft*. In this chapter, I have argued a case for video games as vehicles for new kinds of digital literacy practices, and I have specifically explored the collaborative potential of video games in formal learning spaces. *Minecraft*, however, has a heavy emphasis on creative play, and on user-generated content as an intrinsic dimension of the game's design. Creativity, and how creative thinking can be understood, defined, and identified, is a critical tool for unpacking the ways that young people collaborate using a game like *Minecraft*. In the following section, I construct creativity, and creative play, in terms of the ways that creative events can be interpreted as indicators of learning and skill development.

Video game play has historically been critiqued in both academic and media spaces (Gentile, Swing, & Lim, 2012) as a medium which denies participants ability to engage in meaningful, productive creative work, and as corrosive to the academic and social lives of young people. This is, however, a position that is becoming increasingly challenged by research which suggests that video games can be optimised cognitive spaces which can potentially offer more textured and resonant learning experience than many formal learning spaces (Gee, 2003; Squire, 2013). 'Creativity' has become an integral aspect of the experience of video game playing across a range of genres, and exemplified by the 'sandbox' genre typified by *Minecraft*, and the genre titles that it spawned, including *Terraria*, *Ace of Spades*, and *Cube World*. Understanding how creative thinking is applied to these titles is critical as a tool for exploring the learning potential of digital creative play.

A conceptual understanding of 'creativity' sits within a highly contested theoretical field. Traditionally, research has often focused on 'eminent creativity', or the kinds of creative endeavours which are demonstrated by highly unique, talented individuals (Simonton, 1997). Richards (1993) wrote extensively on 'everyday creativity'; the creative activities which people may choose to engage in throughout the course of an average day, for example the arrangement of a vase of flowers, or the creation of a practical solution for a work-based problem. This idea of 'everyday creativity' was further explored from the personal (Runco, 1996; Runco, 2003) and the developmental approaches (Cohen, 1989) to creative activity. This approach to understanding creative work is critical when examining the data generated through a creative literacy activity; it allows for the consideration of the smaller, iterative creative events which non-expert participants may experience each day (Richards, Kinney, Benet, & Merzel, 1988).

3.4.2.2 Defining creativity

Plucker, Beghetto, & Dow (2004) proposed a broad definition of 'creativity':

Creativity is the interaction among aptitude, process and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context. (p. 90)

While this is a broad definition of creativity which is congruent with the majority of attempts to provide a succinct definition of ‘creativity’, the focus on ‘a perceptible product’ is problematic in terms of how we might come to understand the relationship between learning and knowledge construction and individual learning and literacy events. Beghetto (2013) describes

‘creative micromoments’ as ‘brief, surprising moments of creative potential that emerge in everyday routines, habits and planned experiences... Micromoments occur anytime someone finds oneself having gone off-script, playing a wrong note, drifting away from the plan, or otherwise entering uncertain territory’. (pp. 5-6)

In the shift towards ‘micromoments’, it is critical that a theoretical model allowing ‘creativity’ to be positioned as an intrinsic element of the learning trajectory of study participants be introduced, namely Beghetto and Kaufman’s ‘Four C Model of Creativity’ (2009), which I will describe in detail in chapter 4.

3.4.2.3 Minecraft as Creative gaming

Minecraft is a robust and multi-featured tool for the generation of creative content, which is supplemented by a range of in-game and paratextual resources designed to streamline the creative process, from FAQs and guides, to forums and SIGs. In the examples of *Minecraft*-based learning described in this chapter, students often use the game’s three-dimensional creative environment as a space in which their capacity to engage in complex, detailed creative work is not subject to the same pressures experienced during creative work in other, traditional mediums. The manual dexterity and fine motor skills required to achieve professional results with, for example, pen and ink are lowered when using *Minecraft* as a creative space, with participants required to learn objective, measurable, documented systems and processes, rather than the subjective ephemera of the physical creative process. Hsu and Wang (2010) describe this process as the use of gaming literacies in the cultivation of new literacies, noting that ‘new literacies encompass a broad set of tools that can be integrated across a range of contexts’ (p. 401).

A critical aspect of creative activity within gaming spaces is the capacity for safe, risk-free simulation of different ‘real world’ creative pursuits. The hypothesised situations described in

this chapter include architecture, graphic design for commercial games, sculpture and city planning, all of which are simulated by *Minecraft*'s client software, and the array of game systems that it contains. The layered nature of gaming literacies implies that multiple competing simulations are enacted as a student engages in creative work, with multiple literacies and disciplines incorporated in the various simulations being engaged. Durga and Squire (2009) describe a similar approach to understanding how students interact with the multi-disciplinary nature of a game-based curriculum as their work with *Civilization* linked economic, political, and ecological simulations.

In this study, the representational and ludic dimensions afforded by particular types of video game play will be explored through student activities representing collaborative and creative literacy learning events. In the following chapter, I will provide a methodological framing for this work, outlining a rationale for the chosen study design, analytical approach, and methods of data generation.

4. Methodology

This research explores the potential for rich literacy learning that can be generated through *Minecraft*, a commercial video game, as curriculum in an Australian secondary classroom. With Australian schools being encouraged to integrate ICT in classroom practice, I wanted to investigate the learning potential of *Minecraft* as a catalyst for rich literacy learning, while considering the kinds of challenges that this approach can present for teachers. I was also interested in accessing the social and cultural value of video game culture experienced by contemporary secondary students, and to develop an understanding of the potential benefits of inviting these valued out-of-school literacy experiences into the classroom space.

When designing and evaluating pedagogies that address these aims, a research study is required which allows data to be generated which assesses the efficacy of a game-based curriculum in a formal learning context. This also requires consultation with classroom teachers

and school administration to effectively audit the kinds of difficulties, from both an infrastructure and policy perspective, that a *Minecraft*-based curriculum might present, if this teaching approach is to be adopted. This study discusses the design and implementation of a research study which seeks a deeper understanding of the value of a *Minecraft*-based curriculum in literacy education, while exploring the contours of deployment which can restrict, or enable this kind of digital literacy learning in other classrooms.

This chapter begins with a discussion of the qualitative approach, and a justification for selecting it as a methodological framework. This is followed by a discussion of the rhetorical function of reflexivity in social research, and of the complexities which arise from the 'incomplete' nature of social research. I conclude with an overview of my study design, including an outline of a case study approach, and the details of the data collection and analysis.

4.1 The case for a qualitative approach to literacy research

A qualitative approach facilitates this 'social' context for data generation, and allows for an expanded repertoire of analytical opportunities to be explored by the researcher. Case study research (Yin 2009; Platt, 1992), narrative inquiry (Rissman 1993; Chase 2007; Clandinin 2006), and ethnography (Powdermaker 1966; Geertz 1973; Wolcott 1999) are all examples of approaches to qualitative research methodology which share the core aims of social research: rigorous, complex analysis of the 'human qualities' of the social worlds of people. The preceding examples demonstrate a range of qualitative designs intended to facilitate social research in real-world settings, and under real-world conditions. The transparency of qualitative research, in which participants are observed 'performing in their everyday roles... entirely independent of any research inquiry' (Yin, 2011, p. 8) critiques the artifice of laboratory-based experimental research, and attempts to capture context and practices in order to develop 'situational understanding' (Elliot, 1991, pp. 71-83).

The limitations of designed research in real-world environments highlight a key strength inherent in a qualitative approach. The naturalistic researcher cannot use a deductive model, in which a predetermined procedure of investigation is positioned as being static, inflexible, and

not subject to negotiation based on the shifting conditions and contexts of the real-world research environment (Gillham, 2000). Thus, a qualitative approach allows for modifications to be made to the overall research design, and allows the researcher to continually audit and adjust the locus of study in order to cater to new, unpredicted data. In action, the qualitative researcher will employ a recursive analytical process, in which emergent data are collected via a flexible and evolving research design that is sensitive and reactive to the behaviours of study participants. A qualitative design also facilitates the use of a range of sources as a part of data generation, allowing the researcher to build a robust study via a broad range of field artefacts (Woodside, 2010). Somekh (2005) describes the multiplicity of voices, perspectives, and contexts that participants bring to any social research, which indicates that a methodology is required which can adequately react to both anticipated and emergent multiplicities, while remaining oriented towards the initial research questions and the research design.

As described in 2.2.1, literacy has traditionally been viewed by teachers and researchers as a specific set of cognitive skills, which facilitate a range of measurable abilities pertaining to the reading and analysis of print media. This has been reflected in the literature through research methodologies that draw largely on objective, measurable data. This static perspective presumes that both data collection and analysis can be statistically and numerically represented, and will ultimately lead the researcher to some kind of knowable truth regarding her or his object of inquiry (Creswell, 2002, p. 19). In order to foreground the more fluid, situated approach adopted by this study, this chapter will make a case for the strengths of a qualitative methodological framework for this study.

As argued in 2.2, literacy in the digital era has taken on expanded and more complex conceptualisation, encompassing multiple mediums, discourses, and technologies. Students have developed new repertoires of literacy practices as new digital mediums have been more closely integrated into regular classroom lessons, often reflecting the changing techno-culture in which they are informally engaged. In the digital era, Knobel and Lankshear (2007) define literacy as

socially recognized ways of generating, communicating, and negotiating meaningful

content through the medium of encoded texts within contexts of participation in Discourses. (p. 64)

This current conceptualisation of literacy resists any fixed understanding of literacy and literacy research, and instead acknowledges that literacy is a negotiated process of interacting with a range of texts, with meaning being co-constructed by multiple authors, while grounded in the situated literacy practices (described in 2.1).

This reframing of literacy as rising out of complex, situated meaning making has undermined many traditional assumptions pertaining to quantitative methodologies in literacy research. The current emphasis on context and negotiated meaning making in literacy studies aligns with a sociocultural understanding of literacy and student-centred learning.

4.2 Case study

While a case study may adopt a quantitative, qualitative, or mixed methods approach, in the context of this thesis a qualitative case study has been identified as being best aligned with the research objectives described in Chapter 1. A qualitative case study enables researchers to achieve a deeper and more complex understanding of an aspect of the human experience. Somekh and Lewin (2005) note that a case study approach allows a researcher to investigate, record, and analyse the localised conditions which produce a specific and bounded set of social and cultural phenomena. Rather than attempting to locate universal, objective data pertaining to a particular object of inquiry, case study research involves an examination of a local context from which a specific social or cultural event has emerged. The complexities of social activity become the locus of case study analysis, with the situatedness of 'social reality' (Somekh & Lewin, 2005, p. 33) being viewed as a product of particular contexts and histories, which the researcher seeks to identify and analyse. The 'messiness' of the human experience is at the centre of case study research (Law, 2004), with the researcher required to consider a vast array of competing and, at times, contradictory social and cultural variables when building a thick description of the study site's complex structures and contexts. For this study, I selected a case study approach in order to generate data which captures the complex, and often contradictory aspects of human behaviour that occurs in complex institutional environments such as schools.

This study used a combination of digitally-generated data, student observation, interviews and small group discussions, and an ongoing researcher journal to develop a range of qualitative data. In a case study context, this was intended to highlight the literacy events, dimensions of engagement, and the social and cultural factors which affected the efficacy of the *Minecraft*-based curriculum.

The qualitative tradition requires researchers to identify a social unit – an individual, an institution, or an event – and to use that unit as a detailed study focus which enables the exploration of the study aims and themes (Merriam, 1998, p. 27). This social unit, however, may comprise a number of interlocking social units which the researcher conceptually assembles into a coherent whole. In this context of this study, these units involved the students, the study teacher, administrative staff, the school itself, and finally, the study curriculum. These social units must be considered in terms of the localised contexts which position them as social products, but also in terms of the wider elements which inform their structure, and the ways in which they are articulated through the speech, language, and behaviour of their human participants. The case study allows researchers to analyse the complex interactions which take place between individuals, organisations, institutions, communities and programs (Yin, 2003). Miles and Huberman (1994) describe a case study as ‘a phenomenon of some sort occurring in a bounded context’ (p. 25). The case is bounded through the specificity of context; the time, place, and contexts in which data generation has occurred. Creswell (2007) notes that a case is a ‘bounded system’ (p. 73), meaning that research is a product of a set of specific statements regarding the focus, context, and extent of the research. The case, in this study, is a bounded to a single school, in 2012, with a specific set of participants, and a specific social, economic, and educational context.

It is, however, important to draw a distinction between the *phenomenon* and the *case*. To use the example of this research, the *phenomenon* that I am investigating involves the social practices surrounding teaching and learning in secondary schools pertaining to video games and digital literacy, and the positioning of literacy education practice in these differing contexts, while the *case* refers to the schools, teachers, and students who have been recruited as study participants. (Dyson & Genishi, 2005)

This distinction informs the analysis of collected data (such as interviews, observations, and focus groups) by acknowledging that the *case* represents only one possible context in which one possible set of data may be generated. In a different set of social and cultural contexts, my investigation of the research questions might look completely different, and may present an entirely different method of investigating the way in which the study object manifests. Stake (1995) writes that 'the function of research is not necessarily to map and conquer the world but to sophisticate the beholding of it' (p. 43). This draws to attention the interpretive nature of case study research, and highlights the prominence of the researcher's role in decoding the complexities of an individual site:

The case is singular, but it has subsections, dimensions, and domains – many so well-populated that they need to be sampled. Each of these may have its own contexts, and the contexts may go a long way toward making relationships understandable.

Qualitative case study calls for the examination of these complexities. (Stake, 2005, p. 449)

Thus, a case study represents a localised exploration of a particular object, which, through careful analysis of generated data can be contextualised in terms of broader, potentially global, social, cultural, ideological, and economic practices. For the case study researcher, analysis is achieved primarily through a rigorous understanding of the speech and text that can be retrieved from research locations, which is analysed for 'fine details of behaviour and meaning' (Erickson, 1986), and offers a deep, holistic understanding of the various forces which shape the ways participants articulate the contexts in which they live and work. In the school environment, in particular, there is an extremely complex matrix of competing, and often contradictory forces which are continually shaping behaviour and speech. Digital research in complex school ecologies brings with it a specific set of challenges, as researchers are required to negotiate the often highly contentious and political landscape of digital disruption and emerging techno-pedagogies (Selwyn, 2013; Selwyn, Henderson, & Chao 2015). The political landscape of the school environment as relating to the use of technologies, external pressures from parents, the techno-literacies of school students, and community concerns around student wellbeing all contribute to the complex nature of digital research in formal learning

spaces. The overall objective of the case study is for the researcher to understand how the matrix is operating as an ecosystem of social and literacy practices and discourses, and to use that knowledge as a method of understanding the relationships, or absences of relationships, which exist between the study phenomena, and the case itself.

Interpretive research recognises that reality is seen as a negotiated and co-constructed product, and that 'defining' social reality is highly subjective. The interpretive researcher believes that 'the descriptions of human actions are based on social meanings', and that the situated, co-constructed nature of these social meanings can involve the participation of the researcher, in which they 'may change the potential variables in the enquiry' (Bassey, 1999, p. 43).

4.3 Researcher reflexivity

An important instrument of post-positivist social research involves reflexivity through meta-analysis of research practice, positioning the researcher as being active in the construction of meaning and context during data generation. The literature has argued that the researcher can never be passive, or a conduit for 'objective' truth, but rather is incorporated into the body of analysis by way of 'a methodologically self-critical account of how the research was done' (Seale, 1999, p. 468). Thus, a core agenda of modern qualitative research involves an awareness of the contested nature of the boundaries between the research narrative and the researcher narrative, both of which are entwined, subjective, and interpretive:

The concern of ethnographers and anthropologists (among other qualitative researchers) to unravel how their biographies intersect with their interpretation of field experiences led, initially, to highly subjectivist accounts of fieldwork. Through critical reflection, they used reflexivity to continually monitor, or even audit, the research process. As the research process is made transparent, they argued, personal experience is transformed into public, accountable knowledge. (Finlay, 2002, p. 210)

My identity as a teacher-researcher in the school environment was a complex one, and I was positioned in a number of simultaneous roles throughout data generation. As this was not a school in which I was currently employed, and the students were unfamiliar with me, I was

initially introduced as someone who would be working in the classroom for a few weeks on a special project. An exchange of cultural enthusiasm between researcher and participants, through shared interest in video games and technology, became a mechanism for relationship building. Students enjoyed the opportunity to see texts drawn from their techno-cultural moment being invited into the formal learning space. By pursuing a relaxed attitude toward formal school policy pertaining to the use of computer games in secondary schools, I was able to expand the repertoire of potential skills and knowledge that could be mobilised inside the classroom. These responses, however, were designed for consumption by a specific recipient, in a specific social and academic context, and as such are necessarily subjective in terms of their 'truth'. Here, reflexive analysis is crucial in understanding the positioning of participant voices, and the social, cultural, and political contexts which contribute to their construction.

In order to facilitate the kind of rigorous self-analysis necessary to understand the complexities and contexts illustrated by the preceding examples, I kept two sets of research notes – a hand-written research journal, and a series of fieldnotes written up as emails to my supervisors. I used these sources to generate an understanding of the research process while I was engaged in data generation, in addition to developing an observable record of the ongoing research narrative. Watt (2007) notes that introspection and journaling can help researchers to understand their own feelings and reflections on a study site, unpacking the ways that these experiences are influencing their research:

By engaging in ongoing dialogue with themselves through journal writing, researchers may be able to better determine what they know and how they think they come to know it. An introspective record of a researcher's work potentially helps them to take stock of biases, feelings, and thoughts, so they can understand how these may be influencing the research. (Watt, 2007, p. 3)

There are, however, issues which may confront researchers during reflexive analysis. The first is the problem of the 'rhetorical functions of reflexivity' (Potter & Wetherell, 1995). Here, the researcher attempts to counter accusations of 'bias' by acknowledging the positioning of their interests, their social and political alignment, and their personal characteristics such as gender,

in the production of reflexive analysis. In this instance, reflexivity becomes a rhetorical strategy for the claiming of ownership and credibility, by initiating a pre-emptive counter against accusations of agenda, rather than a contributor to deep methodological analysis.

The second criticism of reflexivity has been described as 'infinite regress' (Finlay, 2002, p. 226), in which the researcher can become lost in endless, narcissistic details, or a labyrinth of systemic deconstructions in which meaning becomes lost. The prominence of the researcher narrative must be measured against the role of the research narrative, and a balance is necessary, with personal revelation being mobilised as a method of illumination in terms of broader study objectives (DeVault, 1997).

These complexities do, however, speak to the 'incomplete' nature of social research. The emergent, fragmentary, and interpretive nature of qualitative data suggests that this kind of research is necessarily imperfect, and effective reflexive strategies may help manage these challenges, while keeping researchers aware of the critical challenges that they face during data generation and analysis. A challenge specific to this study from a methodological perspective involved the digital focus of the study design. This study requires a methodological approach which was situated in the digital, and allowed the effective generation and analysis of study data emerging from both 'real world' and virtual sites. In the following section, I frame this study in terms of multimodal and visual methodologies, with a view to unpacking the specific methodological approaches which were well aligned with the analysis of game-based data.

4.4 Media analysis methods

This study required an approach to data analysis which was able to navigate the tensions which exist between video games as objects of visual and multimedia design, and the ludic qualities associated with texts that are designed to be played via human interaction. Video game texts feature many of the design and multimodal aspects of film, video, and sound production, but also include game systems, rules, incomplete and emergent narratives, and the requirement of active player interaction in order for the text to be experienced. In the following section, I will outline an approach to data analysis which attempts to reconcile some of these dynamics by drawing on research specific to the digital, multimodal, and game-based dimensions of video

game composition. I will begin by describing a set of analytical approaches which draw on visual and digital analysis and will then move the focus to the video game-specific approach selected for this study. Finally, I will discuss an analytical approach specific to *Minecraft*-based data and consider the implications relative to my own research.

4.4.1 Visual analysis

Video games often draw strongly on visual design as an integral part of their composition and method of user engagement (see 2.2.1). A dataset which is drawn from video game play will necessarily require an analytical approach which deconstructs elements such as colour, shape, symmetry, arrangement, and design language of multimedia assets that users are interacting with in a virtual, digital space. The production-focused approach of this study requires an analytical method which explores the artefacts drawn from a digital, multimedia-based environment, and understands them in terms of their research context and the literacy practices employed in their generation. Pink (2001) describes a visual ethnographic approach, in which photography, video and hypermedia are paired with ethnographic research. Using visual research methods, Pink draws on visual data (including multimedia images) in order to develop an understanding of the research context, and to identify aspects of visual composition which are animated by the social and cultural contexts in which they were produced (p. 46).

Pink notes that

fundamental to understanding the significance of the visual in ethnographic work is a reflexive appreciation of how such elements combine to produce visual meanings and ethnographic knowledge. (p. 29)

Pink (2006) describes an approach which is specific to the analysis of hypermedia. In this example, Pink interrogates a CD-ROM presentation through 'through three stages that visual researchers have identified as essential to visual analysis: production, content, and the context of consumption' (p. 109). Analysis involves the investigation of artefacts in terms of production processes, and the ways that individuals and institutions are arranged in order to facilitate production. The content and design are also critical aspects of this analytical approach, as the arrangement of elements, the selection of visual elements, and the alignments in the picture

space 'communicate about experience and theory' (p. 109). Finally, Pink highlights the importance of analysing the context of consumption. Belk (2007) notes that 'by connecting images to the cultural context of consumption, researchers gain a more thorough (yet never complete) understanding of how images embody and express cultural values and contradictions)' (p. 303).

I will draw on Pink's visual approach by interrogating the data set in terms of one or more of the three essential stages of visual analysis. Data will be considered in terms of the production methods selected by students working in *Minecraft*, and the arrangement of participants. I will examine the dataset in terms of the visual composition of the three-dimensional objects by taking screenshots using the Windows screen capture feature, considering their use of colour, shape, and composition as strategies for visual design.

4.4.2 Multimodal analysis

Kress and van Leeuwen (2002) describe a 'mode' as a culturally shaped resource which enables meaning making amongst participants. Examples of modes include writing, visual design, moving images, and sound, each of which can be used to engage in meaning making through various forms of text authorship. Digital texts are examples of 'multimodal' texts, in that they employ two or more modalities in their construction, which must be navigated simultaneously by reader and author, in order to engage in meaning making. Video games are examples of multimodal texts which integrate visual design, animation, sound, and written text in their composition.

This work is heavily influenced by the work of Kress and van Leeuwen (1996, 2002), particularly visual grammar (1996), an approach focusing on the 'grammar' (or rules and constraints) of representation through image, as a tool for expression within a specific social group. While this approach provides a rigorous method for doing visual design, Hull and Nelson's work, drawing from Kress and van Leeuwen, and focusing specifically on multimodal analysis in digital spaces, is more closely aligned with the video game-generated artefacts used in this study. Hull and Nelson (2005) argue that the power of multimodality resides in the semiotic relationships between and among different modes. That is, how the arrangement of modalities within a text,

and the configuration of their relationships, both intra-textually and how they are designed to be consumed by an audience, represent their aesthetic power. In a monomodal context, each modality offers different meaning making affordances to both author and audience; with images conveying meaning in a vastly different way when compared to language or sound. Hull and Nelson (2005) note that ‘although different semiotic modes may seem to encode the same content, they are nonetheless conveyors of qualitatively different kinds of messages’ (p. 229). Thus, multimodal analysis is concerned with the business of locating the potential for individual modes, when fused in a multimodal space, to ‘aesthetically transcend themselves in multimodal composition’ (p. 230).

Hull and Nelson emphasise the importance of identifying the modalities existing concurrently within the multimodal text which comprises a piece of data, suggesting that the analytical foci will guide the ways that modalities will be conceptualised and highlighted. When dealing with a digital multimodal game text such as *Minecraft*, the modalities which comprise the multimodal composition of the text will change according to context, author, intention, and audience. The arrangement of modalities, and the degree to which each is privileged in the design philosophy of the artefact, is a significant aspect of the analytical approach adopted by this study.

I will draw on Hull and Nelson’s approach to multimodal analysis through application to the images drawn from the dataset. Each piece will be considered in terms of the modalities that the student author is working with, and the insights into student learning and the context in which authorship was conducted, by exploring the semiotic relationships arranged between the modalities. For example, a piece of *Minecraft*-based data which blends text, visual design, and (in the original game) animation offer opportunities for analysis regarding student-selected approaches to in-game authorship and digital composition.

4.4.3 Game analysis

Apperley and Beavis (2013) point out that video games ‘cannot be understood simply on textual terms’ (p. 2), and instead provide a model for the critical analysis of video game texts which involves two interlocking layers. They describe the two layers as ‘games as text’ and ‘games as action’. The ‘games as text’ layer explores the connections that exist between the video game

text and the lived world of the player, a space in which meaning making around play is conducted, and enacted. The 'games as text' layer addresses player knowledge about games, the local and global contexts around the game and how those contexts inform and shape play (including gaming paratexts), reflexivity and player identity as positioned within the game, the learning that is enacted through the game – including both 'edutainment' titles, and commercial games such as *Minecraft* (p. 5). The 'game as text' layer informs a range of aspects of my study methodology. The ways that prior knowledge became critical in many of the learning and literacy events which occurred during the curriculum was a major theme that was pursued during data analysis, as were the ways that students engaged in paratextual resources in order to develop and enhance their own understanding of the game's systems. The study context, similarly, became a critical feature of data analysis, and required me to develop an understanding of how student/teacher identities, and their increasingly porous borders, became integral in analysis of the purposes of, and ways that that the game was being played.

The 'games as action' layer places emphasis on the physical interactions that the player engages in during interaction with the video game text. This involves the physicality of game play as players use controls and peripherals, and the ways that they engage in design literacies during play in the form of customisation, participation in communities, and the generation of new material products using creative environments such as *Minecraft*. The layer also involves the situated nature of game play which foregrounds game play, such as their physical location, the technologies being used, the choice of collaborative or competitive titles, and the social/cultural contexts which frame play, such as school or home-based locations (p. 4). Beavis (2014) describes the 'games as action' layer:

Within each sector, attention is paid to different aspects of game play and the processes in making and playing games. The Games as Action layer addresses game play both in and out of school, and it focuses on the contexts, actions, and decisions needed to create play. (p. 436)

Apperley and Beavis (2013) propose that these two models of analysis separate the textual and paratextual features of video game play from the ludic and interactive, but also note that

during analysis there is significant overlap and commonality between the two layers. The 'games as action' layer also grounded the study methodology, as the analysis was centered around an understanding of how *Minecraft* is played, and the systemic features of the game that students exploited in order to generate material products. This also included exploring the ways that both the physical and digital locations in which student play was located influenced the trajectory of student learning, and the ways that the playing of a game across both spaces empowered students to generate new literacy events through creative and collaborative play.

I will draw on Apperley and Beavis's 'games as text/games as action' approach to game analysis by considering each piece of data in terms of the two layers, which will allow me to consider their textual/paratextual and ludic dimensions individually. Each piece will be interrogated in terms of the 'games as text' layer, reflecting on prior knowledge, paratextual engagement, player identity, and the ways that the creation of the artefact articulates both the local and global contexts in which the game was played, and the artefact by creation. I will also use the 'game as action' layer, as a way of understanding the physicality of play during the creation of the artefact, the technologies used, and the contexts in which the artefact was created. This will allow me to move beyond visual analysis, acknowledging and analysing the ludic dimensions of each artefact's creation.

4.3.1.1 Systems analysis

While *Minecraft* can be considered a significant entry in the pantheon of modern video game design, it is a uniquely designed title which requires a specific analytical approach in order for the data to be understood in the context of the game's rules, systems, and subsequent teaching affordances. A generalist approach to video game analysis (as described in 4.3.1) is important as a tool for game-based data analysis, but the specific features of *Minecraft* that were available to study participants, and which constitute the rationale for choosing *Minecraft* as a study text, require analytical methods which are sensitive to the specificities of the game.

In a study involving student-created video games, Burn (2016) notes that

the means by which the game is created requires another analytical move. Unlike literature, films and theatre, videogames are computer programs, which work because

they have been written as code. We need, as it were, to look under the bonnet of the car to see how this “engine” is put together (and the program running a game is referred to as a game engine). (p. 15)

Burn uses an example of two students working in a game-based curriculum, who designed their own video game which staged a scene from a Shakespeare play. In the data, study participants were asked to design a game in which the player, as Macbeth, murders King Duncan. This task required students ‘to design a sequence in which the player has choices, multiple routes to follow, challenges to face, resources to meet them, and a win-lose state to complete the sequence’ (p. 18), and the resulting games that students created were analysed in terms of their ludic and systemic design. This allows the researcher to explore the student-selected approach to game design at a coding level, developing an understanding of the design decisions that students made during the construction of a new video game text. In order to effectively conduct this kind of analysis, the researcher required an understanding of game systems, the ways that game systems can be manipulated to achieve in-game goals, whether ludic, narrative, or design-based. While Burn’s study participants created their own custom-built video games to explore these concepts, this study’s participants will use the pre-built game systems included in the retail version of *Minecraft*, while drawing on Burn’s game design-based analytical approach.

A systems-based analysis of *Minecraft* play, in which student uses of *Minecraft*’s various simulations of construction, cooking, item generation, and physics became essential dimensions of the material artefacts of play, is a key dimension of the *Minecraft-specific* analytical method. *Minecraft* is heavily governed by interlocking sets of rules and systems which drive the game’s physics simulations, content generation engines, and action-oriented gameplay. While Burn focuses on student-generated code, and the systems and rules that are generated by that code in order to facilitate gameplay, this study focuses on the pre-existing *Minecraft* systems, and the ways that students used them in pursuit of in-game goals. Burn (2016) highlights the need for a rigorous analysis of game design, rather than game play. The question of how game design influences the analysis of multimodality (see 4.4.2) in video games became one that was central during analysis. Despite students not engaging directly in programming or coding, many of the activities that they pursued required a significant understanding of the intricacies of *Minecraft*’s

game systems. This included the numerical and geometrical structures of the game world, the hierarchy of crafting materials and craftable products, and the *Minecraft* file system, including the ways that it was vulnerable to modification.

I will be examining the ways that students interact with these systems, and the ways that the game's use of graphics and sound articulate those interactions by generating onscreen artefacts. I will identify the multiple, intersecting *Minecraft* game systems that students repurposed as tools of media production, and will illustrate their use through the analysis of the resulting artefact. This will allow the analysis to be situated in terms of the specific forms of play that are unique to *Minecraft*, and the ways that those approaches to play enable students to engage in different forms of visual design. By interrogating the *Minecraft* systems that enable multimodal content production, I will be able to understand the literacy practices students needed to access in order to effectively engage with them, and the resulting skills, knowledge and understandings that were generated.

4.4.4 *Minecraft* analysis

Dezuanni and Zagami (2017) describe an approach to analysing curriculum built around *Minecraft* as a part of the *Serious Games* Australian Research Council project (2016). During this project, Dezuanni and Zagami introduced *Minecraft* to a private girls' primary school in Brisbane, and used the game as a stimulus text for a range of English curriculum activities. Students were required, after playing the game, to write about their experiences, create descriptive reports about their gameplay, reflect on the kinds of learning that they felt had occurred in the game, and engage in planning for a collaborative design task. The participant teacher in this study stipulated that students were required to engage in a set of handwriting tasks, intended to engender the practice of neat handwriting, and correct grammar and spelling. This was, however, not a designed feature of the study, and was an objective of the study teacher. The study design required a flexible approach which allowed the researchers to satisfy the pedagogical focus of the study teacher, while ensuring an integration between the print and digital dimensions of the data generation. Dezuanni and Zagami note that

the students' written artefacts also became the site of intervention from the teacher because she provided corrections with red pen and affirmations in the form of 'ticks' and initialing. In this sense, then, the students' overall learning experience traversed conventional literacy learning and innovative digital games' use. (Chapter 5, Section 4, para. 2)

The study dataset comprised observational, interview, and student artefact data. Student workbooks were analysed in order to develop insights into the teacher-curated learning involving *Minecraft*. An educational version of *Minecraft* was installed on the school system in order to ensure that students were able to play the game in a safe environment, and while the teacher was not an experienced player of *Minecraft*, she drew on the expertise of her students, encouraging them to co-teach. During data analysis, Dezuanni and Zagami considered the ways that students described their experiences regarding the use of *Minecraft* in the classroom, focusing on the ways that students framed the experience of game play in the formal school context, including their anxieties around the game, and the disruption to the typical sequence of the classroom experience.

Dezuanni (2017) engaged in a similar *Minecraft*-based research study as a part of the *Serious Play* ARC project, in which a socio-material approach is employed (see 3.3.2), with students asked to recreate their school using Lego, *Minecraft*, or a 3D printer. The teacher set up a dedicated room for *Lego* play, and each student access to a laptop computer with a copy of *Minecraft*. Dezuanni notes that the materiality of the building experience is a significant point of contrast between student description of the experience of both *Lego* and *Minecraft*, noting that when working with *Lego*, they were able to directly pick up and manipulate blocks, while *Minecraft* requires an additional operational literacy, as students acclimatise to the game's systems and controls. The study dataset comprised observational, interview, and student artefact data, with students required to reflect on their experiences working in each of the three creative domains, developing reflective pieces which were later used during data analysis. Dezuanni's analysis of the dataset involved reflecting on student responses to the study, while considering student evaluations of the efficacy of the *Minecraft*-based classroom. This also extended to an analysis of the decisions that students made during the study, including the

construction system that they preferred, and the dimensions and affordances of each system that influenced their choices.

The *Minecraft*-specific analytical method designed for this study mirror a number of aspects of these two approaches. I did not, however, be asking students to create print-based paratexts, nor will I be asking them to shift between print and digital modes of literacy instruction.

Instead, the student-created data will be drawn from within *Minecraft* itself, using the Windows screen capture function. Students will be asked to produce their own, self-created screenshots of their work, and I will interrogate the data produced by students and will create my own screenshots to ensure that the analysed dataset is consistent, and represents the most significant pieces of student work.

As with Dezuanni and Zagami (2017), I encouraged students to demonstrate expertise in the many potential literacy practices that are offered by *Minecraft*, and I positioned them to distribute this expertise in a co-teaching role. I encouraged classroom experts to work with less experienced *Minecraft* players, to ensure that all students have the opportunity to develop a *Minecraft*-based skillset.

I conducted one on one and small group interviews, during which I asked students to talk to specific pieces of *Minecraft* work. I also asked them to reflect on the challenges of working in *Minecraft* when at school, and to be honest about the limitations and affordances of the school infrastructure in terms of their experience of this kind of study. This approach is similar to that undertaken by Dezuanni (2017), as he asks students to reflect on the affordances of both *Lego* building and *Minecraft*. While I did not ask students to compare *Minecraft* with a competing authoring platform, I asked students to consider *Minecraft* as a teaching and learning resource within the broader context of their regular classes, and to critically reflect on the aspects of their school lives that it enhances, and those that it potentially undermines.

The approaches to conducting research by using video game texts in classrooms described in this section highlight the need for specificity when developing the research design, and in the selected approach to data analysis. This study acknowledges the unique qualities inherent in video game architectures, and attempts to mobilise them as effective points of data generation

and analysis. This is, however, not simply a research project that is interested in the use of video games by students; it is concerned specifically with literacies and the ways that games can be used as generators of rich literacy practices. In the following section, I will describe the methodological approaches that this study adopts to effectively analyse the data set in terms of literacy activity and student learning. This study adopts two approaches to do this kind of work: Bill Green's 3D model of literacy (1988), and Beghetto and Kaufman's model of creativity (2007).

4.5 Literacy analysis methods

Student practices were analysed using Bill Green's 3D model of literacy (1988) in order to identify specific dimensions of literacy, and evidence of learning and skill development, through the exploration of student-generated *Minecraft* content. This involved using the three dimensions of Green's 3D model simultaneously to unpack the choices that students made during *Minecraft* play, in terms of their interaction with the game software, and the resulting material artefacts that were included in the dataset. This approach allowed me to develop an understanding of these aspects of play, and to draw conclusions regarding the significant multimodal literacies underpinning play, and the ways that they reflect the game's ability to generate rich literacy learning.

This approach to understanding literacy provides a useful theoretical frame for this study. As research communities become increasingly interested in *Minecraft* as a pedagogical tool for engaging in complex literacy work (Abrams & Rowsell, 2017), an approach which allows scholars to unpack language and literacy events is critical. The 3D model focuses on technotextuality, allowing for data to be unpacked, examined as texts, cultural objects, and through the operational layer, as interactive, user-driven games.

A second approach to data analysis focuses on literacy practices that specifically involve creative, design-based *Minecraft* work. This is Beghetto and Kaufman's (2007) 4-C model of creativity, which explores the kinds of creative learning events reflected in the data. I will describe the 4C model in 4.5.2.

4.5.1 The 3D model of literacy as an analytical tool

Green's (1988) 3D model of literacy will be used to explore the nature of literacy events which resulted from student interactions during the game-based study curriculum (see 2.1.4). The 3D model allows researchers to explore the interconnected nature of skills, knowledge and understandings which are inherent in literacy practices, an approach which has enabled me to isolate examples from the dataset and unpack the various practices, products, and interactions which comprise their generation.

In order to develop the capacities to engage in this kind of literacy work, participants are required to develop additional operational and critical literacy skills in order to fully participate in the affinity space. For example, young people who are interested in engaging with the broader community of *Minecraft* players, which might include their peers at school, will need to develop the operational skills required to play the game, the cultural knowledge of how to make meaning within the affinity space, and the critical literacy skills which will enable them to evaluate the text practices occurring within the community, and to participate in their creation. These three dimensions of literacy, the cultural, operational, and critical, are described by Green and Bigum (1998) as the 3D model of literacy.

The proceeding analysis will be structured using Green's 3D model of literacy, and data will be categorised according to the operational, cultural, and critical dimensions of literacy posited by Green (1988) and Green and Bigum (1998), in order to better highlight the interconnected set of skills, knowledge and understandings which students engage in during the playing of *Minecraft*, and during their participation in the generation of the dataset. Green's model views literacy as being a set of tightly defined clusters of social practices which 'overlap, intersect, and are interdependent' (Nixon, 2003). The '3D model' will be used in the following ways:

4.5.1.1 Operational

During data analysis, I will be using Green's *operational literacy* to describe events reflected in the dataset which involve the operation and configuration of systems (whether digital or analogue), the mechanical aspects of *Minecraft*'s ludology and game code, and the broader

literacy practices required by students in order to participate in the study class at an operational level.

4.5.1.2 Cultural

I will use Green's *cultural dimension* during data generation to categorise material captured in the dataset which features study participants constructing meaning making. This will refer to the cultural context occurring in the physical classroom during the study, as well as the cultural contexts being generated inside the digital text.

4.5.1.3 Critical

Green's *critical dimension* will be used during data analysis in order to group content involving the translation, transformation, or recontextualisation and repurposing of content – whether in the physical classroom, or in-game. This will involve student examples of remix culture, student uses of *Minecraft* to achieve non-ludological goals such as communication, instruction, and commentary, and student capacities to acquire, parse, and interpret external content such as guides, instructions, and internet posts pertaining to the operational potential of *Minecraft*.

The 3D model of literacy allows a granular analysis of literacy activity occurring during the generation of artefacts drawn from the dataset. The data generated by this study also involves creative literacy practices, seen in artefacts involving art and design literacies, requiring an approach to analysis that is specifically tailored towards unpacking and contextualising creative work. In order to do this, I have chosen Beghetto and Kaufman's (2007) 'Four C Model of Creativity'.

4.5.2 Beghetto and Kaufman's Model of Creativity

Beghetto and Kaufman (2007) posited the 'Four C Model of Creativity', a conceptual model designed to articulate the nature of creativity, which frames creative activities as components of a broader developmental process. 'Little-C' creativity describes everyday creative activities, such as a person who is an amateur painter, or who writes music for pleasure. These are commonplace creative expressions, involving typical levels of original thinking. In the context of this study, there are examples of 'Little-C' creative work, and the expectation was that students would engage in a mixture of 'Little-C' and 'mini-C' creativities. Beyond these early, exploratory

and developmental creative experiences, there are 'Pro-C' and 'Big-C' creativities which students may ultimately reach. 'Pro-C' creativity refers to expert-level creativity, such as a professional writer, artist, or designer; it describes the point at which a person can be considered some kind of authority in a creative discipline. 'Big-C' creative activities involve creative genius; Mozart, Stanley Kubrick, or a technologist like Steve Jobs produced work during their lives which can be considered 'Big-C' products. The inclusion of 'Big-C' and 'Pro-C' creativities in this section is not intended to imply that there was an expectation that the study cohort would achieve these kinds of results through their interactions with *Minecraft*, but to highlight the importance of both 'mini-C' and 'Little-C' creativities in the developmental trajectory of young people as they increase their proficiency in skills and literacy practices, and may ultimately become capable of engaging in these more advanced forms of creative work. The focus of this study, however, is on 'Mini-C' and 'Little-C' creative thinking, as the students involved in the study developed new skills and literacy capacities.

4.5.2.1 'Mini-C' creativity

The critical aspect of the 'Four C' model in terms of understanding the ways that students engage in skill development during creative play is the concept of 'mini-C'. 'Mini-C' creativity refers specifically to the relationship between learning and creativity. Beghetto and Kaufman (2007) position 'mini-C' creativity as being the initial point of departure on the creative trajectory which leads an individual to 'Big-C' activities, noting:

This interpretive and transformative process is a creative endeavour that we call 'mini-c'. Of course, this is not to say that learning is creativity, but rather that knowledge development and later forms of creative expression (e.g. little-c and Big-C) have their genesis in mini-c interpretations. (2007, p. 73)

'Mini-C' creativity occurs during the initial, exploratory steps of a creative endeavour, in which participants are developing the basic skills, knowledge and understandings needed to move towards 'Little-C' creativity, which is significantly represented in the study dataset.

4.5.2.2 'Little-C' creativity

'Little-C' creativity has 'enabled researchers to recognise and examine the more ubiquitous forms of creative expression, including the creativity of school-age children' (p. 74). It is, however, problematic in how it can be used to explore this dataset. 'Little-C' creativity describes creative activities in which some level of schooling or general experience has been previously accrued by the participant, and is largely product- focused. That is, an analysis of a creative event which draws on 'Little-C' as a theoretical framing will examine a product against the backdrop of expectations regarding quality, consistency, or aptitude. A 'Little-C' approach to evaluating the creative events involved in the production of a short story would look for originality, but also mechanical expertise regarding the construction of a piece of writing (p. 76).

The 'mini-C' approach is intended to address the limitations that such an approach has when dealing with children engaged in learning and literacy events. Beghetto and Kaufman note that 'current conceptions of little-c creativity are not inclusive enough to accommodate the personal creative processes involved in students' development of new understanding and personal knowledge construction' (p. 75). Thus, the 'mini-c' approach does not require activities specifically located in the developmental trajectory of the creative process to be discarded, not does it equalise all creative events by divorcing them of context, and instead focusing on an evaluation of the creative object itself.

While examining the dataset, I will be considering each artefact in terms of the 4-C model of creativity, specifically the 'mini-C' and 'little-C' aspects of the 4-C model. This will provide a theoretical approach enabling an analysis of the data which contextualises it in terms of a learning continuum being pursued by students, and which positions the creative learning events as triggers for potential future learning trajectories which students may both formally and informally pursue. The 'mini-C' aspect of the model articulates a creative approach to the interpretive, contextual process of constructing and co-constructing knowledge within a specific socio-cultural context; in this case, a secondary student in a formal learning space. This is critical in understanding the highly subjective, contextual relationship between the creative activity and concurrent literacy events represented in the dataset.

4.6 The study design

The primary focus of this research involved an exploration of the ways that secondary school curriculum could mobilise *Minecraft* in order to enable rich literacy learning. This involved the generation of data which, once analysed, would deepen my understanding of the ways that these students were engaging in self-directed learning through a video game, and how that learning could be described as ‘powerful’ in terms of Green’s 3D literacy model (1988). Using a qualitative research approach, I generated a study design which allowed me to collect data pertaining to the existing student use of *Minecraft*.

To collect data to explore my study’s aims, I sought one class of secondary school learners from an Australian government school, subject to typical funding and resource allocation arrangements. With participants from this cohort, I taught two periods (90 minutes) per week for 10 weeks, with the study teacher. During this unit on *Minecraft*, I collected observational notes, transcripts of a single student focus group, five structured interviews with the classroom teacher, interviews with the principal and I.T. co-ordinator, and a range of digital artefacts.

As this study was driven by case study design, which comprised interviews, observations, and the capturing of digital artefacts as data collection methods. Focus group interviews were audio taped on most Fridays during lunchtime. One-on-one interviews consisted of roughly six hours of audio material, and were conducted at various locations at the school. In addition to this, I recorded extensive interviews with my participant teacher, the school principal, and the school's I.T co-ordinator. In total, I collected roughly 20 hours of audio material. Finally, field observations were written, documenting the progress of the study. See *Appendix Four: Data Overview* for further detail on the volumes and kinds of data generated during this study.

4.6.1 Site selection

During initial site canvassing, I searched for schools in the outer northern suburbs of Melbourne online, and approached them via cold-calling, asking to be put in contact with the school's Learning Technologies Co-ordinator. These schools were all public-funded schools that could be considered average across the Australian secondary education sector, in terms of both resource allocation and academic performance based on national school achievement data.

I drew on a prior relationship with the secondary school, Greendale College, that I had attended as a student. I made a phone call to Greendale in which I requested the email address of an English teacher whom I remembered from this period and sent her an introductory email in which I outlined the project, described my research interests, and requested a meeting with her to discuss the possibility of using the school. The school met my desired criteria, as it was a public-funded school in a predominantly low-SES (socio-economic status) band. At the time of the study, Greendale had 689 enrolled students, with 341 girls and 348 boys. Of this distribution, 46% of all students had a language background other than English. Academically, the school was producing student outcomes that aligned with national averages, and while unexceptional, they did not indicate any significant deficits in teaching or pedagogy (Myschool website, 2017).

After presenting the teacher with a formal outline of the study and communicating my requirements to her, I secured the school as a research location, after ensuring that teaching and administrative staff felt comfortable with the study proposal, and confident that it could be executed with minimal disruption to the regular curriculum.

4.6.2 Participant selection

In this case study, I recruited a single Year 8 class, from the northern suburbs of Melbourne school. A total of 17 students out of 23 self-selected to participate in the study by returning completed parental consent forms, and these students ranged in age from 13 to 14 years. This group was known throughout the school as one which had posed significant challenges to teaching staff, with many participants regularly refusing to attend school, and struggling to complete academic work satisfactorily. In addition to this, several students were reported to be presenting with learning disabilities. While these students had been formally assessed by a department psychologist, the results of these assessments had not been made available to the school. From this pool of students, five were selected to participate in ongoing focus groups, while a further four were selected to participate in one-on-one interviews. The focus groups were arranged based on student willingness to sacrifice their lunch hour to the study, while interview subjects were selected based on their *Minecraft* work, and the dimensions of their learning that I chose to explore with them in more detail. All of the students recruited for one-

on-one interviews and small group discussions presented signed consent forms prior to the commencement of data generation.

4.6.2.1 Class recruitment

My selection of this group of students was based on availability and access, and was not chosen with any specific features or contexts in mind. My intention was to locate a group which could be positioned as being a 'typical' Australian school classroom, with no specific qualities that would assist with the successful execution of the study design. During the recruitment process, schools often expressed discomfort with the idea that this study would be inviting video games into a formal learning space, with school policy, the perceived values of parents and teachers, with the 'technology-as-catastrophe' discourse (Bulfin & Koutsogiannis 2012) contributing to the difficulties in sourcing a research site.

During an introductory session, I discussed computer and video games, asked students to tell me about the games they currently enjoyed playing, explained the purpose of the study, and distributed consent forms. I encouraged the students to discuss the project with their parent/guardian, and to return the forms to either their teacher, Cynthia, or to the school's office. Of the twenty-three students included in the class, seventeen self-selected to participate in the study. At the conclusion of this introductory session, I revisited the research location, and made extensive notes on how the physical environment had altered since my graduation. I intended to develop an understanding of how the research site's visual and spatial features had changed to accommodate the technological developments of the late 1990s and 2000s (Bassey 1999). I was interested in immediately developing a understanding of the class, and the contexts in which it was operating, and understanding the physical environment was a first step (Clandinin, 2006, p. 48; see also Chapter 4).

4.6.2.2 Focus group recruitment

Once I had established a pool of students from which I could further recruit individual participants for a focus group, I asked the class for a single lunchtime a week to discuss the study with them, informed them that participation was non-compulsory, and that it would be a space in which they could freely share their impressions of gaming, school, and the intersection

between the two. Five students, all boys, self-selected to participate in the focus group. These boys were known by the study teacher as the 'nerdy boys', as they were all aficionados of computer and video games.

4.6.2.3 Interview recruitment

Candidates for one-on-one interviews were identified during data collection, based on their contribution to the dataset, recommendations from the study teacher, and classroom observations. Students were selected based on aspects of their work, or roles within the classroom, which I felt could be pursued in greater detail, with the kind of depth that classroom observations, or focus group discussions were not able to provide. For example, the role of gender in the context of the study was not easily captured by classroom observation alone, and it proved difficult to create a female-oriented focus group due to a lack of willing participants. By requesting one-on-one interviews with single candidates, however, I was able to develop a deeper understanding of how female students were experiencing the study, and to ask them to talk to the data that they were generating specifically. Students were also recruited for one-on-one interviews as a strategy for mitigating their reservations regarding talking openly about their experiences with the study and with gaming, with the one-on-one interview space framed as a private and confidential conversation in which they were encouraged to speak freely.

4.6.3 Participant observation

While engaging in data generation, I used a method of naturalistic observation (Hays & Singh, 2012, p. 224) in order to collect material pertaining to the behaviour of participants engaged with the study curriculum. While I was positioned as a teacher-researcher, and I was actively participating in the delivery of the study curriculum, I was aware of the need for student observation to be managed in a way that did not cause students to become self-conscious, and to ensure that my interactions with staff and students did not influence their responses during classes. Thus, I positioned myself in the participant as observer role (Hays & Singh, 2012, p. 225), in which the researcher is actively participating in the events transpiring at the research site. While this could be seen to be damaging to objectivity, Patton (2002) notes that increased participation can often result in increased knowledge and understanding. Participant observation was recorded using a number of methods. I recorded audio of the classroom, with

no questions or prompts, allowing the chatter of students and instructions of the teacher to be recorded naturally. I also wrote extensively in a reflective journal, making notes in class which were then more fully fleshed out into field note entries, as discussed in 4.6.7.

4.6.4 One-on-one interviews

In order to collect data on student responses to schooling, technology, and the game-based curriculum implemented by the study, I chose to conduct a series of one-on-one interviews with selected study participants. By moving to a one-on-one format for interviews, as opposed to the focus group, I intended to generate unique student responses that were not shaped or influenced by their peers, and I wanted to give them an opportunity to talk freely and candidly in ways that they may not in a group environment. Mishler (1991) notes the unique discursive properties of the interview, observing that while everyday life is filled with interactions involving the asking of, and response to questions in a broad range of contexts, the interview – as a speech event – brings with it a set of contextual interpretations which may differ between participants. It is, then, the responsibility of the researcher to navigate this complex discursive terrain, and to be flexible when adjusting the variables of interactions in accordance with the verbal and non-verbal cues of interview participants. With formal interviews being central to my research design, I scheduled interviews with selected students, with the participant teacher, with the school principal, and with the school's I.T co-ordinator.

Students were selected during data generation, based on the kind of work that they had created using *Minecraft*. As students worked throughout the study, I collaborated with the study teacher to identify students who produced interesting and significant pieces of data using the game, and these students were approached individually with a request for a one-on-one interview.

DEFINE WHAT YOU MEAN JUSTIFY WHAT YOU'RE SAYING - engaged? Disengaged? Typical and non-typical uses? Students doing things that surprised you?

These interviews were semi-structured, in order to provide structure around the topics that the interview covered, while still leaving enough flexibility for students to feel that they were being heard and respected. The interviews ran from between twenty minutes to two hours in

duration, depending on the time available to and engagement of participants. While I developed a rough outline of the content that I wanted to cover in each interview, I did not take notes or pre-written questions, nor did I create written documentation of the interviews. As with my focus groups, I used a Tascam DR-40 digital recorder to capture the audio of the interviews.

The student interviews (seven in total) were designed to allow me to understand the relationships existing between computer and video game culture and secondary students, to facilitate an informed analysis of the impact that these relationships have on student responses to traditional school curriculum, and to allow students to engage in an evaluation of the study curriculum, and in a self-evaluation of the impact it may have had on their lives as secondary school learners. It would also offer me a snapshot profile of the range of literacy practices that students are engaging in both during school and outside of school, and would allow them to engage in a critical evaluation of the ways in which formal schooling mobilises these practices.

The three longer (over an hour) interviews with my participant teacher were intended to generate detailed data on the historical, economic, and political contexts within which the school is operating. My intention was that my study teacher would position herself as an education practitioner currently working along a continuum of technological practice, and I wanted her to critically reflect on her role as a facilitator of innovative pedagogies, on the systemic impediments which complicate her work, and on the outcomes associated with this study.

In order to deepen my understanding of the complexities of the school site, I also conducted a single interview with the principal, and a single interview with the I.T co-ordinator. These interviews were intended to explore some of the technological complexities inherent in a game-based curriculum such as departmental filtration, Government policy, and local policy restricting student internet use. As in the previous examples, I took a semi-structured approach, which allowed these conversations to be wide ranging, and to cover a range of topics in a relatively compressed space of time. The school's principal chose to reflect on what she perceived as the school's inability to adequately implement technological pedagogies, while the

school's I.T co-ordinator felt compelled to move the discussion towards the practical realities of doing digital work in secondary spaces.

4.6.5 Documents and artefacts

The technology-based nature of this study required the collection of field documents and artefacts to be tailored to the mediums being used by students. As I was interested in the ways in which students were making use of video games as learning tools, it became necessary to identify methods of capturing data from inside the games themselves, in addition to print-based material.

The study used a digital environment which took place inside a *Minecraft* server that was run on-site at the school. I was able to collect study artefacts by entering the server using my own *Minecraft* client, and then proceeded to observe student activities in the digital world, in addition to observing their activities in the physical one, as described in 3.3.2. By doing this, I was able to collect screen shots of their creations, and their work in progress. The server allowed me to collect a log of their text-based interactions, and the server world itself was written to file at the study conclusion, and can be viewed through a *Minecraft* client. This digital material was timestamped, allowing me to construct a chronological portrait of the events unfolding during classes, and to match the digital data against my own written observations and associated print artefacts.

In several cases in which students refused to use the communal *Minecraft* environment, I collected screenshots of their activities by manually photographing the environments on their computers. I also took copies of their private server environments which can be viewed through a *Minecraft* client, and I asked several students to take their own screenshots of what they felt were significant images from inside their *Minecraft* games. In doing this, my intention was to generate data pertaining to student perceptions of themselves as digital learners, and to visually analyse the ways they position themselves through image as classroom participants.

During the course of the study, a student blog was also set up, by myself and the participant teacher, in order for students to submit images and writing, and although it met with mixed success, samples of student writing were collected from it. In addition to this, I collected

written material in the form of essays, PowerPoint presentations, and correspondences between students and the participant teacher. I also created an extensive gallery of still images depicting the school environment and the surrounding suburb, in order to have a snapshot of the physical environment in which the study was conducted.

4.6.6 Fieldnotes

For the duration of data collection, I kept extensive fieldnotes, in two different formats, pertaining to classroom activities, group discussions, interviews, and general observations of life at the research site. These included hand-written notes, recorded in notebooks, and extensive, emailed accounts of days spent at the research site, which were addressed to my supervisors. My hand-written notes generally took the form of brief one-sentence mnemonics and scribbled diagrams, and were designed to capture fine details that couldn't risk being left to memory. These included names, dates, the arrangement of furniture in classrooms, etc. The longer emails ran generally between 2,500 and 3,000 words each, and were highly descriptive and evocative accounts of the events that had transpired over each day spent engaged in fieldwork. Over the course of the study, almost 30,000 words of journaled material were generated in the form of emails to my supervisors, and when placed in sequence, these emails offer a detailed account of the research narrative.

The archive of field emails contained a mixture of thick description, administrative detail, personal reflection, commentary, and preliminary analysis. They contain records of the practices of participant students, impressions of staff working at the research site, breakdowns of technological impediments, discussions of both the frustrations and successes of doing this kind of fieldwork, and early analysis of emergent data. They are extensively illustrated with screenshots taken from student computers, and with images taken from the research site. These emails, while allowing me to report to my supervisors on the events of each day spent at the research site, also constituted a form of data generation which became a part of the study analysis. By documenting the events of the classroom in a linear and chronological format, I was able to establish a sense of continuity in terms of how the events of data generation were sequenced and unfolded, and I was able to capture observations and reflections on behaviour, activities, and the interpersonal relationships which existed between participants.

Somekh (2004) notes that diaries in which the self becomes the point of investigation can often lead to important insights, and that 'depending on the research, every diary writer develops a style and idiosyncrasies that make diary writing valuable as a research tool' (p. 26). It was important to me that I didn't simply write to myself, or to an imagined audience, and it became crucial that my fieldnotes had real, interactive readers. In using my supervisors as an audience for the writing, the process of journaling the research narrative became a 'living' one, as initial emails extending into an ongoing, co-constructed discourse which would continue over the week, before being taken in a fresh direction by the following week's email.

Hays and Singh (2012, p. 205) suggest that a reflexive journal is key in allowing the field researcher to understand the ways in which the research process is impacting on their practice. This critically reflective component of the journal process became integral in allowing me to articulate my immediate responses to the events unfolding at the research site, and for the formulation of early hypotheses regarding the behaviours of students participating in data collection.

This chapter provides a rationale for the methodology, data collection and analytic methods, highlighting the connections that it makes to the qualitative tradition and to the broader field of game studies, by drawing on the bodies of literature which currently exist pertaining to both. While this study is not a specific example of game studies research, it is partially informed by game studies as an emerging research discipline which adopts a range of different methodological and analytical approaches. I have drawn on these in my research design and here, I have outlined their dimensions of practice which were suitable, and their limitations for this study. The data generation tools have been described, and positioned in terms of their value to a case study methodology. In the following chapter, I move on to detail the study location, including the classroom, teacher, and student participants who engaged with *Minecraft*.

5. Background

The following material is drawn from a range of conversations with Greendale's staff and students, and is intended to provide background to the construction of the school's narrative. The nature of this kind of research suggests that these impressions may be contestable, and

only provide one perspective, but they have been compiled in order to provide context based on staff perceptions of Greendale, as opposed to a definitive history of the school.

Set in a suburban, middle-class valley in the northern suburbs of Melbourne, Greendale Secondary College is a typical government school. The school's architecture consists of a mixture of monochrome 1950s-style brick buildings, many of which seem strikingly anachronistic in their industrial-era aesthetic, set against a broad array of modern buildings with their matte-coloured, geometric designs belying their 80s and 90s pedigree. The school has undergone a number of revisions over the years, and as funding has become available there have been a number of redesigns and upgrades implemented to enhance the look of the school.

Greendale itself is a modest sized suburb, consisting of typically Australian suburban homes, many constructed in the 1960s and 1970s. Located 14km to the north-east of the Melbourne CBD, Greendale has a population of 9,606, as per the 2011 census. With a predominantly white, lower middle-class populace sitting in a mixed economic band, Greendale borders both Melbourne's inner-city belt, and the corridor of increasingly rural outer suburbs which spread out to the north and north-east of the city. Greendale's student population is drawn from both the area itself and from the surrounding suburbs - many of which are classified in the low-SES banding, with extensive housing commission zones (government-funded public housing, intended for low-income earners).

The following chapter is presented as a contextual framing for this study. In order to better understand the environment in which data was generated, including the school, study participants, and technological context in which they learn, this chapter describes the school, the curriculum, the teacher, and finally, profiles of three of the major study participants who produced content that forms a significant part of the analysis conducted in Chapters 6 and 7.

5.1 The School

Initially a secondary school offering classes for the middle to upper years (Year 6 to 12), Greendale has been reimagined as a Prep to Year 12 college in order to address the problems of collapsing enrolments. This has, however, not translated into significant gains in student levels,

with 689 total enrolments spanning the 12 year levels. The school has demonstrated a consistent decline in student levels, dropping from 1021 enrolments in 2008, to 897 in 2010, to the then-current 2012 figure. This sense of entropy permeates the staff, who often express anxiety regarding the sustainability of the school, and the security of their employment.

Academically, the school sits uniformly average across the NAPLAN data (National Assessment Program – Literacy and Numeracy, a set of standardised tests which focus on basic skills that are given annually to Australian school students, in order to determine the kinds of student outcomes that are being generated by current curriculum), with slightly elevated outcomes at a Year 5 level. The school has made a conscious decision, however, to pursue an arts/performing arts agenda, and this has become a key focus of Greendale’s marketing strategy, as evidenced by promotional literature which highlights the school’s cultural program. It is, however, a controversial approach, and is one that is perceived as not necessarily being in the best interests of the school. Greendale’s music and performing arts program, at one point an integral part of the school’s ongoing success and elevated community profile, has become the school’s primary promotional tool. Compounding these issues is an instability in staffing, particularly at a principal level, with six principals passing through the school in recent years, plus an aging teacher population, with the majority of the teaching staff being employed at the school for more than 15 years.

The school prides itself on an atmosphere of warmth and family. Former students, and the parents of former students, often comprise support and administrative staff, and the school is consistent in attempting to build positive, healthy relationships not only with students, but with families. Despite this, the school attempts to maintain a healthy fusion of the traditional and the progressive, tempering the human side of their philosophy and practice with what it hopes is an innovative, technology-enriched curriculum.

5.1.1 Curriculum

“Small enough to be family, large enough to be innovative”

School motto, 2013

Greendale Secondary College was, for many years, considered to be one of the leading academically-oriented schools in the northern metropolitan region, and featured a curriculum which balanced both cultural and intellectual imperatives, maintaining a reputation as one of the more desirable schools situated in a largely aspirational area. In the 1980s and 1990s, the school was home to a well-regarded music and performing arts program, which drew students in from across Melbourne, and received numerous plaudits praising the school for the outstanding quality of its cultural export. Simultaneously, Greendale was also considered a school which prized academic achievement, and boasted a cutting-edge, effective curriculum which fostered innovative thinking, and stood in clear competition with similar schools in the region. During the 2000s and 2010s, life at Greendale has changed dramatically, and the school has been rocked by a series of systemic, funding, and cultural issues that have undermined teacher confidence, and decimated both reputation and enrolments. Today, Greendale is a school fighting a public perception of instability and decline, while attempting to find direction in a vastly changed social, economic, and pedagogical landscape.

5.1.1.1 The Achievement Improvement Zones Project

Greendale’s current predicament is, in many ways, attributable to a range of regional policy initiatives which dramatically affected both the intra and extra-contextual operation of the school. Both the *Achievement Improvement Zones* project (2007) and the *Heidelberg Schools Regeneration Project* (2009) aimed to address the problem of flagging academic performance in the northern metropolitan region of Melbourne, yet for Greendale, neither project has had the desired impact.

The *Achievement Improvement Zones* project described itself as a ‘key school improvement initiative... which aims to improve the literacy and numeracy achievement levels across all schools in the NMR’ (2010). It was a ‘framework for change’, intended to be delivered over a

three-year period (2007-2009) which attempted to facilitate elevated performance in low-SES and disadvantaged schools by addressing:

- Developing leadership capacity
- Using data to plan student learning
- Student management techniques
- Numeracy teaching strategies
- Literacy teaching strategies

These areas were led by educational experts drawn from academia, each of whom was to provide extensive support, guidance, and philosophical direction to their area of expertise. In addition to the disciplinary areas of literacy and numeracy, the project intended to focus on questions surrounding classroom management, the configuration of power in classrooms, and how to effectively cope with challenging behaviour.

From conversations conducted with many teachers at Greendale, however, the *Achievement Improvement Zones* project was received with mixed reactions. Professor David Hopkins, the project's executive, could be seen as being somewhat simplistic in his assessment of Greendale's, and the region's, raw performance data. Greendale's teachers have described him as being dismissive of the very real challenges facing schools in the northern region, and as being both a vocal critic of the performance of schools such as Greendale which are anchored in consistently average levels of academic performance, while simultaneously dismissing the notion that socioeconomic status is a contributing factor to student outcomes.

Compounding this perceived intrusion into the professional lives of Greendale's teaching staff was the personal development itinerary mandated for participating teachers. Teachers were required to leave their typical disciplines, and to cross teach in subjects that they may be unfamiliar with. Teachers who had generally taught in literacy spaces were required to undergo extensive numeracy training and vice versa, while all teachers were required to undertake 'development management' modules. Drawing upon the work of Latrobe University's Professor Ramon Lewis, these professional learning sessions were intended to heighten teacher awareness of disciplinary issues in low-SES environments, and to provide them with a system of

engagement and interaction which would allow them to more effectively control unruly students. This, however, was often perceived by a number of Greendale teachers as overly prescriptive, and as an unrealistic formula in which teachers would observe certain results if they performed in certain ways, undermining the credibility of the *Achievement Improvement Zone* project amongst staff.

5.1.2 Community

RESPECT – Responsibility, Equality, Strive, Pride, Excellence, Connectedness, Trust

Greendale's core values, 2012

Greendale's relationship with the surrounding community has been increasingly problematic as the school's problems become public, and its credibility becomes increasingly contested. As the first decade of the 21st century drew to a close, Greendale found itself at a crossroads, faced by the teaching and learning-focused initiatives of the *Achievement Improvement Zone* project on one hand, while simultaneously being destabilised by the *Heidelberg Schools Regeneration Project* (2009).

5.1.3 Innovation and Technology

Greendale considers itself a technologically progressive school, and attempts to find a balance between the traditional imperatives of the school culture, with a curriculum intended to embrace emergent opportunities provided by digital media. Innovation is central to the school charter, and is a core feature of the school's promotional agenda. Despite this, the school has experienced significant challenges in implementing innovative pedagogical strategies, some of which are attributable to Greendale's fragile political situation in recent times, while others are a product of wider, more general complexities facing the secondary public sector.

5.1.3.1 The Impact Center

In response to the *Middle Years Literacy Research Project* (MYRAD, 2001), Greendale applied for significant funding to create an open plan, technology-based environment intended to be used for the development of innovative teaching and learning pedagogies. Conducted by Deakin University, the *Middle Years Literacy Research Project* indicated that there were salient

issues affecting performance, particularly in boys, during the middle years – with disengagement, disinterest, and a perceived lack of utility and currency restricting the effectiveness of formal, institutionalised education. To address the issues in literacy education that emerged from the study data, funding opportunities were offered to Victorian secondary schools by the state government, and Greendale was a successful grant applicant.

The *Impact Center* was the outcome of the grant application. A substantial block of the school was to be converted into an open plan, technologically rich learning environment, and would ideally drive school initiatives to conceive innovative, modern pedagogies which would elevate student engagement and, ultimately, translate into quantifiable outcomes. Greendale sought a design template for both the physical landscape of the *Impact Center*, and the pedagogical design of the centre curriculum, and entered into a consultative dialogue with the Senior Science and Maths Academy, a satellite school operated by Flinders University, who had recently implemented a similar technologically-rich program. Greendale staff were sent interstate for extensive professional learning sessions with Flinders teachers and academics, and the Flinders model became the template upon which Greendale's *Impact Center* was created.

Initially, the *Impact Center* was furnished with the latest Macintosh computers, in addition to a complement of Netbooks and miscellaneous Windows-based systems. While the technology presented a transformative opportunity in an environment which could arguable foster a sense of innovation and experimentation, the pedagogy largely failed to match the technological promise. Powerpoint, Garageband, and basic film editing became the overwhelming focus of the *Impact Center's* curriculum, creating a friction within the school between teachers who saw the *Impact Center's* potential being squandered on fairly pedestrian, software-driven pedagogies, and those who saw Powerpoint and Garageband as being demonstrably innovative, and fulfilling the project charter.

Overwhelmingly, a sense of the experiment having failed began to affect the *Impact Center* staff, who weren't necessarily technological experts, and who began to struggle with

maintaining the momentum of innovation being required of them. The school's internet filtration began to curtail the effectiveness of the *Impact Center's* potential for innovative pedagogy. Greendale teachers have reported a seemingly random, and expanding, array of filtration layers which crippled both function and accessibility of the school internet, leading to student and teacher disengagement. The purpose of the *Impact Center* became increasingly unclear, as attempts to implement various technology-based initiatives were undermined by filtration, and the open plan environment began to seriously affect both pedagogy and practice. One teacher noted that in an effort to reverse the downward spiral of the *Impact Center*, the technology – rather than classroom pedagogy – began to drive the curriculum, and with the technology so unstable and often limited, the curriculum began to similarly suffer.

A more complex and daunting issue began to enter the *Impact Center*, as teachers began to realise that in addition to locating best practice for the technology they had been allocated, they were simultaneously in competition with their students, who demonstrated a remarkable level of technological savvy. With staff confidence becoming increasingly undermined by the difficulties faced by the incompatibility between the *Impact Center's* charter and broader school and departmental policies, the additional pressures of a student body who were vocal critics of *any* use of technology began to compound a growing sense of discouragement. The informal skill set developed by students during their out of school lives, which had often created a set of expectations regarding what technology *is* and how it *should* be used, rubbed up against the restrictive *Impact Center*. Students began to stage a kind of rebellion in 2009, by creating a Youtube video, and adding comments, mocking the *Impact Center* as a waste of their time, and as a technological failure, citing censorship, poorly maintained equipment, and the predictability of a Powerpoint-driven curriculum. The Flinders University template, which had been designed for senior, self-selecting secondary school students in an unrestricted, University-driven environment began to increasingly reveal itself as being unsustainable and unsuitable in a policy-driven, Government-funded secondary environment. Teachers began to express a discomfort with student expertise, and this oppositional relationship continued to degrade the potential of the *Impact Center*, until the leases on the systems themselves expired

and – due to the perceived failure of the program by teaching and administrative staff – were not renewed.

During data generation, Greendale’s teachers described the challenge of advocating for this kind of technology-rich learning environment with parents. Having already expressed significant concerns regarding the school’s ability to pursue an academic agenda, parents have informed Greendale’s teachers that their real objective in choosing a school for their children is that it offers ‘the same education that they had’, and that their children should be given the same educational experience that ‘worked for them’. Greendale is, increasingly, not in an economic or political position to refute such a claim, and with the failure of the *Impact Center* to generate the kind of innovative pedagogical strategies that the project charter promised, and that Greendale itself had pledged to the student and parent community, the school finds itself in a difficult position. It is, in many ways, unable to innovate, yet due to the evolving nature of globalised techno-culture, it is concurrently no longer able to retreat into conservative, traditional teaching and learning approaches.

5.2 The Teacher

Cynthia has been a teacher for the majority of her adult life, and in a career spanning almost three decades, the majority of her time as a professional educator has been spent at Greendale in English and History classrooms. Upon graduating from ‘Teacher’s College’ in 1983, Cynthia taught for a single term at Burwood Heights High School, before accepting a position at Greendale. She is considered by her principal, who noted her importance during a study interview, to be an integral part of the Greendale school community, regarded as an excellent teacher, but also as a stabilizing force amongst the staff. A mentor to younger teaching staff who pass through Greendale, Cynthia is consistently seen as a key participant in the shaping and support of early career teachers who cut their teeth at Greendale. Cynthia is also seen by many students as a candid yet non-threatening authority figure, who is able to deal with sensitive personal issues with confidence and humanity.

Cynthia has an extensive academic background which informs her practice. In addition to her Bachelor’s degree in English Literature and Diploma of Secondary Education, she also holds a

Graduate Diploma in Art History, a Master's degree in Archaeology, and a Master's degree in Education which she completed during data collection in 2012. This familiarity with a range of disciplines at a postgraduate level informs Cynthia's practice, and has armed her with an intellectual depth which permeates her classrooms. Cynthia's impressive credentials and extensive classroom experience have elevated her to the position of Curriculum and Learning Leader at Greendale, a role in which she oversees the ongoing development of Greendale's academic programme, and attempts to realise the school's charter of being 'large enough to be innovative'.

As a classroom teacher, Cynthia prefers a somewhat more flexible and student-driven pedagogy than many of her colleagues. Inviting informal literacies into the classroom space, customising text selection to meet the individual needs of students, and inviting negotiation of curriculum objectives with students are all key elements of Cynthia's teaching style, and her students often respond to her positively, relishing the unique environment which Cynthia constructs. She is, however, frustrated. Whilst she is an imaginative and progressive thinker, she feels increasingly stifled by the technological arrangements at Greendale. Her inability to effectively create an authentic and well-designed technological space is a concern to her, and her efforts to reconcile what she sees as the growing incompatibility between the digital techno-cultures of her students, and the overwhelmingly legacy-oriented curriculum of Greendale are often thwarted by resource, managerial, and policy-driven impediments:

DE: Is it frustrating to you, as a teacher?

C: Sure. Because, we want to do our best for our students, and we want to see the connections made between the things that they do at home and here, but sometimes we just can't. And, that's about policy, and it's about what's available to us. If we don't have the tools, we can't do the kind of technology-based work that we might like to.

(Interview 10-12-2012)

While she is dedicated to Greendale, and tireless in her efforts to raise and consolidate the profile of the school in an attempt to recapture the previously excellent reputation earned by the school, she – like many of her colleagues – feels a certain level of anxiety about her future.

She was not an advocate of the abandonment of the academically-driven curriculum which earned the school its reputation, and although she acknowledges the immense value of Greendale's music program historically, she seriously questions the validity of this approach as a response to Greendale's recent difficulties. This does not manifest in her teaching, which is her primary professional focus, and her classrooms will continue to be flexible and progressive pedagogical spaces.

5.3 The Class

The Year 8 class that Cynthia provided me access to in this study was described to me as significantly challenging, with a number of students requiring ongoing, extended pedagogical strategies to be implemented in order to maximise the benefits of formal learning. The class consisted of 23 students with a median age of 14. The class was composed of 11 girls and 12 boys, many of whom had been in the same classes throughout their primary *and* secondary education, although there were also a number of students who had transferred into the class from other schools. Out of 23 students, four chose to opt out of the study curriculum, and were instead given alternative work to complete during class times. The class is categorised as a combined literacy/humanities space, leveraging both spheres of Cynthia's expertise, and offering significant latitude in developing an integrated curriculum.

The technologies students were given at the commencement of the school year change from year to year, and during data collection, Cynthia's class were all working with Lenovo Netbooks. These were in various states of disrepair, with some students able to care for them well, and others struggling to maintain their systems. Software often failed to work, requiring updates that could not be installed due to the lack of permissions on student accounts, and screens and keyboards were often physically damaged.

The classroom contained two students who the school classified as learning impaired, and two others who Cynthia described to me as having significant literacy issues. This has led to the employment of two integration aids, who work with the more complex students in the class, and attempt to ameliorate their learning and behavioural issues. This is, however, often

undermined by extensive absences from class, and by a growing sense of disengagement with classroom activities.

As the technology is often so volatile and unpredictable, Cynthia attempted to provide these students with a concurrent legacy curriculum; thus, printed worksheets and quizzes were typical learning tools given to these students, who generally reciprocated with disinterest. This has contributed to a sense of unease, with Cynthia describing many other staff members attitudes towards this particular class as being pointedly negative, often articulating them as ‘hopeless’, and as a group of delinquent students. Cynthia, by contrast, describes them warmly, noting that although their behavioural issues make them a challenging group to work with, they can also be funny, ingenious, and even endearing in their chaotic and ‘naughty’ behaviour. She does not consider them to be ‘hopeless’ – but, rather, a group requiring creativity, sensitivity, and compassion in order to achieve positive learning outcomes, and to ultimately students who are seen as socially and economically mobile.

In the following sections, I will provide a snapshot description of three of the key students involved in this study. They have been selected due to their capacity to generate data that highlights critical dimensions of the study analysis. They are necessarily impressionistic, and are intended to contextualise their behaviour, and their biography, in terms of their identities as classroom participants, as members of the Greendale school community, and as players in the social worlds of Greendale students.

5.3.1 John

John didn’t like school. As a student who had been identified as having significant challenges as a learner, school was difficult for him, with an endless sea of worksheets to be completed, and a strange kind of social displacement rendering him, in many ways, an outsider. He was a big chested, awkward schoolboy. His friends, in particular – a small group of four or five students whom Cynthia has dubbed ‘the Nerdy Boys’ – closed ranks around John, helping him survive the myriad complexities of life as a secondary student, insulating him from harm as best they can by helping him with his work, defending him against other students, and including him in their

lunchtime activities, most of which revolved around computer and video games (see Appendix C).

DET would not disclose to Cynthia exactly what the nature of John's learning difficulties were, but only that it must be somehow ameliorated through a combination of curriculum and support from his integration aid. John had demonstrated challenges in handwriting and print literacy, as well as more complex behavioural challenges concerning his ability to socialise with other students. Staff had also reported issues regarding John's personal hygiene, and although his parents had been contacted by Cynthia, there was no evidence of neglect. Rather, John's mother had appeared concerned for her son's wellbeing during discussions with Cynthia, and was often frustrated with the difficulties inherent in maximising John's potential as a secondary student. Cynthia had also noted that John is often treated by teaching and administration staff as though he is 'an idiot – when he is not'.

If John had demonstrated significant difficulties with regards to formal learning, his work in computer games told a vastly different story concerning his abilities. He was regarded by his friendship group, the 'Nerdy Boys', as an expert both in *Minecraft* and in computer and video games in general, and he had mobilised his expertise as a game player as a way of expanding and consolidating his social roles in the school. In conversation, he told me that he "likes teaching people things", and seemed to draw a considerable amount of pride from his perceived expert status as an enthusiast of gaming media, noting during interviews that 'even if new games come out on Steam, I figure them out and teach other people'. While John had been described as having problems with learning, it is interesting that when asked about his favourite past times, a learning-related activity is one of the most prominent.

For many other students, however, John was invisible. Sitting consistently at the front of the class, nestled in amongst his small group of technology-obsessed friends, John often appeared shy, and perhaps even frightened by the other, more aggressive and boisterous boys. Cynthia had noted that John had been a victim of bullying in the past. As a student, he was often marginalised by his limitations, requiring assistance to complete work, and as a peer, he was both gentle and vulnerable, requiring the support, patience, and protection of the 'Nerdy Boys'.

5.3.2 Chaiya

Chaiya was an ESL student, and her parents spoke little English at home, reinforcing a strong accent. In school, her words escaped from her lips in short, nervous bursts, as though she had little confidence in her ability to communicate. She was a part of a small cluster of ESL students who worked together in class and socialised during recess and lunch. Chaiya was timid and shy, particularly around males, and demonstrated a considerable amount of discomfort when communicating with them. Greendale's teaching staff had observed that her ability to communicate fluently in English may be somewhat compromised by second language interference, yet despite this, she consistently attempted to better her English skills, and often produced written work.

She was generally a diligent student and would complete any work that she was assigned by teaching staff. Cynthia had noted that she does, however, have a mischievous and innocent sense of humour, and would attempt to talk her way out of class work – and, when unsuccessful, cheerfully completed her assigned tasks. She was seen as a popular and highly social student, comfortable with her own group of friends and with the broader Greendale community. She did, however, dislike collaborative work, and preferred to simply complete tasks alone.

Chaiya surprised the Greendale community when she revealed herself to be an accomplished fine artist, capable of producing extremely intricate, beautiful pencil and ink sketches. She had developed a reputation as an artist, and other students described her work with a mixture of admiration and pride; Chaiya's expertise as an artist is something that the other students seemed to aspire to, noting that while they have also engaged in various artistic pursuits, they are often 'not as good as Chaiya's'. Despite this, Chaiya is extremely modest, and self-deprecating about her artwork, responding to compliments with a shrug, and a small, nervous laugh.

When initially approached about the game-based curriculum, Chaiya refused to participate. She claimed that 'games are for boys' and complained to Cynthia that she had no interest in playing games – let alone playing games as a part of the regular school curriculum. Games, however,

were very much a part of the out-of-school literacy practices which she engaged in – she was an avid player of iPhone games, and was a player of *CityVille*, a Facebook game. Her opinion was swayed when it was pointed out to her that *Minecraft* could be a creative experience, and could be used as a new form of design and sculpture.

When *Minecraft* was repositioned as a creative tool, Chaiya's attitude towards the study unit began to change. She began experimenting with the ways she could use *Minecraft* as a platform for creativity and sculpture, mirroring her pen and ink drawings that had become so central to her identity as a student, and as a participant in Greendale's school culture.

5.3.3 Gabriel

Gabriel transferred to Greendale earlier in the year of data collection, pulled out of his previous school by his parents due to a reported ongoing campaign of school bullying. A small, dark haired boy with a voice which crackles with intelligence, the effects of bullying on Gabriel are obvious as soon as he began to discuss the subject; his eyes drooped, and his voice vacillated between world weary resignation and real pain. Greendale has accepted him into the school community, although the transition away from a violent and troubled history with secondary education had not been a simple or seamless one, and Gabriel continued to chart a complex, difficult course throughout his schooling.

While Gabriel is now considered one of Cynthia's 'Nerdy Boys', upon arriving at the school, he struggled to socially find his place. He immediately attempted to align himself with a group of students who are considered troubled, and who present a range of challenging disciplinary issues to Greendale's teaching and administration staff, but this experiment in reconfiguring his social position was short lived. The boys rejected him, and he was once again socially adrift – resulting in a considerable number of school absences, which caused him to begin to fall behind in his studies. Gabriel's love of computers and technology caught the eye of the 'Nerdy Boys', who adopted him as one of their own, and allowed him to become an integral part of their small social circle.

Gabriel's academic history is equally complex, and presented significant challenges to Cynthia and her colleagues. While he was bright, articulate, passionate about computers and

technology, and had expressed a desire to one day become a game designer, it was significantly difficult to elicit any 'traditional schoolwork' from him. He was constantly attempting to acquire knowledge informally – by repeatedly questioning Cynthia on points of history, on further elaboration and detail of subjects being discussed, and by using the Internet to independently research. Unfortunately, he had demonstrated little interest in producing the mandated classroom 'products' which the school required from him, leading to serious questions being raised regarding his ability to make effective use of his time spent as a secondary school student.

His technological expertise was impressive, and as he was experienced in operating system emulation software, he was able to quickly, efficiently conceptualise workarounds which allowed him to disarm school filtration and other technological restrictions. He was a confident and creative thinker, who was able to move between pedagogical, ludological, and cultural framings of video game software seamlessly. This level of sophisticated thinking frustrated Cynthia, who saw Gabriel's enormous potential as a student, but found it extremely challenging to harness his boundless energy and intellectual curiosity, and to direct it in a generative way which is measurable by the standard curriculum.

Cynthia had contacted Gabriel's mother in an attempt to engage with her in seeking a solution for Gabriel's reluctance to attend school, and lack of interest in formal schoolwork once in classrooms. While she recognised that Gabriel needed to be guided towards formal academic goals if he was to become a successful secondary school student, Cynthia had observed that Gabriel's mother's attention seems to be more specifically focused on his social and emotional wellbeing. While the details are largely not available to Cynthia, it can be assumed that Gabriel's bullying was severe and distressing enough, for both Gabriel and his parents that they felt a need for him to begin again at a new school. Cynthia remarked that despite his erratic academic performance, his mother is 'just happy that he's safe, happy, and settled at Greendale'.

This chapter is intended to provide a detailed snapshot of the study context, and the principal participants in the data generation process. Greendale was a complex and challenging

environment, from a teaching and learning perspective, and in terms of the kind of data that could reasonably be generated during the study. While it did not represent a school that was optimally configured to engage in new forms of digital learning, it was in many ways an archetypal Australian government-funded school, representing the kind of challenges that are common across the education sector. In this sense, Greendale was an excellent candidate for data generation, with the *Minecraft*-based study implemented in a typical school environment. In the following chapters, I will analyse the data that was generated at Greendale, with a view to unpacking the ways that literacy learning occurred through a selection of artefacts that can be considered indicators of literacy activity.

6. Analysis: Collaboration

This chapter argues that *Minecraft's* utility as a digital classroom text can be made explicit by considering the ways that the game affords students the opportunity to work collaboratively. These collaborations, and the literacy practices that underpin them, point to the game's value for educators intending to work in digital spaces, and advocate for the role of a game-based approach to classroom pedagogy. Using the analytical approaches described in 4.4 and 4.5, this chapter will explore a range of artefacts generated at the study site, considering them in terms of the ways that co-authorship and co-participation framed the literacy practices engaged during their creation. The study's main research question asks how students can use *Minecraft* to engage in rich literacy learning, and in this chapter, I will respond directly to that question by providing a range of collaboratively authored digital artefacts which articulate the potential for the game as a site of purposeful digital learning.

During this analysis, the 3D literacy model will be used to isolate and interrogate the ways that students worked collaboratively, in a shared digital space, on each game-based artefact. This will allow me to draw connections between the artefacts, my fieldnotes, interview transcripts, and the research literature around the ludology and sociology of *Minecraft*, arguing for each artefact as an example of rich, digital collaboration, and multiliteracy practice. I will also use a range of approaches to digital analysis which will draw out significant themes, or dimensions of game play, which will allow the unique features of the digital environment, and the content created within it, to be captured and interrogated.

The chapter is divided into three sections. In the first section (6.1) I examine *Minecraft's* role in the study as a multi-purpose toolbox of collaborative digital activities, and I will draw a range of artefacts from the dataset which highlight the collaborative aspects of *Minecraft* play, and their role as sites of rich literacy learning. I will start by introducing an artefact displaying a collaboratively-constructed *Minecraft* asset, and will then move the focus to the specific systems and functions which enable students to co-author digital assets in the *Minecraft* world. I will then broaden the focus of the analysis to consider the ways that students operate within a designed digital space, by considering a set of artefacts which demonstrate design literacies as

students tailor their co-authored structures to the aesthetics of the environment. I will then look at the ways that students co-author knowledge in order to achieve the kinds of design outcomes described in 6.1 by looking at the ways that students co-construct meaning by drawing on community resources, and by distributing knowledge within the classroom (6.2). The third section will look at the ways that student collaborations resulted in shifting classroom identities, as students who demonstrated expertise and aptitude for *Minecraft* play began to take on roles as knowledge producers, and their out-of-school digital literacy practices became recontextualised within the formal learning space as powerful instruments of rich literacy learning.

6.1 A new media paintbox



Figure 1 - The desert outpost

The data presented in this chapter was drawn from a series of lessons taking place in a composite literacy/humanities classroom. An initial curriculum was developed in which students were to engage in a structured and ordered sequence of development tasks built around the concept of a student-developed *Minecraft* village. They were to develop buildings with various functions (a town square, dwellings, a market and so on), and paratexts would be developed by students supporting civics and citizenship-based learning (the creation of a code

of laws and a student-run legal system). Upon the commencement of data generation, this approach proved unsustainable due to the challenges of the school network (see 8.4.1) in providing all students with a stable, connected game experience, the limitations of external connectivity (see 8.4), and the difficulties surrounding effective moderation of in-game student behaviour (see 7.3). In order to overcome some of these challenges, a new pedagogical approach needed to be quickly developed and implemented. Instead of the structured play anchored in a teacher-authored narrative regarding the development of a town, students were instructed to develop only the buildings featured in the original town. They were free to pursue this task in any way that they chose, whether alone or in groups, with the only caveat being that they did not interfere with each other's building projects. This approach authorized a kind of free play which more closely aligned with student expectations regarding the way that *Minecraft* was played during their home lives. Ultimately, students embraced this freedom to explore the game's potential, and tasks that students completed moved beyond the 'village'-based structures of the original curriculum design, with students engaging in imaginative, highly contextual design projects using the game's content creation tools. As Gabriel noted:

G: We don't really play the game with rules at home. We just do stuff that interests us. It's cool to do that here.

(Interview 10-12-2012)

In Figure 1, an artefact from the classroom game of *Minecraft*, study participants are working collaboratively in an attempt to colonise the land from the procedurally generated, randomised landscape that is created when a server instance (an installation of a *Minecraft* game world) is created by the *Minecraft* software. The second stage of Pink's (2006) visual analysis yields significant insight into the construction of this artefact. The artefact depicts works currently in progress, including housing and irrigation, and a number of participants can be seen working on various parts of the design, construction, and implementation of various buildings. Participant avatars are using the default *Minecraft* skin (a male avatar in blue pants and an aqua shirt), and they are all using the naming convention 'School(First name/Last name)', with the exception of

‘SchoolNichola’, whose full name exceeds the available character buffer in *Minecraft*’s account naming system. This combination of text and image points to two semiotic modes (Hull & Nelson, 2005), image and text, with the two modalities arranged by study participants in order to ensure that consistency amongst avatar design has been achieved, and to ensure that avatar identification is quick and simple for both in-game participants and the audience. This artefact depicts a typical *Minecraft* ‘desert biome’, in an area of the game map close to the point at which players ‘spawn’ into the game world. This area is dominated by blocks which have been assigned properties commonly associated with desert environments – sand, dirt, stone. Areas located within *Minecraft* worlds are aesthetically representative of their ‘biomes’ (environments built from *Minecraft* assets which simulate a specific kind of landscape – glacial, desert, tropical, etc.). The environment does not replicate the physical properties of a real-life desert beyond the colours, textures, and use of space commonly seen in fictional depictions of desert landscapes. The game’s ‘rules’ do not change to reflect the changes in the environment as participants move between biomes.

The collaborative creation of in-game assets in *Minecraft* involves the engagement of the cultural, critical, and operational dimensions of literacy, as participants are tasked with communicating, sharing knowledge, critically evaluating the ludological scope of the game’s design engines, and operating complex computer software. In the artefact taken from the study *Minecraft* server, participants are pictured in the act of content creation using the game’s internal content generation functions (as opposed to an external content development/editing package).

In the following subsections, I will be looking at two examples of students collaboratively populating the digital *Minecraft* space with co-authored assets. The first section will explore the ways that students used the engine to collaboratively design and deploy new work in *Minecraft*, by exploring the systems which power *Minecraft* asset generation at a micro level (see 4.3.1.1). The second subsection will consider *Minecraft* content creation from a macro level, by looking at artefacts which demonstrate student awareness of the digital space, the affordances of the space, and the co-developed strategies for populating the content with a consistent, collaboratively designed aesthetic. This is the ‘new media paintbox’ of the title; a creative space

where students draw on colour, shape, and design to collaboratively author new works as a way of populating a digital landscape.

6.1.1 Creation and crafting practices

Content creation in *Minecraft* involves a number of concurrent processes, which can be engaged both as a solo player and as a group collaborator. While many of the blocks seen in Figure 5.1 are ‘naturally’ occurring within the *Minecraft* landscape, and are the result of the game’s world generation algorithms creating and placing them, there are many which have been created by study participants using the game’s in-engine ‘crafting’ system. Game content may be manually generated by accumulating and processing in-game materials via a system of ‘crafting recipes’. Materials gathered from the in-game world are arranged by players in specific patterns within the 3x3 ‘crafting grid’ (see Figure 5.2), with the right-aligned box indicating the type of block, or asset, which will be ‘crafted’. This object can then be placed into the player’s inventory for use in the game world as building materials, as equippable tools, or as a part of a more advanced crafting recipe to generate higher-level content such as advanced weapons, or components used in complex machines.

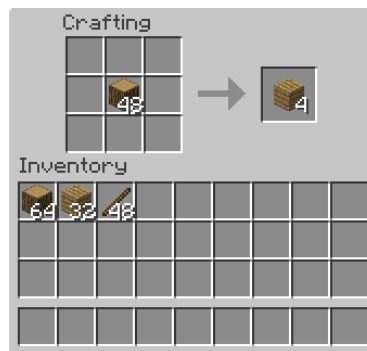


Figure 2 - Minecraft crafting grid

While the structures seen in Figure 1 could have been geometrically constructed using the generic materials that are randomly generated in the game world, deliberate design decisions have been made by study participants which use the game’s crafting system as a means of developing more interesting, customised and visually complex content. Each brick used in the

construction of the houses was individually crafted by one or more participants, and there are a number of design choices which required additional labour in order to be successfully implemented. In the artefact, a number of materials are randomly generated by the game's world-building algorithm, and while others have been manually crafted by participants using the game's content generation engine. While there are construction materials present in the artefact which have been created by participants and arranged to create appealing, symmetrical patterns, there are also aesthetic elements present in the scene – a bookshelf and a pair of fence posts, which are similarly products of *Minecraft's* in-game crafting engine. Burn (2016) (see 4.4.3) suggests that a systems approach to game analysis is significant in understanding the literacy practices involved in the creation of a game-based artefact. In this example, the 'systems' of text generation encompass the crafting engine, resource collection, the 'recipes' through which each block type can be generated, and their physical arrangement in the game world using *Minecraft's* systems of in-game, avatar-based spatial navigation.

The operational dimension of literacy is being engaged during the creation of these objects, with participants required to execute tasks – in this case the operation of the *Minecraft* software and its crafting systems. The mechanical aspect of *Minecraft's* content creation system involves operational literacy work, in that the software interface must be understood, including the function of different controls, and the information presented by the game's GUI (Graphic User Interface) which reports back to the player on in-game variables such as health, resources, and so on. The cultural and critical dimensions of literacy are simultaneously engaged, as participants concurrently make decisions regarding the purpose of their crafting within the context of gameplay (cultural), for example, crafting tools for distribution to their classmates to enable them to assist with building projects. They are also interrogating the kinds of in-game resources that will be required to complete different projects in the *Minecraft* world, and ensuring that they have created the right conditions for those resources to be gathered or created; an evaluation of text elements and events in the context of the broader purpose of their play. The simultaneous use of these literacies is an illustration of the integrated nature of the 3D model. This is, also, an example of the 'game as action' layer (Apperley & Beavis, 2013), as it involves the physicality of game play, including the use of the

game's controls, and the decision to work collaboratively. In terms of the literacies engaged during this example of the 'game as action' layer, Beavis (2014) notes that the layer describes game play 'both in and out of school, and it focuses on the contexts, actions, and decisions needed to create play' (p.436). In this context, considering *Minecraft's* crafting system through the lens of the 'game as action' layer allows us to see the way that operational, cultural, and critical literacies are arranged by students in a way that enables game play, through their physical interactions with the computer and the game's systems.

In order to effectively expedite the process of content generation, participants were required to work collaboratively by designing a production process which assigned responsibility for the various crafting elements to specific collaborators. Simonton (1997) suggests that a key element of creativity is the ability to generate many ideas and products over time. This is reflected in the collaborative creative learning depicted in artefact such as Figure 1. Participants collaborated both in-game and using *Minecraft's* text chat feature, delegating tasks and requesting help on specific resource shortages. For example, the exchange below, taken from the in-game text chat involved three students:

2012-11-02 14:47:56 <SchoolKurtJ> i was getting some coal 4 torches

2012-11-02 14:48:12 <SchoolDaveD> Anyone got wood?

2012-11-02 14:48:29 <SchoolRickP> yea i got some

2012-11-02 14:48:37 <SchoolDaveD> It doesnt have to be raw wood

In this example, Dave is asking for participants who currently possess the 'wood' blocktype to share their resources with him, as they co-author an in-game farm (see Figure 3). He is more specific when he notes that 'it doesn't have to be raw wood'. Cultural literacy is engaged in this exchange, as Dave is 'drawing on cultural knowledge to make meaning' (Beavis, 2012, p. 141) – in this case, the culture of video gaming, and more specifically, the micro-culture of *Minecraft* itself. Cultural literacy work can be seen here, as both Dave and Rick co-construct themselves as participants in the emergent semiotic text through a shared understanding of the game's

vernacular and ludology. The 'game as text' layer can also be seen here, as students reflect on their involvement with the game, and the relationships that the game is constructing between players, particularly in terms of the literacy practices that can be seen in their interrogation of block types, and their text-based exchanges designed to manage in-game resources.

Dave's demonstration of the critical dimension of literacy is located in his use of the phrase 'raw wood', rather than drawing on the authorised, in-game nomenclature for block types mandated by the game, in interrogating the contours of the text, he has chosen to mobilise language in order to achieve a specificity of block type which did not exist in the original names. While 'raw wood' is not an authorized *Minecraft* blocktype, Dave is referring to the wood blocks that can be collected by destroying trees and other wooden objects in the game world, prior to their processing, via the crafting table, into more functional, or aesthetically divergent forms of in-game 'wood'. In the game, 'wood' also exists in the form of wooden objects such as tables, shovels, stairs, and walls. Dave's use of the 'raw' descriptor is intended to let his co-players know that he doesn't require the 'wood' block type, but that he can use the game's crafting engine to create it through breaking previously crafted assets (chairs, ladders, etc.) down into their component parts. This approach was not mandated through the lesson plan, and students were free to draw on their own informal knowledge of the game and to share expertise amongst students.

This use of improvised and informal language is, however, transactional. The legitimacy of Dave's new term hinges on the familiarity that his conversational partner has with *Minecraft's* naming system, so that Dave's informal label can be decoded. The critical dimension of literacy is a significant aspect of this work, as the boys create a structure with a specific, defined purpose. Figure 1 displays a structure built with an aesthetic purpose in mind (described in greater detail in 6.1.2), but the creation of a farm represents the mobilisation of *Minecraft's* possibilities as a creative text, and the authoring of a new text which is designed for a particular purpose (the generation of new 'edible' assets in the form of crops grown in the farm).



Figure 3 – Building a farm

A similar example of cultural literacy practices can be seen in the example below where Kurt mentions his in-game activity:

2012-11-02 15:10:07 <SchoolKurtJ> i'm farming for food

The farm that Kurt is referring to was created by Thomas, Dave, and himself, as depicted in Figure 3. Both operational *and* cultural literacy practices are embedded in this statement. He is referring to the practice of agricultural farming, and the game's simulation of it. He is planting seeds, growing crops, and harvesting food – typical activities associated with farming, which are executed through the game's crafting and construction systems. He may also, however, also be referring to 'farming' as a cultural practice of engaging in a repeated and repetitive set of actions within the game world which are intended to increase the player's pool of resources. 'Farming' is a term used across gaming, but not to refer to agricultural practice and processes – indeed one may 'farm' for a range of materials in *World of Warcraft* or *Guild Wars 2*, for example – gold, armour, gems and other valuable and tradable assets (Liboriussen, 2015; Rapp, 2017). In the context of video game play, the term 'farming' has multiple possible meanings, even if Kurt may not be explicitly aware of it. Kurt is farming for one or more in-game objects

which are used during the crafting process – seeds, meat, or coal for burners – by breaking down in-game objects and collecting the resources that are randomly generated as a result. This is, again, the ‘game as text’ layer in operation, as study participants work to structure gameplay around shared objectives and, depending on how Kurt is using the term ‘farming’, on intertextual references to gaming vernacular intended to orient his co-players towards a specific action, or set of actions. These actions, in this case the construction of the farm, and the ‘farming’ of resources, represents the operation of the ‘game as action’ layer, as students select in-game courses of action in order to satisfy their ludic objectives.

In this section, the ‘new media paintbox’ described by 6.1 sees students using the game’s systems of content creation and design to build structures that are aesthetic (the desert structure of 6.1) and functional (the farm of 6.1.1), and these are examples of rich literacy learning emerging from *Minecraft* gameplay. While students populate the game at a micro level, creating individual assets and engaging with the game’s systems, there is also a macro-level design dimension to their work, in which *Minecraft*’s status as a designed digital space, with differing terrain and ecology. In the following section, I will examine two examples of students working at this broader, macro-level, the ways that their design work is influenced by the *Minecraft* world at large, and the opportunities that this presents for rich literacy learning.

6.1.2 Painting a collaborative landscape



Figure 4 – Rooftop desert vista

In the following two artefacts, I will draw on Pink's approach to visual analysis in order to provide an understanding of, from a design perspective, the kinds of decisions that students made in order to realise the visual outcomes captured by the dataset. Figure 4 depicts the rooftop of a student-created structure located inside our collaboratively owned and operated *Minecraft* study server. There is evidence of a theme that has been collaboratively acknowledged by study participants, with a collaboratively designed and mandated style ensuring that buildings are conforming to a consistent theme. The visual look or 'language' adopted by the class and seen in Figures 1 and 3 emerged during classroom discussion, with participants ultimately suggesting that it would be aesthetically pleasing to match the visuals of their structures with the organically occurring visuals of the game's desert theme. The buildings are constructed from a mixture of sand and sandstone block types, ensuring that the look of the participant-created structures is congruent with the overall aesthetic of the desert 'biome' in which players are working.



Figure 5 – Farm design

Figure 5 depicts a similar set of design choices, with a second view of the farm described by Kurt and Dave in 6.1.1. This artefact shows an aesthetic approach to asset construction which is congruent with the ecology of the 'biome' in which the players are situated. Here, the farm is located on arable land, rather than the desert seen in Figure 3, and as such, the design of the structures themselves has changed. The colours selected align with the greens and browns of the grass and dirt blocks which constitute the 'biome', and the blocktypes used include stone and wood, with the inclusion of water indicating that this is a space intended for the growing of crops. Kurt has crafted a sign for the farm which reads 'WIP' – indicating that he is aware that this is a 'work in progress'. This is a significant addition to this piece, indicating that Kurt may be aware of the presence of an audience, and that he wants to construct the in-game object in a specific way; it is not a finished piece that is ready for evaluation or use, but is an iterative work that he is still in the process of authoring. This also represents a mobilisation of the text mode in the digital multimodal space (Hull & Nelson, 2005). The context in which the two modalities are operating changes across the vertical space of the image; the text modality depicted in the sign is a label of intent, which signals the experimental and contestable state of the structure

that has been built by Kurt. The second instance of the text mode can be seen in the text parser located above the GUI, as Kurt says 'hi'. This use of the text mode has a different purpose and audience; it privileges intra-team communication, and demonstrates Kurt 'speaking' directly to in-game players. Both of these uses of the text mode indicate choices that have been made by students; Kurt could have simply used the text parser to 'tell' in-game participants that the farm is a 'work in progress'. Instead, he has used the 'game as action' layer to mobilise the game's systems of content generation in order to complicate the multimodality of his virtual space, managing two very different, simultaneous uses of the text mode. The third approach of visual analysis (Pink, 2006) can also be applied to this artefact, as Kurt creates visual, multimodal content intended for two contexts of consumption; intra-team communications (the text parser) and both the broader class cohort *and* the general audience of out-of-game viewers who may be consuming this text (the 'WIP' sign).

The cultural dimension of literacy is engaged during these collaborative design decisions, as participants endeavour to make contextual meaning of Minecraft's systems and mechanisms for content creation, and their contribution to the class as co-authors of new digital artefacts. In this context, participants are using design elements to collaboratively conform to the expectations of the text's topography – ensuring that design is both internally consistent (within participant creations) and externally consistent (between participant creations and the randomly generated game world). The need for consistency, as a driving design philosophy, suggests participant knowledge of the imperatives of industrial design, even at an embryonic level, with sequence, replicability, and consistency between designed/manufactured objects and structures being reflected in the creative decisions that study participants have made. This can also be seen as an enactment of critical literacy. Unsworth (2002) notes that the critical dimension requires 'an understanding that all social practices, and hence all literacies, are socially constructed' (p. 70). In this context, the consistency of design across multiple participants in the same digital space demonstrates a consensus around the way that the visual language of the 'biome' has been interpreted, and has generated a collaborative, unified response – namely, an adherence to a design aesthetic that has been willingly adopted by all co-authors involved in the collaborative literacy event. Souto-Manning (2009) suggests that

critical literacy practices involve the redesigning of a text. In this case, the text that is redesigned is *Minecraft* itself. The game mandates no specific play styles, design language, or art aesthetic, and players are not encouraged to pursue any particular approach to in-game activities, beyond the game's combat and enemy spawning systems. As described in this chapter, student activities became increasingly guided by a redesigned learning program which reacted to the limitations of the infrastructure that were revealed. In Figures 3 and 4, students are electing to redesign *Minecraft's* in-game aesthetic by purposefully and collaboratively adopting a set of colours, materials, and in-game ecological contexts in order to realise their individual, contextual design goals. This is a form of authorship which demonstrates a critical interrogation of *Minecraft* as a text, and a collaborative response which prizes a unified design language, and a sensitivity to context and aesthetics.

In order to navigate around the vast game world and find the structures in Figures 1, 3 and 4, it was necessary for participants to navigate their way from the 'spawn point' (the geographic co-ordinates inside three-dimensional space where their player avatar will first enter the game world) to the player-created outpost. As a matter of assisting Cynthia, who had little experience with *Minecraft*, in finding her bearings in the game world, participants discussed a method for creating in-game content which would indicate the correct path to follow from the spawn point in order to find their way to the outpost. This is an example of significant theme which emerged from the data (see 6.4), in which traditional classroom power structures were inverted by different levels of expertise.



Figure 5 – Joe’s sign

In Figure 5, Joe has created a ‘sign’ out of in-game blocks which shows a greeting, but which also indicates the direction of the player-created outpost where participants can regroup after respawning. He has chosen to use the ‘dirt’ block type as a matter of convenience – the sign is located on the border of the desert biome (sand is visible to the left of the letter ‘H’), and the darker tones of the dirt blocks make the text far more visible against the sky, at least during the day. Joe has adopted a multimodal approach, in which he uses the tools of visual composition offered by *Minecraft* in order to replicate the physical shapes of the text mode. This concurrence of modes has been arranged in terms of both Joe’s capacities as a player, and the audience that he is attempting to reach. Hull and Nelson (2005) suggest that the arrangement of modalities, and the ways that each is emphasised, is a significant aspect of multimodal analysis, and in this case, while Joe is clearly working in a visual design space, the limitations of the visual mode have been supplemented by an improvised recreation of the text mode, with a view towards navigational utility for his audience of fellow students. This is also an example of the ‘game as text’ and ‘game as action’ layers operating concurrently, as Joe interrogates *Minecraft* as a game (game as text), particularly in terms of the ways that in-game and out-of-game relationships are configured (Joe needs to lead his fellow students towards their objective), and uses the ‘game as action’ layer in order to interrogate in-game

solutions for reaching his navigational goals, and ultimately, selects to work in the 'Design' sector of the layer by changing the game through the improvised creation of a new text piece.

In this example, Joe engages with the critical dimension of literacy. Students spawning into the game world were unsure of where to go, or how to find each other, and with *Minecraft's* native tools offering no guidance around locating fellow players, Joe has used the game's building features to create his own solution intended to assist in navigation and co-ordinating student movement. In his repurposing of *Minecraft's* construction engine in order to create words, elements of critical literacy are evident. When playing *Minecraft*, writing is typically experienced in the game's text chat feature, or through the game's menu system. Due to the perceived failure of the game's native systems to provide the kind of navigational support that the class requires, Joe has appropriated the game's construction features in order to represent alphabetic language, providing his students with a kind of in-game navigation that *Minecraft's* authorised design was lacking. The lack of markers, signs, or maps in *Minecraft* means that there is no mechanism for locating objects, settlements or pieces of the landscape without manually mapping them, or ascending to a vantage point which allows players to view a larger field of the digital space. Joe is drawing on the cultural dimension of literacy by engaging in a standard in-game practice (creating markers), in order to overcome the limitations of *Minecraft's* capacity to communicate information. This extends to a critique of the limitations of *Minecraft's* systems of in-game communication as Joe draws on the cultural practice of map markers, and modifies it for an audience of peers, who are playing the game at different levels of expertise. Joe's choice of size, scale, and colouring of the assets in the design indicates that he is mobilizing the game's content creation engine in a specific way, for a specific purpose – enabling the navigation of the map by both himself and by others. This artefact also can be considered in terms of Pink's (2006) third approach of visual analysis; Joe is demonstrating an acute awareness of the context of consumption for this visual design, and has designed a text which is intended to directly change it. The original context of consumption, in which students struggle to navigate the game world to a shared digital authoring space, is changed by Joe, by creating a multimodal navigational text which remediates the limitations of the audience.

In this sense, Joe has engaged in a collaboration between himself and his classmates by authoring a new resource for them in response to a shared in-game need that the game's authorised tools were unable to meet. In order for this to occur, both Joe and his classmates needed to understand the limitations of *Minecraft*'s cartography, and needed to acknowledge the shared meaning of Joe's sign. Operationally, Joe needed to understand *Minecraft*'s controls and the affordances of particular blocks – but, more importantly, the geometry of *Minecraft*'s design engine so that he could effectively create the letter-shaped assets at a scale, and with a visual design, which privileges communication and functionality.

In this section, I have explored the opportunities for rich literacy learning that occur through *Minecraft* play at both a systems-based micro level (6.1 and 6.1.1) and at a macro level which acknowledges the importance of congruence in terms of visual design (6.1.2). I have highlighted the dimensions of literacy that underpin the generation of each artefact, and in doing this, I argue that these artefacts articulate significant opportunities for rich literacy learning, in which students work collaboratively, pursuing a range of self-directed design goals, developing their understanding of the game systems, and authoring new text objects that have been designed with aesthetic and ludic intentions.

These artefacts, however, often require student-distributed knowledge that is authored (or co-authored) within the classroom space, or draws on *Minecraft* community spaces in order to import external expertise into the classroom. Both of these approaches to authoring new resources represent rich literacy activities which are powered by *Minecraft*. In the following section, I will describe artefacts drawn from the dataset involving student authoring and distribution of *Minecraft* knowledge. This approach was critical in the study, as it allowed student expertise to be drawn out and mobilised as a productive classroom resource, with disengaged students reconnecting with formal studies by demonstrating expertise during the game-based curriculum.

6.2 Beyond the curriculum: Co-authoring new resources to enhance gaming literacies

Minecraft shares much in common with other new media texts, such as EVE Online and World of Warcraft, in that it is situated amongst a constellation of both complementary and

competing texts, many of which are community-driven as a way of meeting the knowledge needs of the game's global community (Mortensen, 2010). *Minecraft* in many ways remains a community project, as it relies on the participation of enthusiasts to create, host, and distribute guides, wikis, and supplementary tools which augment the information provided to players by the game's creators. In the following section, I argue that the authorship and distribution of new knowledge is an act of collaborative literacy learning between different text participants, in different contexts, intended to pursue specific learning outcomes. I argue that *Minecraft* is supported by a significant and enthusiastic community of players, content creators, and text authors, who have developed digital sources that students are able to engage with in order to extend their own capacities for authoring new texts using the game's content generation engine. In doing so, they are generating rich literacy learning, in which they co-author new texts by drawing on those developed by *Minecraft's* enthusiast community, as described by the first research question. I also argue that in the artefacts generated by this study, there is evidence of co-authored knowledge occurring within the classroom between participants, and that while this often represents rich literacy learning, there are also implications and challenges implicit in this work, with students in the data needing to demonstrate the critical dimension of literacy as they operate on the periphery of authorised, in-school technology use.

6.2.1 Community engagement: Fan sites and collaborative classroom practice

Minecraft's origins as a community-driven project are apparent when one considers that the game does not have an in-game index of creatable content. This formal lack of documentation is a typical characteristic of low budget software development, particularly games released to the public in an incomplete or developmental form. They must be sourced online, using one of the many community-driven fansites which exist to document the game's complex systems of content generation. Some of these are officially affiliated with Mojang, while others are purely enthusiast-driven, and contain forums and discussion boards where *Minecraft* players participate in community discussions, as they connect and collaborate with fans from around the world. When asked about their knowledge of the game, a number of study participants, particularly those already embedded in *Minecraft's* fan communities, described the experience of using enthusiast sites to source crafting recipes, guides to using 'redstone' (an in-game

blocktype) to simulate electrical circuitry, and design tips while creating and building. Using these kinds of enthusiast-authored paratexts allowed students inside the classroom to draw from community expertise, which was then distributed throughout the classroom, allowing students to expand their repertoire of *Minecraft*-based knowledge, which would otherwise have been difficult if students had been forced to rely on the scant in-game tutorial content.

The cultural dimension of literacy is visible here, as participants repurposed external paratexts as learning resources in their classroom. Students were observed logging into *Minecraft* fan sites in class, and when questioned about the practice, told me that they used those resources to find crafting recipes, and explanations of the more arcane and confusing dimensions of gameplay. During one on one interviews, similarly, students noted the importance of *Minecraft* fan communities, noting that they consulted such sites when they couldn't figure out how to accomplish certain tasks through trial and error. By accessing enthusiast spaces dedicated to documenting new opportunities for creative *Minecraft* play, participants are drawing on cultural knowledge in the form of external paratexts and the broader culture of *Minecraft* itself in order to make meaning out of the texts being created as a part of their collaborative work in class and in the game. Students also enacted the 'game as text' layer by expanding their understanding of the game through accessing community-developed paratexts. When appropriating external content, three spaces which foster literacy events become connected; the physical classroom, the virtual space inside *Minecraft*, and the community of external paratexts (FAQs, guides, forums, etc.). Each of these literacy spaces must be understood in terms of their cultural context, with the informal and often fragmented and/or offensive language of an online forum being combed for translatable content which fills knowledge gaps which can be brought into the classroom space, to be mobilised productively inside the virtual world of *Minecraft*. As an example of this, in order to complete the design schema of the outpost (see Figure 5.1) participants were required to know that 'sand' is a block type that can be harvested in the game world, but that 'sandstone' is an iteration of the sand block type which must be manually created using a furnace. This furnace, including the tools used to create it and the coal used to power it, were all required to be constructed as a part of the process of creating sandstone blocks. The recipes for 'sandstone', and the furnaces and in-game

elements required to create them, were sourced from external paratexts (such as the *Minecraft* wiki) and were distributed between participants using word of mouth, before being implemented in the game world, resulting in the sandstone blocks seen in Figure 1. In terms of operational literacy, participants were required to understand how to locate and access the networks of enthusiast media pertaining to *Minecraft*, and how to read the crafting recipes so that they could easily be used to address in-game needs. This demonstrates an example rich cultural literacy work as participants were required to participate in the reading of these external paratexts in a situated, purpose-driven context.

6.2.2 Distributing student-generated knowledge

The distribution of knowledge was an important feature of the study classroom, not only in terms of maintaining a collaborative culture, but also as a method of addressing the myriad problems which can arise when participants of varying skill levels engage with a complex digital text like *Minecraft*. The previous section (see 6.2.1) described the experience of participants accessing community-led supporting documentation. This section, as in 6.2.1, describes an example of the ‘game as text’ layer in operation, as students develop, enhance, extend, and distribute knowledge *about* game play. In the previous example, that knowledge focused on in-game play, and the accessing of paratexts designed to highlight specific aspects of play that students wanted to develop their capacities in. This section similarly shows an enactment of the ‘game as text’ layer, but on a meta-textual level, as students developed and distributed knowledge relating to the operating system that *runs Minecraft*, and the vulnerabilities found within it that can be exploited in order to change the game in significant ways.

In a collaborative context, the ‘distributed’ nature of the learning occurring during the study period involved a shared, iterative approach to diagnostics and problem solving. As new impediments to effective learning emerged as a result of the limitations of the school infrastructure, multiple participants brought both knowledge acquired via paratexts and self-generated skills and knowledge to the collaborative context. The distribution of new knowledge became equally as important as the curation/generation, as students became invested in helping one another by sourcing new information, and developing new processes. An example of this in action can be seen in student attempts to subvert the network restrictions at the local

site in order to enable the game's multiplayer features, and strategies involving knowledge development and distribution which resulted.

The operational dimension of literacy was critical throughout this study, and in the following example drawn from the dataset, took on an increased visibility. All of the participants engaged with *Minecraft* in Figures 1 and 3 were required to operate a *Windows* PC, to install and run the *Minecraft* client, to operate the physical hardware of the computer (Mouse, keyboard, etc.), and to use *Minecraft's* in-game server browser in order to connect to an internet server running on the school network. Study participants quickly discovered that the security layer operating on the school network prohibited the *Minecraft* client's ability to connect to Mojang's client authentication servers – effectively ending the game's ability to be played in an online, multiplayer style. If the player account cannot be authenticated, and a legitimate copy of the game therefore detected, the game's multiplayer functions are disabled. Students found this an obviously irritating and unproductive situation, as they were used to the game being played collaboratively during their out-of-school lives. One student, Michael, did discover a method for re-enabling the game's multiplayer function using an unauthorised, debatably unethical (and illegal) technique. In order for participants to connect to an external *Minecraft* server environment, they were required to run a pirated version of the *Minecraft* software – one which does not need to authenticate with the servers at Mojang in order to be active. This is not a simple process. When *Minecraft* is initially run on a new machine, the client installs a file known as a JAR file (Java Archive) - in this case, *minecraft.jar*. The *minecraft.jar* file contains the game data for that *specific* version of the *Minecraft* software, and is automatically updated upon launching the client. The client connects to an update server – which is separate from the account authentication server – and ensures that the *minecraft.jar* file is the latest stable release. In order to downgrade their installations of the *Minecraft* client, thus allowing an unauthorised version of the software to be deployed, participants were required to remove the previous installation of the default, Mojang-provided version of *minecraft.jar*.

This is an important example of the ways that the critical dimension of literacy was engaged during this study. The critical dimension of literacy describes the ability to critique language, texts, software, and hardware in specific contexts in order to use them in specific ways. More

specifically, the critical dimension involves the interrogation of an existing practice into a new practice which aligns with a new context, whether social, cultural, or technological. In this example, Michael has critiqued the typical kinds of user engagement with *Minecraft*'s software and directory structure and, by extension, the culturally mandated practices of unauthorized game modification. In doing so, he has recontextualised them for the purpose of freeing himself, and his class, from the limitations of the school network by locating, and exploiting, a vulnerability in the way that *Minecraft* handles imported content. In this literacy event, the operational dimension of literacy, particularly as it pertains to the mastery of software and hardware, is significant. 'Minecraft.jar' is not easily accessible to most users, as it is buried in a hidden Windows directory which can only be accessed using a manually entered command line request, which is typically restricted on user accounts similar to those which students are assigned by schools. Students, then, were unable to access this hidden Windows directory using the typical, administrator-level approach. A loophole was discovered by a study participant (Michael), who shared his solution with the rest of the class; *Minecraft* allows the installation of skins and modifications through an in-game menu system. By using this system and changing directories, participants were able to access the hidden *Minecraft* directory buried inside the Windows directory structure, and could replace minecraft.jar with a pirate version that didn't require account authentication by Mojang – thus allowing them to access the game, and the networked server that was temporarily hosted on the school network. Michael has critiqued *Minecraft*'s software in order to understand how it is operating, and has found a specific way of engaging with the software in order to use it in a particular way. In terms of the critical dimension of literacy, Michael has critiqued the existing configuration of the *Minecraft* client, and by re-configuring the way that he has used it, has transformed the existing practice into one which fills the particular need; in this case, the installation skins, and the dismantling of the game's security layer. It is, however, important to note that in a typical classroom context, students such as Michael, with a significant background in digital literacy practices, may only be able to 'go critical' in this way in a limited number of situations. The operational dimension of literacy was far more commonly seen, making Michael's innovative solution, and the way that it articulates the critical dimension of literacy, more prominent.

Participant anonymity was preserved by the school community in order to ensure that the participant was not punished by administrators or teachers, but participants traded instructions on how to bypass the security measures embedded in the *Minecraft* client. This included written documents which students printed, emailed, and passed around on USB sticks, one-on-one coaching between study participants in which Michael's technique was explained, demonstrated and implemented, and interventions in which students simply implemented the workaround for their classmates in the interests of expedience. This example highlights the integrated nature of the 3D model of literacy; while the literacies required to subvert the school filtration represented an unorthodox (and unauthorised) breach of the typical uses of the software, the generation and distribution of new knowledge highlights the simultaneous engagement of the cultural and critical dimensions. Students were required to understand the contexts in which distributed texts were being generated; particularly regarding the unauthorised nature of student-led knowledge which was unauthorised on school grounds. The texts being distributed by students required their recipients to read in a particular context. Specifically, as classroom participants who require the skills detailed in the documents in order to challenge the expectations regarding the use of a classroom text. Similarly, the creation of texts intended for distribution requires an understanding of purpose, audience, and context. Students involved in the distribution of the workaround were required to understand the mediums which the instructions used (written or spoken), and the requirements of their audience in order for them to make sense of the instructions and to be able to replicate the workaround on their own systems. This purpose-driven approach to text generation and distribution indicates an interrelated engagement with the cultural dimension of literacy, as students constructed new texts (the in-game workaround, and the creation of new texts intended to help others replicate it) in order to overcome a restriction on an in-class text.

Students generating new knowledge and texts became a significant research theme throughout the study. A number of student interactions involved the demonstration of sophisticated gaming literacies, and the co-creation of new literacy events as less experienced students became interested in developing new capacities, and teaching staff allowed themselves to inhabit traditionally student-occupied roles as knowledge consumers.

In this section, I have highlighted two methods in which students work collaboratively to extend their knowledge of *Minecraft*, and the functionality of the game's client. In 6.2.1, I described the importance of fan communities and the paratextual content that students drew from in order to enhance and augment their understanding of the game. In 6.2.2, I drew on data highlighting the importance of student authored and distributed knowledge, as a way of collaborative skill development, in supporting the broader classroom's ability to effectively co-author texts using *Minecraft*. In this second example, student expertise became authored as distributable content, with Michael's strategy for installing skins and dismantling *Minecraft*'s security features becoming a shared resource across the classroom. This represents a shift in identity for Michael who, through his expertise in the playing of the game, was recast as a classroom expert, and was able to informally take on some of the duties that are traditionally associated with classroom teaching. In the following section, I will expand on that interpretation of the dataset by drawing on artefacts which highlight the ways that video game play in the formal learning space triggered a shifting of identities, as students took on roles as knowledge producers, with new collaborations occurring as newer players of the game looked to other students, rather than their teachers, for guidance around the game's complex content generation systems.

6.3 The teacher/gamer as a context-driven role



Figure 6 - A new relationship

This artefact (Figure 6) depicts two participants working alongside each other inside the *Minecraft* world. They are wearing custom *Minecraft* skins, and they are standing together on a bed of sand. A participant-created structure stands in the background, lit by participant-created torches, and one of the participants, John, is holding some seeds, which can be planted in the game in order to create new vegetation. The activity depicted is student-led and collaborative, features John taking on the role of ‘classroom teacher’ as he instructs Courtney on how to play the game. John, as described in chapter (see 5.3.1) had a history of learning difficulties throughout his studies in school, yet he excelled at *Minecraft* – while Courtney had no experience with the game. Throughout much of the study and without prompting from his regular classroom teacher, nor the researcher, John assumed the role of subject matter expert, and designed a set of learning interactions which Courtney was able to engage with in order to better understand how the game is played. Because of John’s help, Courtney was able to continue developing her abilities with the software during her leisure time. *Minecraft* does not have significant tutorials in-game which explain the complex features of its content creation architecture, and much of the game’s documentation is community generated, or passed on via

word of mouth. In the classroom, this lack of clear documentation impacted on students who were new to the game, and in response, some participants began to assume new roles within the class as subject matter experts, and they began teaching their inexperienced peers about the intricacies of *Minecraft's* complex ludology. The study classroom's regular teacher was not an experienced player of the game, and was unable to provide targeted help to less capable participants in the playing of the game, and while the participant researcher was available in this capacity, it became necessary to allow collaborative teaching and learning to take place between participants. This ensured that consistent support could be offered to participants who were inexperienced with the game.

The student teaching and learning activities depicted in the artefact demonstrate the 'game as text' and 'game as action' layers being simultaneously engaged by both players. The 'game as text' layer describes students working in multiliteracy spaces in games, in which they develop critical perspectives on game play and the cultures surrounding games. The layer also involves the ways that students are constructed as players within the game. In this case, John is constructed as an expert player, while Courtney constructs herself as a student, and their involvement with the game is heavily foregrounded by their acceptance, and encouragement, of these two roles. For John, as an expert player, his identity within the game is significantly framed by his demonstration of 'gaming capital' (see 6.3.1), or the expertise in the game that is translated as a kind of cultural currency. Courtney's player identity is framed by the ways that the game structures participation and engagement; the lack of tutorials or guides for *Minecraft's* more arcane systems means that autonomy at her level of expertise is often not possible, necessitating a situated form of involvement with other participants. For both, however, the 'game as text' layer can be seen most actively in the 'Learning through games' sector of the layer. Both John and Courtney are engaged in a metacognitive exercise, as they 'learn about learning' (Apperley and Beavis, 2013, p. 437), developing their own approaches to the traditionally teacher-dominated arena of knowledge and skill development, interpreting their approaches through the 'game as action' layer. In this layer, both participants choose actions, build objects, and reflect on their gameplay in terms of skill scaffolding and gaming literacy.

In the following subsections, I will explore the ways that the game-based curriculum facilitated student collaborations in ways that often resulted in a shifting of their regular classroom identities, as students were recast and revalued as knowledge producers and transmitters of expertise. During this process, the role of the regular classroom teacher similarly shifted, as she became less of a driver of knowledge acquisition within the classroom context, and instead allowed student experts to work directly with less capable members of the class in order to develop their *Minecraft* capacities, and work collaboratively towards their creative, design-based goals.

6.3.1 Shifting identities and new roles

In order to effectively teach Courtney to play *Minecraft*, John needed to have an excellent working knowledge of the game's systems, concepts, and ludologies, and needed to be able to repurpose his intermediary/expert levels of knowledge on each critical component of the game's design, creating new texts which were fit for distribution to other students. He was required to be able to articulate the complex systems and processes involved in *Minecraft* play in a way that Courtney, a novice, would be able to understand as a new player of the game. This involved engaging the critical dimension of literacy in order to evaluate *Minecraft* as a digital text, understand the context in which Courtney would be playing it (as a beginner), and developing a method for developing the *Minecraft* capacities of his 'student'. He needed to scaffold Courtney's learning as she moved from basic gaming literacy practices such as controlling her avatar, to the more complex actions possible within the game, such as the construction of objects, assets, and tools using the game's engine. This involved simple knowledge checks such as asking her to perform an in-game task and checking if she was able to complete it, asking her questions regarding her levels of comfort with in-game learning, and observing her playing of the game while making suggestions on how she could address her knowledge gaps in order to achieve her self-directed goals.

Courtney, on the other hand, built on her pre-existing operational knowledge of how a Windows-based PC is operated by learning a new skillset of *Minecraft*-specific functions and competencies. She was required to orient herself with the three-dimensional nature of the *Minecraft* game world, focusing on her visual and spatial literacies in order to facilitate

character movement across an unpredictable, emergent landscape, and to perform tasks in a non-linear environment, which requires participants to think in terms of spatial verticality, in addition to the typical horizontal axis. Courtney needed to listen to John, who – while performing the role of teacher – was not trained as an educator, and who was learning impaired; the instructions Courtney received may not have been as clear as those she was used to receiving from her teachers. This required her to balance the unfamiliarity of the subject matter with the potential unfamiliarity of the participant-developed pedagogy with which it was being taught.

Nixon and Kerin (2012) note that ‘the operational dimension includes the ‘mechanics’ of how to make the computer work, from the basics of turning on the computer to opening and backing up files or searching databases, navigating the World Wide Web and uploading photos to social networking sites’ (p. 64). In the scenario described above, both participants were required to operate the computer – from logging into the Windows operating system, to using the mouse and keyboard combination and running basic software packages. The *Minecraft* client needed to be an authorised, ‘cracked’ copy of the software which was missing the security measures which promote copy protection and attempt to negate piracy, as the local network was not able to allow the basic authentication of the legitimate, ‘official’ *Minecraft* client package. Installing this unauthorised version of the game was, as has been discussed previously, no simple activity, requiring an understanding of the security configuration and account permissions on the school-owned and operated laptops, an understanding of the Windows file system in order to ‘inject’ modified code onto the drive, and an understanding of *Minecraft*’s file system, including the game’s use of the .JAR filetype.

John is using a customised *Minecraft* skin (a custom designed player avatar). It is not known whether he acquired the skin from the internet or whether the skin was custom built by him, but it is clear that he has learned how *Minecraft* handles the importing of unofficial content – an illustration of both operational and cultural literacy learning. If the skin *is* a custom creation, he will have had to learn *Minecraft*’s pixel art format in order to modify, cannibalise, or generate character art. The structure in the background was created using the operational literacies described previously in this chapter – specifically, a familiarity with the *Minecraft*

content generation engine, the resource engine, the game's broader ludology (exploration, combat, etc.), and the navigation of three-dimensional space. Both participants were required to navigate the game's HUD (heads up display – or, instrument panel), including on-screen displays showing hunger, collected resources, and health. The cultural dimension of literacy is engaged when considering that the skin is a text; it can be read, interpreted, and made meaning of in specific cultural contexts, and in this instance, John has selected (or designed) the skin in terms of aesthetic choices, and is using it in the context of *Minecraft* play, in a way that conforms with the cultural, community-driven expectations of skin design and deployment.

The power imbalance existing between John and Courtney became inverted during this interaction, demonstrating an enactment of the cultural dimension of literacy. When interviewed, both participants gave vastly different assessments of their relationships prior to their interaction as part of the study. During a post-study interview, Courtney pointed out that she paid little attention to John prior to the study, and he was not a part of her social world:

DE: Was he a good teacher?

C: Yeah.

DE: Do you talk to John much, generally?

C: No.

DE: No?

C: Nup. I don't talk to anyone in my class generally, except for Nam.

DE: Really? Why?

C: Because I hate them. They're all mean. They're all idiots.

(Interview 10-12-2012)

Courtney positions herself as outside of the dominant social order of her classroom, indicating that this is deliberate, and due to other students' status in her eyes as 'idiots'. By contrast, John noted that he considers Courtney a friend *prior* to the commencement of the study. This,

however, may be attributable to the difference in perceptions between boys and girls. He does believe they established a connection prior to the commencement of the study:

DE: You were working with Courtney the other day. Do you know Courtney well?

J: Yeah! I've known her since last year...

DE: Oh really? She's your friend?

J: Yep.

(Interview 23-11-2012)

In order to become an effective teacher in this context, John was required to mediate Courtney's perception of his role in the classroom by ensuring that her perception of his competence as a player of the game made him socially visible, but also allowed him to overcome her view that the classroom was overwhelmingly comprised of unpleasant students. For John, this is a task that is largely at odds with the school's dominant view of his capacity to engage in meaningful social interaction – teachers and administration had noted that he had difficulty making and keeping friends, and experienced significant challenges in meaningfully contributing to the school's community. In his elevation to the role of a subject matter expert within the context of study participation, John's social world was simultaneously mediated, with Courtney's perception of him changing as he demonstrated an ability to both play the game, and to transfer knowledge to her:

C: He's really nice. I thought he'd be weird and annoying. I'm very judgemental. But, he's actually really nice and funny.

DE: Is he good at what he does in Minecraft?

C: Yeah. He's good – and he knows what he's doing.

(Interview 10-12-2012)

Legitimacy was important to Courtney, who noted that she found people who 'pretended to be good at things' (Interview 10-12-2012) to be especially grating. For Courtney, effective

Minecraft instruction and achieving credibility as a teacher were entwined – she could have chosen any of the students in her class to offer her tuition; some of whom may have carried with them a higher status than John. John, however, was socially reframed by Courtney as both a valuable source of information, and as a desirable social participant through his demonstration of game-based literacy work, and his ability to communicate his understanding and expertise.

Consalvo (2007) uses the term ‘gaming capital’ to describe game players who ‘could be identified as belonging to a particular group that shared similar practices, beliefs, and a sense of style’ – and defines the term as

a key way to understand how individuals interact with games, information about games and the game industry, and other game players. The term is useful because it suggests a currency that is by necessity dynamic – changing over time, and across types of players or games. (p. 4)

In this sense, gaming capital isn’t simply knowledge of ludology, or expertise with software and hardware – it is a familiarity with the multimodality, participatory, and collaborative constellation of practices which can be loosely seen to fall within the spectrum of gaming media. ‘Gaming capital’ is a qualitative sense of authenticity and legitimacy in immersion in the culture of gaming – and the ancillary cultures such as fandom and role playing which orbit around it. Bourdieu (1984) originally described cultural capital as the definition of ‘the systems of dispositions (habitus) characteristic of the different classes and class fractions. Taste classifies, and it classifies the classifier’ (p. 4). John, then, is, in this context, defined by his accrued cultural capital in the eyes of those who are capable of seeing and acknowledging the existence of cultural capital. Informally, participants and teachers may describe such a participant as being ‘good at games’, and this is an articulation of how their ‘gaming capital’ is being interpreted. John may be poor at games from a performance perspective – he may have an unimpressive record in a competitive title like *Counter Strike*, or he may be unable to play a strategy game such as *League of Legends*. His capacity to perform *inside* the game is, in this sense, secondary to his capacity to articulate the nuances of gaming culture, and to act as a

conduit between a novice such as Courtney or Ms. H., and the arcane, often bewildering complexities of the ludologies, sociologies, and cultures of commercial gaming. Consalvo (2007) notes that ‘although possessing gaming capital is supposed to be about game players’ superior playing abilities and knowledge about games, it is often through the consumption of paratexts – not actual games – this knowledge can be gained’ (p. 38). In this context, the creation of a paratext (John’s instructions) acts as the generation of new gaming capital, to be shared between Courtney *and* John in their roles as teacher and participant.

While the school was not given access to medical information on the exact nature of John’s learning impairment, it had resulted in patterns of behavior which had at times caused John, and other participants, distress. Hygiene, language and conduct were all cited as contributing factors to John’s status as an ‘outsider’ within the school. He had recently been brought into a close-knit circle of similarly awkward classmates, who were ensuring that he was safe while on school grounds. Courtney, by contrast, was a music-loving, well liked and reasonably popular student – the two participants were members of two vastly different social worlds, and as such, their awareness of each other had not extended beyond knowing each other’s names. This new relationship, defined by John’s assumed role as a teacher and Courtney’s necessary role as a participant, used language to ‘get things done in the world’ (Nixon & Kerin, 2014, p. 64) – specifically, to fill the knowledge gap left by the subject matter limitations of the mandated teacher.

Courtney noted, later, that the experience was surprising for her. She had never given much thought to John, but noted his kindness in helping her:

DE: Were they good at explaining what to do in *Minecraft*?

C: Yeah. They had to tell me the controls, and then I was okay.

(Interview, 10-12-2012)

It is John’s expertise with the game which allows him to demonstrate the cultural dimension of literacy – his use of language was specifically tailored to a goal: enabling his classmate to experience the game, by using his voice, his laptop, and the *Minecraft* software as teaching

tools. Through the choices that John made around the conditions of Courtney's engagement, the way that he framed the game as a productive and potentially pleasurable activity, and their shifting roles as students and teachers, *Minecraft* was recast as a valid, culturally and contextually appropriate study text. Courtney, similarly, evidences the cultural dimension of literacy by using language for pleasure – she later talked about wanting to learn to play *Minecraft* as a method of creativity which she could pursue during her home life. The social pleasures of the interaction were, in addition, a direct result of her use of spoken language, and the digital language of *Minecraft*:

DE: Were you enjoying getting to work with some different people?

C: Yeah, because I never talked to them. I was like – oh, they're probably just quiet. I just don't have much to do with them. And, they're actually really nice. I get along with guys better. Because I hate a lot of girls.

There are, however, aspects of the cultural dimension of literacy threaded through Courtney's participation which go beyond the pleasures of text consumption. Courtney's initial assertion, that she has little interest in games, and is more interested in social media, was challenged by the complex identity work that occurred as a result of John's teaching, and ultimately led to a re-evaluation of her gendered framing of the broader medium of video games. In understanding John's role in this scenario, it is critical to consider his qualifications as a 'teacher' of the game. Courtney did not ask another girl nor Ms. H. to assist her in learning the game. Instead, she sought out the construction of a relationship with a participant that she admitted she had no interest in previously, and who she thought would be 'weird and annoying'. John did, however, have something valuable in the cultural context of the study; he had accrued an impressive amount of 'gaming capital'.

6.3.2 Out of school literacy practices as collaborative teaching tools

As Consalvo (2007) notes, 'part of the value of having gaming capital is being able to display it' (p. 31). The exchange occurring in the scenario benefits both Courtney and John. For Courtney, she receives guidance from a classroom colleague who has demonstrated, in her view, enough gaming capital to give him credibility and authority enough to credibly fulfil the role of a subject

matter expert within the class. For John, however, this was an opportunity to indulge in the pleasures of *accruing* gaming capital, as ‘gaming capital is paratextual itself, and all of these elements have fused, becoming indistinguishable from actual game-playing ability’ (p. 38). It was the creation of a new text in the form of emergent, player-generated *Minecraft* content, augmented by the simultaneous creation of a new *paratext* in John’s improvised ‘curriculum’, and the learning products generated in order to support it (descriptions, explanations, and the activities depicted in the artefact).

Tour (2010), writing about ESL (English as a Second Language) participants that she was working with through technology, notes that

participants often described their uneasy experiences with ICT, saying that they did not have enough knowledge and practical skills to use some technologies or to deal with some of their functions. They reported that they lacked or had limited technological capabilities because those activities were not part of technological practice in their native countries because of the issues related to the “digital divide.” (pp. 153-154)

This ‘digital divide’ can also extend to gender – Courtney was one of the girls who was vocal in her displeasure at the expectation that she engaged in a game-based curriculum, later noting that at the time she ‘didn’t really think much of it’ (Interview, 10-12-2012). Courtney was not, however, inexperienced with games. For example, she enjoys playing *Tomb Raider* with her sister:

DE: Do you play computer games?

C: Not really. I’m just more on Facebook and Youtube.

DE: What, on your phone?

C: I don’t really use my phone that much. Unless Mum and Dad call.

DE: What about Angry Birds?

C: I did play that... but I got bored.

DE: What about consoles? The PS3 or the Xbox?

C: My sister, Louise, she has a PS3. And she said I can get the new Lara Croft.

(Interview, 10-12-2012)

After observing a number of participants engaging with the game, and seeing John's willingness to take less capable players on as 'participants', she requested his help – which he gave, in an interaction which exercised the technoliteracies of both participants. In this scenario, the 'educational' component of the technoliteracies being demonstrated is participant-led, with a participant-designed and implemented pedagogy and assessment methodology.

6.3.3 Co-constructing new literacy practices through *Minecraft*-based student teaching

As depicted in Figure 6, two learners are engaging in the critical dimension of literacy with different purposes and framings. Beavis (2012) describes emergent forms of critical literacy as involving 'positioning of participants, self-reflexivity, recognition of limitations, protection of participants, distancing and reflection, ethics' (p. 141). As previously described (see 6.3.1), John assumed the role of classroom teacher and subject matter expert after receiving a request from Courtney to assist with her work. In order to effectively achieve this, he needed to consider *Minecraft's* suitability as a teaching and learning tool, and to ensure that Courtney was equipped with the knowledge to work autonomously. When interviewed, John was able to reflect critically on his actions, and to articulate a vision of how this form of improvised training operates:

DE: What other things do you teach them?

J: How to play the game better... stuff like that... teach them the basics of what you need to do... strategy guides...

DE: When you're teaching the other kids, what do you do? How do you do it?

J: I just calm them down so that they know what they doing. I make them focus on the screen, and stuff like that, so that I'm teaching them the controls, how to move, how to break stuff, how to deal with dirt and sand and stone... how to, like, make some basic materials – like stone hats and a sword.

In this exchange, John describes his ability to improvise a model of teaching and learning which includes subject content, pedagogy, and a basic form of formative assessment. John, as subject matter expert, indicates that he draws on his knowledge of the game's systems ('controls, how to move, how to break stuff'). He also engages with a specific pedagogy intended to mitigate elements which could potentially inhibit the transmission of knowledge and the assessment of learning ('I just calm them down' and 'I make them focus on the screen'), and some specific tasks that he wants his 'participants' to perform as a means of assessing their performance, knowledge retention, and enabling further scaffolding of learning ('how to, like, make some basic materials'). His model of teaching and learning, however, is built around the critical dimension of the 3D model. It requires that John critique the application of *Minecraft* as a piece of entertainment, and instead, to develop approaches to *Minecraft* play which allowed him to build the confidence and capacity of his co-players. John was required to isolate and curate a set of skills, knowledge and understandings drawn from his experiences playing the game during his out of school life, and needed to assess their suitability as learning activities for a specific level of participant. As a beginner, Courtney was not going to be able to take advantage of the full breadth of John's knowledge of the game. John's play often involves highly complex and intricate systems within *Minecraft*, such as the 'Redstone' electricity simulation, and the game's ability to create virtualised computational systems. He was able to reflect on the appropriateness of these systems as teaching tools for entry-level players, and modified both his own practice and his teaching strategies accordingly.

Minecraft allows for a range of different forms of collaborative learning to occur, both in the digital space, and in the 'real' physical world of the classroom. There was evidence of collaborative project management and content design (see 6.1), and collaboration through the distribution of both internal and externally authored support content (see 6.2). The repositioning of student roles inside the classroom emerged from collaborative digital work using the game, with John, a socially marginalised, low performing student, adopting a role as a classroom teacher, his game expertise affording him a new kind of respect from a fellow student (see 6.3). These kinds of collaborative literacy events take advantage of the unique

properties offered by the video game-based environment. *Minecraft* allows participants to quickly and easily work in a highly visual environment which draws together multiple systems of simulation (physics, geometry, biology). The avatar-based digital environment promotes the collaborative generation of new 'texts' within the game, supported by an environment of community created paratexts. A key feature of collaborative play in *Minecraft*, as seen in this chapter, is creativity and creative play. The ability for participants to generate new ideas, new in-game assets, and new methods of completing tasks and goals was an important aspect of the game-based curriculum, allowing students to expand the borders of their knowledge while finding new, unsanctioned uses of the technology. There was, however, a subversive element to this collaborative interaction; students operated beyond the authorised parameters of the curriculum, responding to an unscripted, unauthorised in-game event. This will be explored more fully in 7.1. In the next chapter (chapter 7), I explore the nature of creativity in the *Minecraft* unit, and I examine some examples of students using the game for creative design, highlighting a range of potential learning events that may result from this kind of work.

7. Analysis: Creativity

This chapter argues that *Minecraft* allows young people to engage in the generation of creative knowledge and skill development facilitated by playful literacies and supported by the game's content authoring engine. The study's primary research question focuses on the ways that *Minecraft* can be used to generate rich literacy learning, and in this chapter, I highlight the aspects of creative play occurring within *Minecraft* that can be considered valuable to educators intending to work in digital spaces. As in Chapter 6, I will draw on the digital analytical approaches described in 4.4 and 4.5, and in order to focus more fully on the creative literacy practices underpinning the chapter's selected artefacts, I will use Beghetto and Kaufman's model of creativity. I examine the creative work of a female ESL student who participated in the study, drawing from a range of artefacts which contextualise her classroom identity, and her approach to creative classroom work (7.1). I explore a piece of design work that she completed during the study curriculum, in which she appropriated a pop culture image and recreated it using *Minecraft's* content generation engine (7.2.1). This creative project resulted in a blurring of her formal and informal creative lives, as she used *Minecraft* to replicate the creative pleasures of drawing and sketching in pencil that she typically enjoyed during her out-of-school life.

I then explore the creative work of a second student exemplar; a boy who demonstrated little interest in formal schooling, but who was creative, productive, and engaged with the formal study space when working in *Minecraft*. I examine his approach to recreating a pixel-based video game character by exploiting *Minecraft's* grid-based building system, and will then frame this as an example of student-led geometric and numeracy learning (7.3). I consider the 'remix' aspects of this student's work, introducing data showing his interest in modifying the colour palettes of the original video game characters, as a creative merging of formal and out-of-school literacies, and reflection on the critical dimension of literacy (7.3.2).

The closing section of this chapter will describe a large, multi-participant creative event which occurred as a result of *Minecraft's* networking functionality, in which an unauthorised group of students 'invaded' the study server, and began to 'destroy' student-created artefacts using in-

game fire and explosions (7.3). I frame this data by exploring aspects of mini-c and little-c creativity which were engaged during the creation of the assets that were later attacked by the invading student classroom (7.3.1), and I then explore the use of creative play in addressing the ‘invasion’ itself (7.3.2), and the aftermath of that event (7.3.3). I argue that despite the unauthorised nature of the ‘invasion’, this unscripted in-game event represents a significant opportunity for rich literacy learning, as students were required to collaboratively develop a creative solution that would preserve their work, expel the ‘invaders’, and begin the process of rebuilding the assets that had been destroyed.

7.1 Creative learning using *Minecraft*

The data presented in this chapter explore a range of *Minecraft*-based literacy events as examples of mini-c creative thinking. Here, new literacies are developed, refined, and demonstrated by producing original pieces of creative work, using the game in order to enact Gee’s ‘Psychosocial Moratorium Principle’ (Gee, 2003). That is, the real-world risks associated with creative pursuits, such as the limitations of available media, or the aesthetic rejection by consumers, are often remediated through the affordances of the digital simulation space. This allows students to mobilise the simulations of real-world scenarios and phenomena offered by *Minecraft* in pursuit of context-driven, creative play events. This principle also allowed one student, Chaiya, to explore the gaming literacy practices that she had previously considered to be the domain of ‘boys’ (see Appendix A), discovering a rich vein of creative potential which intersected with her out-of-school pursuit of art and design.

In this section, I will explore a creative approach which facilitated a re-engagement with formal classroom work by Chaiya, who was an ESL student previously demonstrating significant challenges in classroom participation. The creative activities that she pursued during her work using *Minecraft* allowed her to reframe the classroom as a site of rich multi-disciplinary creative learning, re-engaging her with the formal learning environment. In this chapter, the effect of Chaiya’s creative work on her willingness to participate meaningfully in classwork will be considered through the lenses of her role as an ESL student, and her role as a new female gamer. Previously, she had declared that gaming was ‘for boys’, and had therefore never considered the possibility that a video game (such as *Minecraft*) could offer her a rich landscape

of opportunity for creative expression and design literacy thinking. Her involvement in this study reoriented her thinking around gaming's value, and allowed her to engage in complex creative work using *Minecraft's* creative toolkit.

7.1.1 Pop culture and creative play



Figure 7 - Spongebob Squarepants

This artefact is interrogated using Pink's (2006) second stage of visual analysis, in which content and design are the critical aspects of the analysis, including the ways that the image is configured, the selection and use of assets and elements, and the ways that these are configured in the three-dimensional space. This screenshot (Figure 7) taken from Chaiya's *Minecraft* world was created by using the native Windows 'Print Screen' function, which was later opened in Windows Paint and exported as a .PNG file, on Chaiya's school-owned laptop.

The screenshot allows us to see the full breadth of Chaiya's architectural work, featuring a large geometric structure, built with steel and glass, sitting above a hallway of sculpted terrain and two pools of water. In the distance, a number of other geometric shapes can be seen, with the design pointing towards a large model of the popular cartoon character *Spongebob Squarepants*, modelled using *Minecraft's* in-game resources. The character towers over the rest of the landscape, and is positioned in the centre of the structure. The structure is illuminated by

symmetrically positioned flowers, and rows of torches which fill the centre strut of the building's frame.

As a piece of creative work, Chaiya's sculptural and architectural designs exist in three-dimensional space within the *Minecraft* software, and the game's user interface allows an audience to interact with it in a range of ways via their avatar, including positioning, angle, motion, and game-as-action manipulation of any mechanical assets she incorporates (switches, levers, doors, etc.). Chaiya's role in this interaction is one of an architect; while she has little control over the ways that an audience may elect to interact with her in-game creation, she controls the design and implementation of the assets which she has created. She may anticipate the kinds of requirements that an audience may have in order to more effectively navigate her three-dimensional world, such as ensuring that doors are present so that an audience may move between the exterior and interior design spaces, but Chaiya is unable to design, and control, the user experience as a filmmaker or photographer might.

In the previous artefacts involved in this analysis, student-created work overwhelmingly addresses the ludological concerns of study participants; houses are built for housing, farms are built to create 'food' which can prolong the lifespan of player avatars, and so on. This is a shared, task-oriented approach to the design of new in-game objects, as study participants attempt to align in-game objectives in order to collaborate over shared goals and self-directed milestones. The co-construction occurring here does not share the same bi-directional quality; Chaiya's creations exist as fixed, finished, designed constructions intended for audience consumption. They do not exist to be augmented, remixed, or altered through any kind of in-game collaborative partnership between authors – as a group of boys might negotiate in order to maximise their collaborative efficacy in the construction of a house, farm, or castle. Instead, the relationship between Chaiya and her audience is a more traditional one – she presents designed, 'finished' sculptures to an audience. While that audience can choose to re-author them through changes made to the sculptures themselves, or through the spatial configuration of the lens of consumption (low angles, high angles, close ups, etc.), the point at which the audience seizes authorship does not involve Chaiya's collusion.

Her work does, however, demonstrate an awareness of the presence of an audience. Her audience is not pursuing the ludology of games, and she has not designed a game for them to consume. Rather, her work is aware of how the audience is *physically* positioned inside the game world as a part of *Minecraft's* ludology. The spawn point, the physical space in which the player/avatar first appears in the virtual world, is directly in the line of sight of the structure pictured here; the player must, however, look *up* at it in order to fully see it. This sense of composition, and the use of perspective in creating a feeling of scale and size, is a traditional film technique – the low angle view is used to heighten the size of an object in the frame. The third stage of Pink's approach to visual analysis interrogates texts in terms of contextual audiences; in this case, Chaiya is not imagining her audience as engaged in a process of text co-authorship, but rather as spectators who will consume her work, as an audience might consume a drawing or a photograph. Chaiya also lights her game world, and her lighting is integrated into the design; she does not simply place torches throughout the game world in order to ensure that it can be viewed at night – instead, she uses light as a design device, illuminating the frame, but also illuminating strategic points in order to ensure that while the game world may be dark, *Spongebob Squarepants* is provided with enough illumination to be seen regardless of the levels of light provided by the in-game clock. The 'fixed' quality of these designs, in which they are presented to an audience once their author considers them 'finished' in some way, is a different design approach to those pursued in Chapter 6, in which in-game texts are transient, collaborative, and subject to changes based on ludic contexts, as read through the 'game as text' layer.

This early example of Chaiya's work is an enactment of the mini-c level of creativity. Beghetto and Kaufman (2009) note that 'central to the definition of mini-c creativity is the dynamic, interpretive process of constructing personal knowledge and understanding within a particular sociocultural context' (p. 3). In this example, Chaiya chooses a specific kind of creative learning event to pursue in a classroom context, and as a result, she develops specialised, context-driven personal knowledge relating to the playing of the game, the game's conventions and engine specifics, and the use of the game as an extension of her out-of-school creative life as an artist.

This is a creative exercise, but it is also a self-directed learning exercise. It is a step on a learning trajectory, which will see her working at the little-c level of creativity in the following examples.

Chaiya's work in this section demonstrates the simultaneous engagement of the 'game as text' and 'game as action' layers (Apperley & Beavis, 2013), and represents a 'new approach to productive play' (Lindtner & Dourish, 2011). She questioned the purpose and ludology of the game as classwork, and was only willing to engage with the curriculum if she was able to focus, specifically, on creative literacy practices supported by *Minecraft*, and only if she was able to play alone. This is an enaction of the 'Me as Games Player' sector of the 'game as text' layer, with Chaiya critically reflecting on how she will involve herself with the game as a 'player', how she will be involved (or, not be involved) with other players, and how her work in the game contributes to her sense of identity as a student, and as a burgeoning creative artist. The 'game as action' layer is, in many ways, the more significant one that can be seen in Chaiya's work, particularly the 'Design' sector of the layer, as she builds objects, builds avatars, and chooses in-game actions designed to facilitate her creative and, in this context, ludic objectives. 'Play', in this context, is about having fun, but it is also a labour activity, in which a number of other motivating factors can comprise the ways that 'play' is defined (Dalisay, Kushin, Yamamoto, Liu, & Skalski, 2015). For Chaiya, 'play' is linked to creation, her interest in pursuing a discipline, and her desire to demonstrate her expertise as a content creator.

In the following section, I highlight the dimensions of Chaiya and others' creative work to explore the ways that each is an example of little-c creative learning. These examples will cover her exercises in geometry, architecture, and visual design, and demonstrate that *Minecraft's* potential as a creative design toolbox offers a broad range of opportunities for creative thinking.

7.1.2 Little-c creativity and *Minecraft* architecture



Figure 8 - Chaiya's Castle

The above screenshot (Figure 8) is an artefact collected from Chaiya's *Minecraft* client, who has chosen to pursue a creative direction which manifests in the form of architecture and design as a part of her in-class game play. This was not a designed piece of curriculum created by me and Cynthia, as the study curriculum that we had envisioned was overwhelmingly designed around multi-user collaboration in a shared digital space, which often involved competitive ludologies such as monsters, weapons, and combat. Chaiya self-selected to create an alternative to the mandated classroom curriculum by engaging with *Minecraft*'s content generation subsystem. Rather than collaborate on in-game structures with her peers, she has chosen to disconnect them from her Netbook, and to engage in the creation of a castle – complete with interiors. This was a conscious decision on her behalf, as she was offered a slot on the student operated *Minecraft* LAN server, which she turned down, preferring to engage in private, solo explorations of the software. The 'game as text' layer involves 'The World Around the Game', and in this case, Chaiya is drawing on design literacies taken from popular culture. The castle design is reminiscent of the traditional depiction of castles from film and literature, situating her design language within a global context of media tropes and visual language.

While *Minecraft* is often celebrated for the ‘sandbox’-style play packaged inside a game mode which privileges typical video game ludology (health, weapons, combat, exploration), the game also features a robust content creation environment described by Mojang as the ‘creative’ mode. Much like *Little Big Planet* or *Mario Maker*, this game mode allows participants to work in an environment which eliminates all competitive elements from the digital environment, and supplements the game’s user display with a content creation toolbox, giving participants access to the game’s asset library of blocks, weapons, and tools. This requires a shifting of the operational literacies needed to participate in play away from those dedicated to combat, resource management, and navigational controls, realigning them towards design, composition, and the configuration of objects existing in three-dimensional space.

Lange and Ito (2010) note that the shift from passive media consumption to active production and presumption has resulted in the increasingly resonant embedding of new media in the informal lives of young people; a process which is ‘reshaping our process for self-expression, learning and sociality’ (p. 246). In this artifact, Chaiya offers an example of how creative digital play enables students to engage in new forms of complex, constructivist forms of digital self-expression. In her role as a student, she is very much bound by the confines of classroom participation, with tasks delegated by teachers, in pursuit of formal learning goals which are often reached through print media, and single-purpose disciplinary spaces. By repurposing *Minecraft* as a creative toolbox which aligns with her experiences as an artist, allowing her to draw from I.T, creative arts, and literacy spaces, she has found an opportunity merge her in-school and out-of-school literacy practices, in a way that aligns with many of the typical objectives of a formal literacy curriculum. Chaiya’s engagement with the cultural dimension of the 3D model of literacy is best demonstrated by her rejection of *Minecraft* as a competitive/collaborative digital environment, and through her challenging of the accepted literacy practice that has been mandated by the study curriculum by electing to pursue a creative approach to her classroom participation. Similarly, this represents a demonstration of the critical dimension of literacy, as Chaiya interrogates the capacity of the study text to facilitate specific kinds of digital activity and meaning making which best aligns with her tastes and desires as a learner. Chaiya’s *Minecraft* play emerged as a style of her own devising,

intended to enable her to engage in rich literacy work in a way that intersects with her own goals, and her self-designed literacy objectives.

The creation of the castle required a significant investment by Chaiya in the operational dimension of literacy. To construct the castle, Chaiya was required to develop an advanced understanding of *Minecraft*'s geometry, physics, and complex design elements when building in-game content which has adopted the traditional geometry, colours, and proportions of a castle. In designing the castle, Chaiya's work articulates Gee's (2003) view that video games allow expansive opportunities for individual, self-paced learning, which is not necessarily provided by prescribed, traditional textbooks and study resources.



Figure 9 - Chaiya's Waterfall

This image (Figure 9) depicts a building adjacent to Chaiya's castle – a wood-roofed, three story structure surrounded by a waterfall which flows into a lake located at the base of the structure. In order for Chaiya to create this piece, she was required to build on the operational knowledge involved in the creation of her castle, supplementing it by developing an understanding of how different blocktypes in *Minecraft* are modelled on the properties of their real-world counterparts. In this sense, a *Minecraft* 'water' block is designed by the game's developers to

simulate the physical properties of water – it flows, it moves downward, it extinguishes fires, it can be frozen, etc. In pursuing the operational literacies necessary to craft a waterfall, she has not only selected the ‘water’ blocktype – she has deployed it within the game world in a way that ensures that the ‘water’ is using gravity to move from the crest of the waterfall, down into the gully below, before flowing out to the lake at the foot of her structure. The ‘game as action’ layer is also significant when interrogating this artefact; Chaiya needed to understand the game’s engine, and the way that it handled the movement of ‘water’ blocktypes. She was, then, required to develop her knowledge of the game’s systems, and to design an approach to mobilising them in a design context. Her use of the systems is critical here (Burn, 2016), as her ability to work in the ‘game as text’ layer is contingent on her mastery of *Minecraft*’s systems of simulation and composition.



Figure 10 - An interior shot of Chaiya's castle

The spatial relationship between the interior and exteriors of Chaiya’s constructions is exemplified by this image (Figure 10), which depicts a corridor running through the inside of one of her *Minecraft* buildings. Pink’s approach to visual analysis is useful in understanding the literacy practices engaged in the design of the assets seen in this artefact. In order to achieve the multi-coloured effect that is displayed, in terms of operational literacy, Chaiya was required

to develop her own geometric system by which block placement was regulated in order to ensure that spacing, evenness, and symmetry were maintained. This is not unlike the operational literacies required in a typical engineering project – in this instance, sections of the wall have been cut into 10 x 20 grids of coloured blocks, and this corridor has been engineered to connect with other rooms, tunnels, corridors and antechambers, each requiring a unique geometric design brief. This exemplifies cross-disciplinary learning, with Chaiya engaging in mathematical and geometric thinking; a form of learning that will also be seen in 7.2. In the corridor, Chaiya has designed sections of the walls to align numerically, with an equal number of horizontal and vertical blocks, ensuring that the proportions of each section are identical. She has also used doors as design devices, which have similarly been positioned to ensure a consistency across the numerical patterning of the design; on either side of the doors can be seen three rows of blocks, four blocks high. It could be argued that this is simply an example of Chaiya creating these patterns through trial and error, but this does not account for the mathematical precision in the design, and the purposeful balance and symmetry which exists across all of the assets in the finished artefact. Thus, from an interdisciplinary perspective, Chaiya is engaged with design, mathematical, and spatial literacies in order to produce this kind of work.

The final piece (Figure 11) submitted by Chaiya to the study involved this geometric tower, which is reminiscent of an M.C Escher painting, despite Chaiya never indicating that she had any familiarity with the work of Escher. Critical in understanding how it represents Chaiya's evolution as a designer of in-game content is that it sees Chaiya – having mastered *Minecraft's* system of block placement – expanding the potential of the game's design environment by co-opting game assets which are not specifically intended for use in the design of structures such as towers, buildings or houses. As shown in this close-up, this tower is only partially designed using

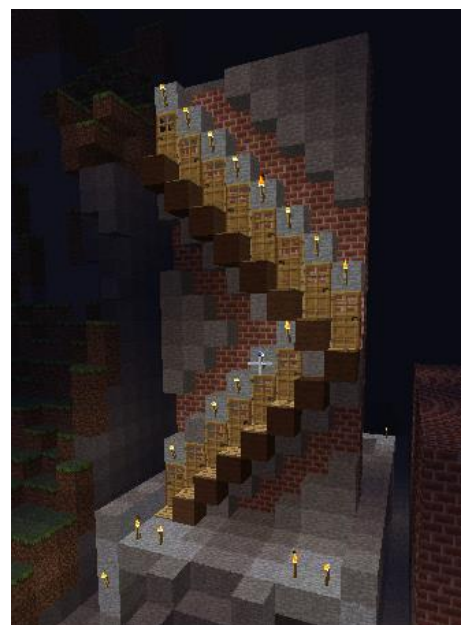


Figure 11 - An Escher-esque design

Minecraft blocks – the rest of the tower is built out of doors, which retain their function (opening and closing). This presents an interesting example of Chaiya’s critical literacies (see 4.5.1.3), as she repurposes an in-game asset which is not typically associated with the construction of walls, as these are, quite literally, doors which can be opened and closed in order to grant players access to the interiors of buildings. Chaiya has, however, integrated *Minecraft*’s system of doors into the design as an aesthetic – rather than a purely functional choice. The effect here is twofold. On one hand, her sculpture has a look that is unique in the pantheon of block-based *Minecraft* construction work. At the same time, she has incorporated a small piece of *Minecraft*’s game system into her purely sculptural work – the doors seen in this sculpture can be opened and closed, allowing the sculpture to be transformed by users, who may choose to open one, two, or all of the doors that have been mounted against her basic tower frame. In this sense, Chaiya has created an ‘interactive’ structure, in that it allows the audience – rather than the author – a method of co-construction and collaboration which does not deviate from the intention of the content creator.

The examples described in this section are enactments of little-c level creativity. Little-c creativity describes the kinds of creative events which may be experienced by non-experts on any given day (Richards et al., 1988). Beghetto and Kaufman (2009) describe little-c creativity:

If a friend shared a painting with you, he or she would not expect you to begin your critique by comparing it to Van Gogh or Monet. Rather, you would be expected to explain whether you found it to be unique and aesthetically pleasing (within the context of what you know about that particular style of painting and your friend’s current level of artistic accomplishment). (p. 3)

Evaluating Chaiya’s *Minecraft* architecture requires an acknowledgement of her level of achievement commensurate with her experience and level of education; in this sense, she is demonstrating clear progress along a learning pathway. This kind of creativity requires a certain level of mechanical education, and an ability to demonstrate competence in an aspect of the creative process. In this creativity, the operational dimension of literacy is evident (see 4.5.1.1), as she masters the technical requirements of the *Minecraft* UI, and the systems that it controls.

In the examples shown here, Chaiya has moved from the initial 'mini-c' explorations of her *Spongebob* sculpture and the constructions which surround it, and is now applying that experimental, experiential knowledge to a more focussed application.

Creative games such as *Minecraft* have been appropriated by many fans as sophisticated, engaging content creation toolboxes that are largely unmatched by any commercial design packages in terms of their accessibility to children and young adults. Students could use *AutoCAD* or *Photoshop* to engage in creative work, and while many certainly do, *Minecraft's* status as a video game offers easy access for children, making it a powerful tool for art and design in formal learning spaces. The grid-based game world, the streamlined and stylised content creation tools (block placement), and the accessible asset library (blocktypes) represents a game-based imagining of a traditional authoring package; instead of selecting brush types and pressure levels, PANTONE colours and line thicknesses in *Photoshop*, a *Minecraft* player can simply choose a 'water' block type, and can 'paint' it onto the three-dimensional space using a left mouse click.

Minecraft, then, offers students a chance to create pieces of virtual, digital art using a simple, powerful design language, and a set of tools which are identical to the kinds of user interfaces seen in the commercial video game landscape. In the following section, I will draw on artefacts generated by a student named Gabriel, who used *Minecraft* to engage in his own 'remixes' of popular Nintendo characters, drawing on mathematical and spatial literacies to recreate the original pixel-based art.

7.2 Creative learning and the art of the 'remix'

A creative approach to gaming is capable of supporting a range of different design and content generation activities which allow students to build, view, and iterate a static artifact, such as Chaiya's *Spongebob Squarepants* construction. The activities which contribute to the creation of these in-game structures can support simultaneous, multi-disciplinary learning, as in Chaiya's work involving the development of a design language, the engaging of cultural literacies, and enacting the basics of architectural design. A creative approach to a game-based learning curriculum can also support non-humanities based disciplines such as mathematics. This example features a 'remix' of a popular video game character made by one of the study participants by mathematically matching the design of the original 1980s pixel-based character with the block-based three-dimensional space of the *Minecraft* engine.

7.2.1 Using *Minecraft* to build a replica of *Mario* from the original schematics



Figure 12 - A 1:1 model of Mario

The 'game as text' layer can be seen in Figure 12, as Gabriel engages in a rich, intertextual design piece involving the replication of a popular, global cultural phenomenon. The popular video game character 'Mario', the centerpiece of Nintendo's flagship platform game franchise and the star of *Super Mario Brothers*, *Super Mario Galaxy*, and *Super Mario 3D World* has been

rendered here (Figure 6) by Gabriel, using the *Minecraft* engine. Located on an empty plot of land stored on a local hard drive, the 'Mario' character was created in the game's 'Survival' mode – rather than being produced while the player is required to interact with the ludology of *Minecraft*'s game systems, it was created in a mode specifically designed for creative, non-competitive play. The selection of this angle neglects to show the depth of the 'Mario' character – if *Minecraft* content has a universal measurement of one 'block' representing one unit of content, this image is two 'blocks' in width; a first and second layer of information. This is both an aesthetic decision on behalf of the creator, but it is also one which facilitates a different design opportunity; *Minecraft* blocks can only be a single colour or type; a 'grass' block cannot be grass on one side and a different property on another. The limitations of the *Minecraft* engine have been mitigated by Gabriel by using a layering effect, whereby two different coloured layers are built simultaneously, and thus present a creation which uses two colour palettes, which can be seen when viewed from different angles.

While the rear of the 'Mario' character adopts one user-generated colour palette out of

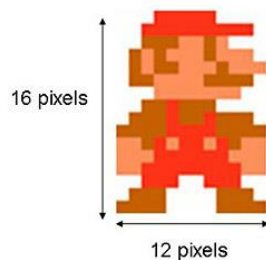


Figure 13 - Nintendo's Schematic

thousands of possible combinations, the front (Figure 13), mirrors the colours of the 8-bit original. The image itself is a 1:1 recreation of the original 'Mario' sprite created for the first *Super Mario Brothers*, released in 1985. By using the pixel chart for Nintendo's 1985 original, Gabriel has produced an exact replica of the character in a different engine. He uses a scale in which one block equals one pixel of the original 'Mario' sprite – it would have been easy for him to rescale the

character in order to create a larger version of the sprite, but he has chosen to maintain the original pixel density and aspect ratio of the source character. The image he has selected represents a single frame of animation from *Super Mario Brothers* – this is Mario's resting animation, seen when the NES system is receiving no input from the user.

Interestingly, Gabriel has not chosen to create the earliest iterations of the 'Mario' character – that being the sprite featured in 1983's *Mario Brothers*, or 1980's *Donkey Kong* – instead choosing to focus on the incarnation of the character featured in *Super Mario Brothers*, a flagship title for the Nintendo Entertainment System (NES), the most successful of the post-

Atari, post-crash video game consoles. While 'Mario' was present in titles prior to *Super Mario Brothers*, including the iconic *Donkey Kong*, it wasn't until the introduction of 'Mario' and 'Luigi' in 1985 that the character became internationally iconic. It could be argued that *Super Mario Brothers* is a greater part of Gabriel's cultural purview, and of the canon of contemporary video games, than preceding titles such as *Donkey Kong* or *Mario Brothers*, due to the massive success of *Super Mario Brothers*, and the genre of platform game that it is largely responsible for creating.

7.2.2 'Remixing' Mario

In this example, Gabriel was required to understand the concept of an in-game 'toolbox', which features applications which will either insert new elements into the game world (blocks, plants, building materials), remove elements from the game world (axes, swords, shovels), or modify elements within the game world (lighters, music boxes, dyes). Gabriel's 'Mario' has been created in accordance with the genre conventions of the 'sandbox' game, in that the ludology of *Minecraft's* 'survival' mode has been stripped out, leaving him free from attack by skeletons or zombies, or the need to eat, so that he may more comfortably create content. Rather than working in a landscape which has been populated by the *Minecraft* world generation algorithm, Gabriel is working in a flat, featureless landscape in which only his creation exists. He did not give a specific reason for choosing to work in this way, but it can be speculated that this represents an awareness of this work's power as a demonstration of skill mastery. By eliminating distractions such as the topography of the *Minecraft* landscape, the viewer's attention is drawn solely to the literacies involved in the generation of the object, amplifying the audience's capacity to view Gabriel's achievement in detail. In this sense, Gabriel has made choices that represent the 'game as action' layer, as he made choices to change the game's mode of play in order to better fit his intentions as a player. He wanted to be free to design these pieces without having to manage combat, resources, or exploration, and these represent conscious, deliberate ludic choices intended to facilitate both design outcomes and play contexts. In doing this, however, he has chosen a creative approach to video game play; on in which he exploits the possibilities of the ruleset that is offered through the game's 'creative'

mode in order to ensure that his ability to create and design is not impeded by the unwanted intrusion of in-game adversaries, or scarcities of resources.

In creating this piece, Gabriel demonstrates a deep understanding of the *Minecraft* engine in a number of different aspects, and this understanding of the game's systems indicates a significant opportunity for analysis and reflection (Burn, 2016). Initially, Gabriel was required to decide which of *Minecraft*'s game systems would best facilitate content creation – while he could choose to balance content creation with ludology, building his 'Mario' in survival mode while avoiding monsters, building shelter, and manually acquiring the building materials, he has instead opted to use 'creative' mode. The reason for this is clear – in removing the ludic narrative from the game world, he is able to more fully dedicate himself to building and design. Gabriel's creation in this instance is not entirely self-directed – as he said, his driving impetus behind the project was to create a piece of digital media that is indistinguishable from one that is the product of a professional design studio. His strategy for achieving this is to use the 8-bit pixel art of 1980s Nintendo characters, and to map it to the *Minecraft* engine at a 1:1 ratio. Sophisticated mathematical thinking was required in order to achieve this design outcome, as Gabriel was required to trace the pixel counts for each section of the Nintendo original and map them exactly in the *Minecraft* engine, while accounting for changes in colour, and addressing them via the in-game toolkit.

Gabriel's creation is not two dimensional – it exists within a three-dimensional space simulated by the *Minecraft* engine, and as such, required a set of context-specific skills to be engaged in order to effectively build and design content which takes advantage of that space. Some of these skills are standard, established parts of the way that *Minecraft*'s building engine operates, and are fundamental in the use of the game as an authoring tool. For instance, in addition to building horizontally, Gabriel was building vertically in three-dimensional space, and was required to switch off the in-game gravity so that he was able to quickly move through the game world in order to complete design tasks. This requires a second skillset which facilitates full three-dimensional ambulation, rather than the horizontal axis-based movement of 'survival' mode. When considering this piece from the perspective of creativity and creative work, it is interesting to note that the original 'Mario' figure that Michael is drawing from, which was

designed by Nintendo in the mid-1980s, would have been produced by industrial designers using drafting and design software that was purpose-built for creating these kinds of pixel-based digital graphics. Gabriel could have turned to a drafting package such as *AutoCAD* in order to replicate the process, as well as the designs, of Nintendo's original engineering team, but instead, he has elected to recreate the experience of 8-bit character design by using a contemporary video game title, and improvising a method of translating the content from the original schematics to the finished *Minecraft*-authored product. In order to do this, Gabriel was required to engage in high level visual and spatial literacies as he built his character in three dimensions. In order to colour and recolour (on the reverse) his 'Mario' character, Gabriel was required to adapt the original Nintendo colour palette to the in-game *Minecraft* colour palette – matching the colours closely, before abandoning them and using the game's tileset to recolour the sprite.

Gabriel's *Minecraft* creation displayed here differs from Chaiya's, in that he has engaged in a mathematical, geometric recreation of a pop cultural figure. Chaiya's impressionist rendering of *Spongebob Squarepants* uses the *Minecraft* asset library to approximate the look, feel, and basic shapes of a popular cartoon character, while Gabriel's design uses the schematics of the original digital figure to develop an exact, scaled, mathematically identical copy of the original character design. This mathematical approach, which relies on Gabriel's ability to count the number of coloured blocks in each row of character information, multiply them and arrange them in a way that maintains the proportions of the original character, represents a merging of disciplines. Mathematics is being used in a context which draws from cultural literacies, critical literacies, and design literacies. This composite disciplinary space has been facilitated through creative play in the *Minecraft* game engine, with Gabriel diverting from the typical competitive play styles associated with the game's better-known design. As in 7.1, this is a piece which is not intended to be co-authored by other student participants or an audience; it exists as a statement of skill and capability, and is intended to be consumed as an audience might consume a still image or video. It has also been stripped of ludic utility; Gabriel has not created a structure intended to fulfil in-game goals articulated by the 'game as action' layer (as seen in

6.1). Instead, the 'game as action' layer has been contextualised in the service of design and visual literacies.

In the examples described in 7.1 and 7.2, I have drawn on artefacts generated by students working largely alone. These are not collaborative design pieces, but are rather highly situated and individualised expressions of the interests of single students. In the final section of this chapter, I will draw on a range of artefacts which fuse both creative *and* collaborative styles of digital, game-based learning that I have been discussing, by wedding them to an unscripted, improvised literacy event occurring during the in-class play of *Minecraft*.

7.3 The invasion: Creativity, collaboration, and unscripted play.

In the following section, I will describe an unscripted event that occurred during data generation, in which a group of students who were collaboratively building new objects and structures on a privately-owned *Minecraft* server were ‘invaded’ by another group of students, connecting via an unsecured LAN connection. The ‘invading’ students were not a part of the study group; they were in a different class that was currently in the progress of a maths lesson, located in a different room in another part of the school building. During the ‘invasion’, student-built structures and objects were destroyed, the ‘invaders’ lit fires and detonated explosives, and the study classroom needed to quickly, creatively improvise a solution to preserve their creative work, and secure the LAN network so that no further breaches were possible. I will describe the sequence of events leading up to, and including, the server ‘invasion’; events which demonstrated a range of creative literacy practices, and frame the ‘invasion’ narrative in terms of the creative works that would be subsequently destroyed during the attack. I will then describe the attack itself, drawing on a range of artefacts to illustrate the destruction that the invading students generated within the server space. I will then close the section by describing the ways that mini-c and little-c creative practices can be used to unpack both the event itself, and the student responses to it.

7.3.1 Preface to an invasion: The digital space and student-built structures.

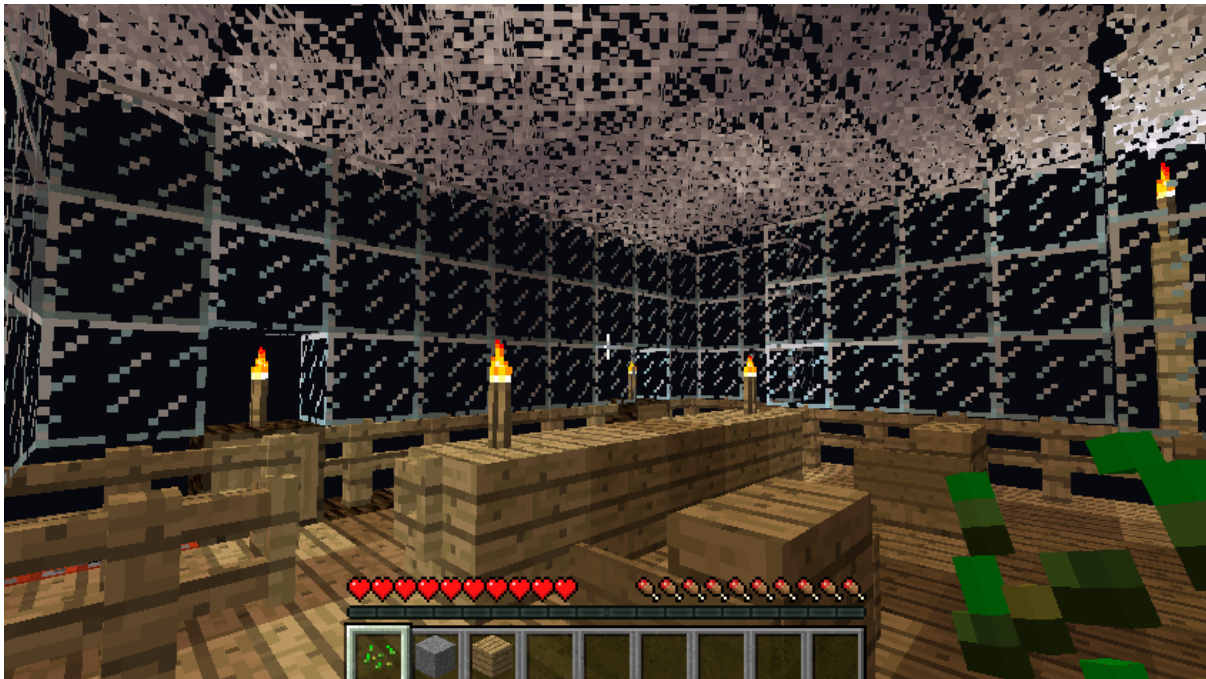


Figure 14 - Rick's Bar

Two groups of students participated in the event described in this section, the study participant classroom who I observed while seated with them in the physical classroom, and a second, anonymous set of 'invading' students, who ran their clients from another concurrent classroom, located in another room in the school building. Prior to the 'invasion', students engaged in a preliminary demonstration of skill development which frames the series of events, providing a context regarding the collaborative nature of their response.

Initially, the class was intended to be run on the school's network, with student computers connecting wirelessly to the servers run by the IT department. *Minecraft* has a unique set of security requirements around the verification of account data, and these were rejected by one or more levels of in-school filtration. I asked the school's ICT co-ordinator to assist me in getting *Minecraft* cleared for use by students, and she was periodically able to rescind the filtration around the ports and network processes required by the game's authentication layer, however these were temporary, and filtration was generally restored within a few hours, meaning that students were unable to play the game collaboratively. The unstable aspect of the school

filtration was attributable to automated application of the network filter. While the ICT co-ordinator was able to temporarily lift the blocks, they would be automatically be re-applied as a provider level, and as such, she could give no reasonable guarantee of stable, ongoing service. This led to students, who were aware of the challenges presented by the school's approach to filtration, seeking out alternative solutions which would facilitate the kind of gameplay that they desired.

The LAN server that the class was using during this session was owned and operated by Rick, a student who had demonstrated little interest in formal school learning, but who expressed a great deal of fondness and enthusiasm for the playing of *Minecraft*. Rather than being an empty server, a number of pre-existing structures that the boys had collaboratively worked on were present, and Rick was keen to use these as demonstrations of their expertise in the playing of the game. Rick offered to introduce me to some previously constructed *Minecraft* content that he kept on the communal LAN server that the class was currently occupying. The artefact shown above (Figure 14) was taken as Rick showed me around his *Minecraft* home, focusing more specifically on the rooms and features of the construction that he had personally been involved in. In the artefact, Rick's 'bar' is visible, with seats, tables, candlelight, and the main bar sitting in the centre of the room. Glen, one of Rick's friends, was at pains to interject during this demonstration, drawing attention to the ceiling:

He took me downstairs to show me his bar. I asked him what the ceiling was made from.

"Spiderwebs." he said.

"That was my idea." said Glen, "I came up with that. Doesn't it look awesome?"

(Fieldnotes, 19-10-2012)

This is an example of the collaborative use of little-c creativity. Craft (2000) describes little-c creativity as 'possibility thinking', which leads to 'refusing to be stumped by circumstances but being imaginative in order to find a way around a problem' (p. 3-4). The 'problem', in this case,

is the need for a roof which encloses the structure. Glen's response is to employ an alternative kind of building material to that which would logically be selected if one's focus was on maintaining the aspects of the visual design of their *Minecraft* structure which closely match those used in the real world; wood, stone, glass, or brick for example. Instead, Glen has described a roof which looks 'awesome', which has been built using a block type which isn't immediately identifiable as the kind of building material which would traditionally be used in construction. Instead, Glen is taking advantage of the more fantastic, unreal aspects of *Minecraft*'s status as a video game, and is using the 'spiderweb' block type to create a roof for their building which features a unique, but no less functional, visual style. Glen never articulated a clear, well-defined rationale for choosing to adopt a non-traditional creative approach in this instance, but there are speculative reasons that may explain his design choice. The pleasures of innovation, for instance, and the opportunity to demonstrate out-of-the-box creative thinking to both his classmates or, ultimately, to the global *Minecraft* community, as described in Chapter 6. He could also simply be choosing to adopt the 'spiderweb' blocktype as an aesthetic choice; it gives the roof a unique, non-traditional appearance that is quite striking in comparison to more typical *Minecraft* construction materials, such as wood or stone.



Figure 15 - Joe's Bedroom

In the artefact shown above (Figure 15), one of the 'bedrooms' from the *Minecraft* building is displayed. The layout of the building was designed by Rick, but the individual bedrooms were the product of their occupiers, featuring a number of notable aspects which highlight the presence of significant creative learning events. My fieldnotes (see Appendix B) describe Rick's impression of how he learned the process of content creation:

He (Rick) showed me his bedroom, and seemed proud of the design. He was responsible for the construction of beds for everyone, and told me that he had spent quite a bit of time working on how the rooms could be accessed by the rest of the building.

Rick led me through Joe's bedroom.

"Who created the pictures?" I asked.

"I did." Joe said, "My stepfather taught me how."

(Fieldnotes, 19-10-2012)

A collaborative approach to construction, as discussed in 6.1, is similarly seen here as the students distribute knowledge to the benefit of the group's collaborative objectives, in this case, building a 'house' that their avatars can 'live' in. In this example, Joe's bedroom shared a design feature in common with the earlier example, as the walls, floors and ceilings are, much like the 'spiderweb' roof of the bar, built using a non-standard building material, in this case a 'leaf' blocktype. The data does not explicitly document that this design feature was the creation of Joe or Glen, but the commonalities – and uniqueness – of this design choice suggests that the creative work of one artefact was likely influenced the creative work of another (see 2.2.4).

The 'picture' assets shown in the artefact suggest a creative engagement beyond the classroom space, and the in-school social worlds of these students, as Joe mentions that he was taught to create these assets by his stepfather. The specific designs of the pictures are not the product of the students; these are *Minecraft* assets included as a part of the game. Joe is referring specifically to the 'crafting recipe' required to create the 'picture' blocktype, which was passed on to him by his stepfather – presumably, another player of the game. The presence of this blocktype, and Joe's explanation for how he came to create it, suggests that this may be an example of mini-c creativity; a creative learning event which has occurred as a part of an individual's in-progress skill development. Joe specifically notes that his stepfather 'taught' him how to create the picture blocktype. It is unclear where this literacy event sits in the broader learning trajectory of Joe's experience with *Minecraft's* construction systems, in the sense that exactly what Joe was being taught has not been captured. He could be referring to the recipe used for that specific blocktype, or he could be referring to the broader crafting system and the processes necessary to engage with it during content creation. It is, however, apparent that Joe sees the creation and positioning of the picture blocktypes as some kind of collaborative learning event, and consequently, could be considered an example of mini-c creative activity.

Craft (2007) notes that

Possibilities are generated by children (and adults) in all areas of learning, whether imaginative play, musical exploration and composition, cooking, mark-making or writing, outdoor physical play, mathematical development or early scientific enquiry. Possibility

thinking is the means by which questions are posed or puzzles surfaced – through multiple ways of generating the question ‘what if?’. (p. 1)

In these examples, study participants are responding to their own possibility thinking (and potentially that of their peers) with a range of student-led little-c learning events which involve design, distributed creative thinking, and mini-c creativity fostering new kinds of learning and skill development (see 3.4.2.2). During the server invasion, they needed to apply these techniques to an in-progress, unscripted event.

7.3.2 Under attack: Using *Minecraft*’s engine for mischievous literacy practices

In moving away from an internet-based, offsite *Minecraft* server towards a self-managed LAN, they had left their server space open to exploitation through a vulnerability in *Minecraft*’s local multiplayer layer. The server could easily be flooded with unauthorised clients, who simply needed to be within the physical radius of Rick’s wifi in order to connect their *Minecraft* clients to the server space. One of the ‘invading’ students needed to be monitoring *Minecraft*’s internal server browser, waiting to see when a Netbook that was in physical proximity to their classroom was offering an unsecure connection to an open *Minecraft* server. Upon seeing the open server being ‘broadcast’, the ‘invading’ students simply had to run the *Minecraft* client and connect over the local area server browser. The ‘invading’ students were required to work collaboratively, monitoring the school for open LAN connections, identifying the moment when one was available, and connecting – as a group – to the vulnerable server space.

The ‘invasion’ was identified quickly by study participants, through server notifications instructing them that *Minecraft* clients with unfamiliar names were now occupying server spaces.

From my fieldnotes:

Three clients joined the server. They were not from inside the classroom.

"Someone's in here." Gene said loudly, leaning forward. "Which of you is it?"

"John, is it you?" Glen snarled.

"No."

"Gabriel?"

"No, it's not - it's coming from outside. Who is it?"

They looked at me.

"Is it you?" Gene exclaimed.

I told him that it wasn't - I only had the one client running, and he'd already seen it.

Out of five sets of speakers, I heard an explosion and watched the screen shake.

"They're destroying the buildings!" Rick yelled, "Where are they?" (19/12/2012)



Figure 16 - A Minecraft bridge destroyed by student invaders

The ‘invading’ party of students were ‘spawning’ (a *Minecraft* term for creating new in-game objects) explosives, and were setting parts of the digital environment on ‘fire’. In *Minecraft*, ‘fire’ blocks feature simulations of the properties of fire, so wooden structures will ‘burn’ (are eliminated from the game world) quickly, while ‘water’ blocktypes will ‘extinguish’ the spread of the fires (neutralizing the effect of ‘fire’ blocks). The work, which at this point was primarily produced by Rick with assistance from a number of different collaborative partners, could be burned or blown up by the invading students, and due to the offline nature of this *Minecraft* installation, would not be recoverable via a cloud repository – therefore, it was critical that the ‘invasion’ be stopped in real time, inside the game world. *Minecraft* servers have a strict user limit which can be set by the server owner when a new server is created. During the ‘invasion’, study participants identified that the user limit was a potentially effective strategy in limiting access to the server. Their LAN was disconnected, while Rick – the LAN’s operator – set the user limits so that only the number of desirable students from inside the study classroom could join, then let his student colleagues know that he was restoring access to the server – and that they needed to rejoin as quickly as possible in order to instantly fill up the available ‘slots’ on the server, rendering external access impossible.

From my fieldnotes:

"Disconnect everything." said Gene, "We need to lock it down now."

My Minecraft client was severed from the LAN, and the boys crowded around Rick's netbook.

"Let's fill the server slots with people so that they can't come in." said Gabriel, "We need to all join at once." (19/12/2012)

In this exchange, Gene, Gabriel and Rick collaborate to ensure that the invaders are removed via technological means; Gene diagnoses the problem, Gabriel provides technical knowledge on how the problem can be solved, and Rick executes the solution. This process of project management, diagnostic thinking, and implementation of workable solutions carried through the both the invasion and the classroom response to it, as the students worked to restore both the functionality and design of their *Minecraft* server. They did not, however, ask Cynthia to intervene – indeed, the intervention by authority figures was not requested, and did not appear to be needed. Their response to the problem does, however, indicate the presence of the operational and critical dimensions of literacy. The boys were required to interrogate *Minecraft's* systems in order to mobilise them for the purpose of increasing security and expelling the invaders, but also required the operational knowledge of the game's UI, the game's network configuration, and the way that the game handles connectivity and online play.

Cynthia investigated the surrounding classrooms and returned to the room, informing me that the invasion had been masterminded by a group of boys currently sitting in a maths class located a few doors away from the room. She had seen them huddled around a laptop and entered the room, asking them what they were doing – they laughed, confessing to the crime, but astonished that she was aware of what had transpired. She'd been a few doors down to see who was invading the server - a group of boys in another class were the culprits. Cynthia

reflected on this information, identifying a number of factors to consider when attempting to contextualise the afternoon's session. Gene's claim that the 'invasion' scenario was not a unique one seemed to suggest that this kind of improvised, collaborative, but highly unauthorised and subversive form of learning activity was perhaps occurring with unreported frequency. The 'game' took on a secondary function as a *simulator* in this scenario – students were required to *enact* learning in a highly context-driven simulated event, an event that could not be easily replicated through *any* kind of curriculum design – whether print based, or digital. This was a secondary classroom which was totally student owned, operated and driven, and which was empowering students to engage in highly complex, sophisticated forms of emergent new media learning.



Figure 17 - Ruined *Minecraft* buildings

In this artefact (Figure 17), captured from a LAN-configured, student-owned *Minecraft* server, student-created content is being destroyed by an invading force who are physically located outside of the classroom, but have established unauthorised connections to the server via LAN networking and 'cracked' (pirated) copies of the game. The student-generated content depicted consists of a wooden bridge, connected to a treehouse-style structure, complete with designed

and decorated interiors, which has been suspended above a ‘naturally’ occurring, procedurally-generated *Minecraft* forest biome. Students have created a number of materials for use in their design – glass bricks, torches, fences and railings, and the ceiling made of ‘spiderwebs’ (see 7.3.1).

The tools of the invasion can be clearly seen in the background. Invading students have generated ‘lava’ (see Figure 12) which simulates some of the physical properties of real-world lava, in that it is slow moving, destructive, and burns any objects it touches. The lava (see Figure 18) can be seen underneath the main structure in the image. Here, *Minecraft* lava is being ‘spawned’ in order to destroy student-created content by burning directly, or by triggering fires which may spread throughout the server.



Figure 18 – Lava block

In addition to destroying content, lava can incapacitate player avatars, and is being used here as an effective barrier which seals off parts of the game world to different players. When used in conjunction with player-generated explosives (TNT), the effect of lava can be devastating on a server environment, and parts of the damage that can be seen in the artefact is attributable not only to the spread of lava, but to TNT detonations which have demolished sections of the walls. This kind of demolition needed to be planned by the invading students, who needed to develop a method of installing the TNT without being seen, and delivering the detonator (lava) in a way that could not easily be countered by the use of water. Water, in *Minecraft*’s ludology, ‘deactivates’ lava bricks, and converts them into ‘stone’ bricks.

The ‘game as text’ and ‘game as action’ layers are explicitly engaged throughout the ‘invasion’. Prior to the commencement of the attack, the ‘invading’ students understood the situated context in which gameplay was occurring (in class, as an unauthorised activity with lowered

risks and consequences), and reflected critically on their involvement with the game, and involvement with other players. Rather than joining the server to contribute to the construction of new assets in *Minecraft's* game world, as was occurring with the authorised study participants, the 'invaders' chose a different, destructive player identity in which they were agents of chaos, rather than contributors to the creation of new works. This is articulated by the 'game as action' layer. The 'invaders' chose in-game actions intended to facilitate these player identities and approaches to game play, as they attempted to 'change the game' to one in which players are not co-authoring in-game structures and assets, but are instead, co-authoring an emerging, in-game narrative of conflict.

As the invasion occurred, study participants were required to quickly change their approaches to play, their player identities, and their involvement with the game's systems in order to meet the emerging contextual needs of the co-authored, in-game narrative. As the student designs described by 7.3.1 were burned and destroyed by explosions and lava, study participants needed to quickly identify the narrative structure emerging in the 'game as text' layer, co-authored between themselves and the unauthorised 'invaders'. They needed to quickly understand how the choices made on the 'game as action' layer by the 'invaders' had necessarily changed their relationship with the game, and with each other, and to develop an approach to remediating the emerging narrative, regaining control of it, and redirecting it towards their original play goals which focused on collaborative design. As described in this section, this required the design of a collaborative play response operating at both a textual (the minimisation of the lava's capacity for damage by transporting water blocks) and a meta-textual level (the manipulation of the server's settings to restrict access to only in-class players). These can both be considered on the 'game as action' layer, as players were required to consider the impact and effects of in-game actions (and solutions), to change the game through in-game play, to build objects designed to address the emerging 'invasion' narrative, and to engage in community management intended to ensure that students from neighbouring classrooms were unable to intrude on their play, and change it to a style that they were uninterested in engaging with.

7.3.3 Developing a solution to the problem of the 'invasion'

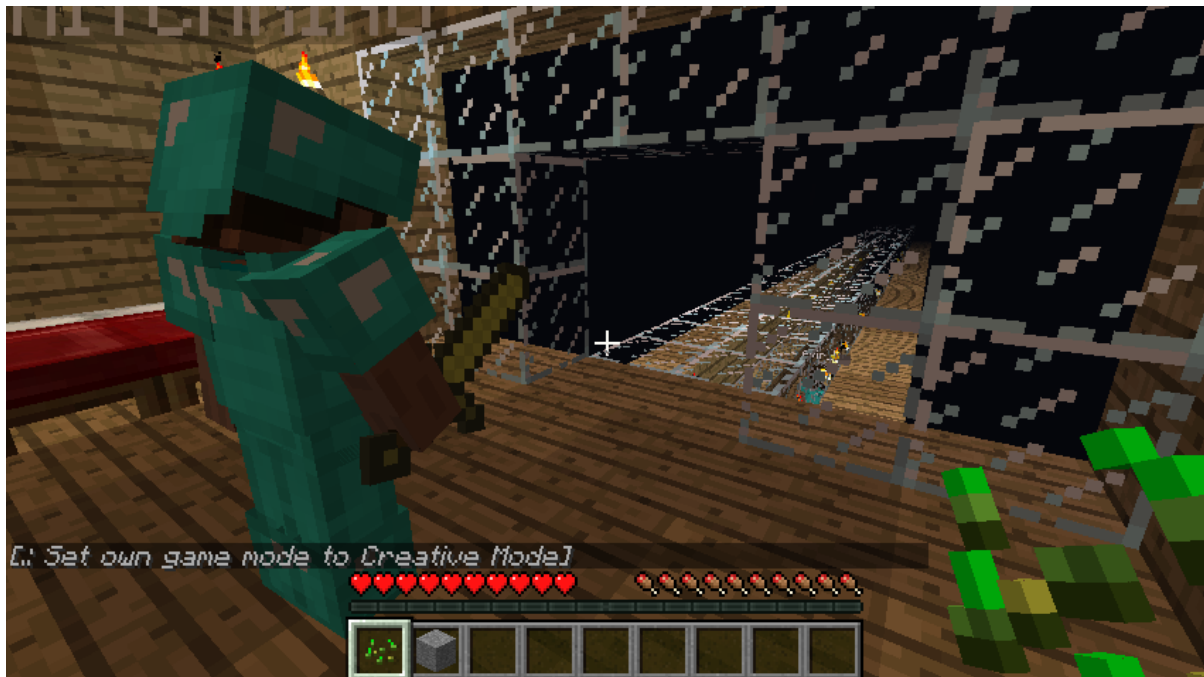


Figure 19 - Rick's Bridge

In the image displayed above (Figure 19), the bridge connecting the two sections of the *Minecraft* structures can be clearly seen, in the moments prior to the invading students detonating their explosives and lighting their fires. Three key examples of creative learning are visible in the example described by 7.3.2. The first involves the response to the invasion involving the creation of new in-game assets to neutralise the effects of the new blocktypes that had been introduced to the server space by the 'invading' maths class. The second demonstrates an improvised method of securing the server space in lieu of access to *Minecraft's* cloud-based account system.

The creation of these new elements such as mechanisms designed to transport water blocks to fire-damaged parts of the game world, can be considered a little-c creative response to the problem of the fires and the invading students. This is a creative literacy event in which student skill and knowledge around both the mechanical operation of the game, and the properties assigned to different types of blocks in the game world, are exercised and developed. It is product focused, as little-c creativity is often considered to be, and students were required to

develop in-game assets which contributed to the restoration of the destroyed structures, or could neutralise the further damage caused by the burning ‘fire’ blocks.

The second creative learning event described in 7.3.2 involves the method of securing the server space which was designed and implemented by the study participants. As the LAN server was not connected to the *Minecraft* server cloud, the boys could not effectively control access to the server space due to the lack of access to the game’s account system. This allowed foreign, unauthorised clients to connect to the LAN server, resulting in the destruction of the class-built assets. Rather than simply terminating the game session, the boys engaged in an example of mini-c creative thinking as they authored and implemented a method for ensuring that their game could not be invaded a second time. This can be considered a somewhat unorthodox example of mini-c creative thinking. Gabriel’s approach, in which an improvised solution to the problem of server security is implemented in response to an unscripted, in-progress event, can be seen as a small, personally significant learning event which could potentially lead to Gabriel working in a ‘big-C’ creative mode. This kind of knowledge development could be considered critical in Gabriel’s learning journey towards more complex methods of creative problem solving around server configuration and infrastructure design. There are a range of creative learning trajectories that this kind of mini-c thinking could generate; for instance, developing an understanding of the relationship between the administration of an online server and the contours of the creative possibilities offered by the environment.

There is a third aspect of creative thinking that is visible in the dataset, that being the broader, improvised narrative of the game as it is played by both study participants and their ‘invaders’. This chapter describes a range of artefacts featured in the dataset which were produced during multiple sessions of *Minecraft* play; in each example, the play is improvised by the student participants, and little intervention was attempted by myself or their regular classroom teacher. A linear study framework was produced, and our intention was to impose a tighter, designed sequence of learning events and relevant assessments, but as data collection continued, the autonomous activities of the study participants yielded the most significant data. Therefore, the

game's narrative is improvised and co-authored by the participants who are engaging with it. This is an example of collaborative little-c creativity, as students involved in the event engage in a product-focused creative learning event which draws on everyday creative literacies, including spatial, design, and gaming literacies. The sequence of events which comprise the improvised narrative of both individual gaming sessions and, in cases where play occurs over multiple sessions, is the collaborative creation of participating students, with their contributions evaluated with regards to their quality, their consistency, and their appropriateness within the context of expectations regarding how the game is played. In this sense, a 'little-c' approach to evaluating the co-authored narrative of the game requires the evaluation of originality in the stories, situations, and exchanges generated by participants, but also in terms of the expertise required to enact those literacy events within the *Minecraft* game world.

The co-authored, student-led aspects of the *Minecraft* game narrative, and the 'little-c' creativity which mobilises them, are visible in the 'invasion' scenario, and in the broader implications of the historical interactions that both sets of students described:

I sat down with the boys, and asked them if that was normal.

"Yep." said Glen, "They come in and wreck stuff."

"Always?"

"No, not always." he said, "Sometimes they come in, and we work together. Today, they wanted to blow shit up."

(Fieldnotes, 19-10-2012)

Glen is describing the changing, improvisational nature of the in-game relationships between participants, which are made fluid by the affordances of *Minecraft*'s digital environment. The unpredictable quality of the invading students, where they could bring destruction one day and collaboration the next, speaks to the improvisational nature of video game play, and to the

overlapping, simultaneous little-c creative events being created by participant students. He is also describing the operation of the 'game as text' and 'game as action' layers operating historically during the game play experienced by both groups of students. Glen is describing two very different approaches to the 'game as action' layer, with students choosing to either operate in a collaborative or adversarial mode of game play. The ways that these approaches manifest as game play is dependent on the choices that players make, in terms of in-game actions, asset construction, and the management of communities. As Glen notes, occasionally players will make choices that are not uniformly accepted – or desired – by the community, with different groups of students choosing to work with the boys on collaborative building projects, and other times, simply wanting to 'blow shit up'. These choices are enacted by the 'game as action' layer, but they are framed by the 'game as text' layer, as students reflect on how they will construct their player identities in game, the conditions in which they will involve themselves with other players and with the game itself, and the composition (and consequences) of different approaches to participation.

This example also illustrates the potentially overlapping nature of collaborative and creative literacy practices, and the ways that they can intersect during a game-based literacy event. I have described the 'invasion' event from both the collaborative and creative contexts, and it is critical to note that neither operated in isolation. Much like Green's integrated 3D model of literacy, collaboration and creative practices are often indivisible in a digital literacy exchange. Co-construction of meaning involved multiple participants located in diverse physical locations (different classrooms, different parts of virtual space), working via the development of collaborative literacy practices which were designed to facilitate creative learning events.

Creative play, as enacted through *Minecraft*, can facilitate a range of different kinds of learning events. Two students who participated in the study were considered by their teachers to be disconnected from classroom learning, with Chaiya's language barrier as an ESL student and Gabriel's disengagement with the non-digital nature of their humanities classes being highlighted as potential issues that the school found it difficult to overcome. Their self-selected approaches to completing tasks using *Minecraft* as a site of creative learning saw both students engaging in different forms of creative enterprise, with Chaiya's sculptures and constructions

seeing a game-based iteration of her out-of-school literacy practices such as drawing and painting, and Gabriel's more mathematical, industrial approach mirroring his desire to work in video game development as an adult. These are both examples of 'mini-c' creativity, in that they are creative events which are specifically geared towards knowledge acquisition and skill development. In these examples, both students are using the classroom space in order to hone skills that they have identified as being critical in their ideal future careers; Chaiya's interest in art and design, and Gabriel's interest in video game development inform the kinds of creative activities that they designed for themselves. The 'invasion' of the student server brings with it another set of creative learning events, with students using creative literacies to respond to an in-progress, unscripted event, to augment and reimagine the design aspects of a piece of work, and to generate an in-game narrative. These methods of creative play may require participants to deviate from authorised curriculum in a broad range of ways. For participants to develop new ideas, new concepts, and new processes for achieving their self-directed, situated learning goals, there may be a need for flexibility in curriculum design. This will require educators to reframe discipline silos as porous, and capable of supporting an integrated approach to facilitating literacy events.

8. Conclusion and implications

This concluding chapter opens with an overview of the study and the ways that it responded to the questions which drove the research. Discussion of the limitations of the project follow, involving decisions in developing the study, and also those which were a result of complications and challenges at the research site. I then explore the implications generated by this research for the future of game-based education in a secondary school context, with a particular focus on the use of *Minecraft* as a study text.

The chapter then describes a series of implications arising from the study, and provides a range of suggestions for future research. In particular, I explore the changing face of video game development and distribution, and opportunities presented for researchers and educators working in this space. Finally, I discuss the potential for a game-based approach to provide new learning opportunities for marginalised students.

8.1 Overview of the study

As described in 1.2, this study was designed to consider the potential of video gaming as a facilitator of different kinds of rich, technology-based literacy learning. I adopted a case study design, which sought to generate qualitative data. A qualitative design allows researchers to use a multiplicity of sources, and allows researchers to cover ‘contextual conditions’ (Yin, 2011), such as the institutional and cultural contexts in which research, and the lives of the participants it involves, are actively occurring. Student reactions to the events taking place, images drawn from in-progress gameplay, focused conversations around literacy events, and one-on-one interviews presented data analysed in terms of *Minecraft*’s value as a vehicle for sophisticated literacy learning using a game-based curriculum.

The primary research question of this study intended to understand the ways that students can use *Minecraft* as a generator of rich literacy learning. The data generated by this research project, and the analysis which was conducted through the dataset, indicate that a video game-based literacy curriculum which uses a commercial entertainment title as a study text can act as a rich, dynamic source of multimedia-based literacy learning. *Minecraft* was selected as the study text for this research project due to several dimensions which made it valuable as a text

for learning – popularity with learners, and the potential for rich, constructivist learning that the game’s toolset clearly offered. The unit’s open-ended pedagogical approach gave students the freedom to engage in self-directed learning activities and collaborate during class time, drawing on the kinds of improvisational, highly situated patterns of interaction and collaboration that students typically engage in during their leisure time. This creative freedom allowed students to demonstrate existing skills, knowledge and learning (see 6.2, 6.3), to develop and demonstrate new skills that were acquired during play (see 6.3), and to generate new approaches to literacy learning via unplanned and unscripted in-game events (see 7.3).

Generating alternative pathways for literacy learning in the context of this study involved a shift away from traditional forms of literacy instruction, towards an emergent, highly contextual form of game-based learning in which literacy events became products of the game’s engine and character design, animated by student play. These literacy events often fell into two larger categories; collaborative literacy events (Street, 1984), in which students opted into group work oriented towards collaborative construction and design, and creative events in which students attempted to use the game’s geometrical engine to create unique, vibrant visual designs. The 3D model of literacy, described in 4.5.1, was used by myself to analyse these literacy practices. Green (2012) notes that the 3D model ‘can usefully be grasped as a set of connected circles, bringing together *language, meaning and context.*’ (p. 25). This approach underpinned the data analysis, in order to establish multiple perspectives on each selection drawn from the dataset, contextualising them in terms of the literacy practices which students engaged in during generation.

Findings from the data that was generated during this study indicate that while there is merit in mobilising a commercial video game such as *Minecraft* in a formal education setting, this is an approach that comes with specific, and significant, challenges. From an infrastructure perspective, the use of a LAN-enabled video game represents a potential challenge to school administration, with legal and ethical considerations regarding student safety and the school’s duty-of-care being significant. As described in 7.3.1, schools take cyber-safety seriously, and the zealous nature of attempts to ensure that students are safe from predation may inadvertently result in a loss of connectivity. This was demonstrated by this study’s lack of access to a 24-

hour, cloud-based *Minecraft* server solution, which would have radically changed the shape of the dataset (see 8.2.1). Student expertise may also represent a challenge to educators. As the study progressed, a focus began to emerge around the ways that student-authored learning needed to be developed and distributed within the class in order to address any potential knowledge gaps in the class regarding *Minecraft* play. Co-teaching became an important method for achieving this (see 6.3), and while this approach proved effective, it might not be feasible in every school context. Teacher capacity to effectively discipline student behaviours inside the virtual space represents a significant challenge, as described by the ‘invasion’ in 6.3. While the ‘invasion’ demonstrated an opportunity for rich literacy learning in an improvisational, student-authored context, the emergence of these kinds of scenarios can be clearly problematic. The destruction of student work, and the subsequent inability to effectively monitor the kinds of play that was emerging, represent challenges to integrate into the administrative and policy-level contexts of a typical suburban school. Thus, strategies for mediating these virtual environments and constructing provisions which empower teachers to have greater understanding of the nature of student participation is a clear implication rising out of the findings of this study.

In the following chapter, I will describe the implications that this study presents, considering the role of *Minecraft* as a potential study text for integration into formal curriculum, and the expanding universe of new gaming models that represent similar possibilities. I then describe *Minecraft’s* potential as a generator of new pedagogical possibilities, before shifting the focus towards an evaluation of student-designed teaching learning approaches, and related issues surrounding digital ownership and student engagement. I will then describe the limitations of this study, in terms of the study design and the site, before closing the thesis with a set of final reflections on the research, and the implications for further study.

8.2 Implications

The research questions designed for this study involved an exploration of video game-based pedagogy as a vehicle for alternative forms of literacy learning (Gee, 2003). In exploring this primary research question, the data and analysis strongly point to a need for new approaches to curriculum design and assessment if improvisational, emergent video game mechanics are to

be embedded in formal learning spaces. This involves an understanding of the tensions which exist between gaming literacies and those of traditional print-based curriculum and assessments, and the new kinds of video game texts being driven by emerging development and distribution models. These are increasingly fragmented and unstable, and the ongoing conversation they represent in technologised spaces often invokes the new opportunities presented by emerging devices and associated user experiences.

8.2.1 *Minecraft* as official literacy curriculum

This study was designed to explore the potential of *Minecraft* as a tool for literacy learning in a way that was often unconventional, experimental, and relied on the ingenuity and creativity of study participants. As described in 8.2.1, the initial study design was significantly more rigid and deliberate, with a weekly, planned schedule of activities intended to shape the activities pursued by students in a way that drove them towards pedagogically valuable outcomes that were aligned with the typical classroom curriculum. Traditionally, this is an approach that teachers often take, with careful planning taking place around curriculum and assessments, with texts, activities, and engagement strategies arranged in and around their classrooms in order to enable students to meet desirable learning outcomes. This is, however, not an approach to curriculum design that is naturally aligned with the play styles of video games, and especially with a free form, improvisational title like *Minecraft*. As student practices began to emerge during the initial weeks of data generation, I made a decision in collaboration with the study teacher to shift our focus away from a traditional, prescriptive approach to lesson planning, and to move to a model which was reminiscent of *Minecraft* itself; free-form, organic, student centred, and thus, risky.

While this decision was made in collaboration with the study teacher, and with the approval of the school administration, there were significant misgivings about this approach. Specifically, a question of academic rigour was raised as the study shifted away from the more traditional, rigidly planned classroom format which privileged clear and visible alignment with curriculum objectives, towards the open-ended, riskier model. The decision to allow students to engage with *Minecraft* as an unscripted, generative text brought with it a new research tension around the implications of doing this kind work in schools. My intention was to explore the potential of

the game in a way that allowed it to be played in school as it was out of school; for pleasure, and for the love of design, in a way that was student-centered, and is shaped by their interests. As the study progressed, it became increasingly clear that despite the misgivings of the school's administration and, at times, the study teacher, there were important and exciting kinds of literacy learning emerging from the study, which are reflected by the analysis detailed in Chapters 6 and 7. The events drawn from the dataset involved student creative work, design work, collaborations on structures and virtual dwellings, remixes, and recreations of pop culture figures. While these events were taking place, and despite the richness of the data, a question lingered between myself and the study teacher; while it was clear that students were engaged in some kind of sophisticated techno-textual activity, did it constitute 'learning' – and if so, did it articulate the objectives of the school curriculum. I argue that while the literacy activities documented in Chapter 6 and 7 were certainly 'unofficial', in the sense that they emerged from an open-ended, improvisational style of in-class video game play, they represented powerful forms of literacy learning which were, in fact, aligned with the 'official' literacy learning outcomes of the sanctioned curriculum.

The data described in 6.1 involved students working on a range of structures in a shared virtual space containing multiple forms of ecology, design, and resources. This data included houses created in a desert environment, and a farm created on a section of arable land, built by multiple participants, simultaneously, in *Minecraft*. As students worked on this *Minecraft* design, there was a sense of excitement regarding the emerging literacy learning that was clearly taking place even if, in that moment, we could not from memory align it with a specific curriculum descriptor. Watching the heightened levels of student engagement, the kinds of rich literacy practices which students were demonstrating during their play, and the ways that students collaborated on self-directed tasks in interesting, sophisticated ways proved a source of interest for both me and the study teacher. Working retrospectively, however, it is clear that it aligns with both the Humanities and English curriculum. The Geography Australian Curriculum emphasises the importance of student capacities to interrogate geographical information while using digital technologies, and an ability to use spatial technologies; the creation of the data seen in 6.1 exemplifies students understanding the geography of the environment as they build

desert-themed outposts which are congruent with the desert 'biome', while they develop new content in three-dimensional, virtual space. Similarly, the English curriculum notes that students must create new multimodal texts that integrate visual, print, and audio features. Throughout the dataset, students can be seen engaged in this kind of work, both alone and in collaboration with other students.

Similarly, the 'invasion' described by 7.3 was an in-game event which occurred during the study curriculum, and in the moment, was difficult to explicitly define as a sanctioned learning activity. Despite the speed of the event, and the relative chaos that it generated inside the classroom, the study teacher and I felt that the event was not simply significant as a quirky anomaly in the study, but was a significant and unique 'unofficial' literacy activity which involved multiple participants and spanned two classes. The teaching aide who was in the classroom at the time of the 'invasion' initially showed significant discomfort with the events, voicing her objection to the study teacher's insistence that we allow the scenario to conclude. As we began to make sense of the chain of events, and began considering what they might mean for our objectives regarding literacy learning, the power of the 'invasion' as an experimental in-class literacy event became apparent. While the 'invasion' was very much considered to be 'unofficial' literacy learning, there were obvious alignments with 'official' curriculum which were valuable to consider. For instance, the HASS curriculum asks students to understand the ways that the global economy is an interdependent system, and to understand the ways that roles are defined within the domestic and global workplace. The 'invasion' could have provided significant opportunities for the study teacher to use the 'unofficial' literacies engaged during the event to align with the 'official' objectives of the sanctioned curriculum, with students considering their roles in the event, the roles of others, and the outcomes resulting from poorly understood (or, in this case, subverted) role definitions.

The ongoing field of research into game-based learning requires an expanded conversation around the ways that games such as *Minecraft* can be used as innovative generators of unconventional pedagogies, but also regarding the development of strategies for ensuring that the 'unofficial' literacy events that these games generate can be effectively articulated by 'official' curriculum. This study was not designed with official curriculum at the forefront; the

focus was on students, and the kinds of literacy learning that they would organically move towards when given the freedom to explore the game's tools in a style that mirrored out-of-school play. The application of these literacy learnings to sanctioned curriculum, while an interesting retrospectively applied dimension of this study's data analysis, requires a more purposeful and focussed response by the research community. A partnership between teachers and researchers which seeks to understand how the 'unofficial' literacy learnings generated by *Minecraft* (and games of its type) might be used to address the values and imperatives of 'official' school curriculum is a significant research opportunity which must be addressed. This includes a focus on the ways that 'unofficial' literacies can be identified (see 8.4.3) and applied meaningfully and organically in the service of 'official' curriculum. Research of this kind will further *Minecraft*'s potential as a techno-textual resource which can engage meaningfully with the digital literacy practices of young people, and the mandated requirements of the formal learning space.

8.2.2 New gaming models and the changing face of game-based literacy pedagogies

The landscape of the video game industry is constantly and rapidly evolving, and the player-led cultures which both emerge and collapse as games rise and fall in prominence, are undergoing a similar ongoing transition. As an example, *Minecraft* represents, in many ways, an already dated mode of video game construction and distribution. The game requires a single license purchase, is installed on a local system, additional players must purchase their own copies of the game and must authenticate them, and the game can be played offline, or via a LAN/local wi-fi connection. This study defined video games in terms of a traditional retail-based distribution and consumption model. *Minecraft* is a game that is purchased for a one-off retail fee, and must then be installed on client systems; a traditional approach to the business of video games. As this thesis was being written, however, new models of consumption, monetisation and distribution have risen within the industry which may have implications regarding the composition of future research questions intended to investigate this area of learning. Video game production companies are increasingly invested in free-to-play titles which monetise in-game items and consumables, and require players to be constantly connected to the internet in order to preserve the integrity of their 'real' money-based in-game

economies and their anti-piracy/cheating technologies (Stuart, 2017). These games are intended by their creators to be played for many years, and the game players experience in the first year of release may bear little to no resemblance to the game that is rebuilt, modified, and iterated by developers over the game's lifespan. While research has drawn on these new models of development, distribution and monetisation, it has largely investigated these iterative models in the form of mobile games (Nieborg, 2015), social networking (Paavilainen, Hamari, Stenros, & Kinnunen, 2013), or by focusing specifically on the economics of the free-to-play model (Lin and Sun, 2011). Gaming genres are increasingly seeing success in this highly lucrative new model. Narrative adventure games (Telltale's point-and-click adventures), card games (Hearthstone), strategy games (League of Legends, DOTA2), first person shooters (Overwatch, Paladins), and simulations (War Thunder, World of Tanks) often see their most profitable and successful titles following the free-to-play development model, and many studios are beginning a pivot away from the retail-focused model of video game production and distribution. The research questions of this study question the ways that *Minecraft* can be used to generate powerful literacy learning, and while there are dimensions of this research which are transferrable across the spectrum of video game media, *Minecraft* is a product of a specific moment in time, in a specific social, technological, and cultural context. It has a finite lifespan, and will ultimately be superseded by new titles which represent evolutions in software and hardware. This section details a number of the kinds of titles that have emerged since the conclusion of data generation for this study, and each represents a new set of opportunities which future researchers and teachers will be able to take advantage of when furthering the potential of game-based learning.

8.2.2.1 Research spaces and the fragmentation of game distribution

New approaches to game-based research will emerge as being increasingly significant as the new gaming models increase in prominence, and will require methods for designing sustainable, ongoing curriculum which draws on emerging video game literacies. This study articulates a tension between the unpredictability and sometimes chaotic nature of video game play, and the perceived need for stability, cohesion, and measurable outcomes in curriculum design (Alaswad & Nadolny, 2015). These tensions will amplify as that unpredictability extends

beyond the ways that games are being played by students, and escalates to a more fundamental design level, as titles are deliberately created to be incomplete and fragmentary. Future studies will need to acknowledge that designing curriculum for newer titles which operate using these new development models may not involve activities, assessments, and lesson plans which can be re-used over time without revision. An imaginative and futuristic classroom approach might anticipate the changes to commercial video game titles and reframe learning objectives around the opportunities that these constantly shifting and iterating titles provide. This position advocates for an openness to exploring different ways of using digital texts in classroom spaces which maximise the literacy learning potential of digital games. Developing sustainable curriculum which can accommodate potential shifts in the focus, composition, and content of commercial video game titles requires a change in approach (Koops, Verheul, Tiesma, de Boer, & Koeweiden, 2016). This moves the pedagogical focus away from traditional media, and is able to work with open-ended and unscripted digital texts. Researchers and educators may need to theorise and design pedagogies that are able to transition seamlessly between game iterations. A content-based approach might simultaneously become less desirable to researchers working in this space. Material that has typically been static and ‘finished’, as with story-based adventure games, might become increasingly unstable and unfinished, with games increasingly adopting a model which deliberately fragments content and sells it to audiences in pieces. Researchers and teachers will need to design data generation and accompanying learning objectives around story-driven games which could be unfinished, with sections of the narrative still undergoing development by game developers.

8.2.2.2 Easing tensions and new opportunities for literacy education

These issues probe certain aspects of video game-based educational research, but there are other opportunities that will be created by these new industry approaches. A broader variety of titles will be accessible by researchers working in game-based learning spaces, simply because the software itself is free. A significant limitation for many researchers, and study schools, involves the costs associated with implementing a video game-based curriculum. Many titles can cost \$80 to \$100AUD per license, and commercial video games rarely (if ever) offer bulk

education licensing. In terms of school resourcing, purchasing a copy of the latest Mass Effect game for an entire class may prove a difficult argument for enthusiastic teachers and administrators. The consumer move towards free-to-play models (service-based software) eliminates these concerns, as the studios themselves are interested only in maximising access to their titles and the cash shops integrated into their design, as opposed to their historical, retail-based focus. Similarly, many of these titles have low system overheads, ensuring that they can be played on a range of systems, including the more modest laptops that schools generally provide for their students. Researchers will not need to negotiate the tricky business of software support, as many titles are playable using web browsers. As these games are account-based, in that user data is stored on a remote server, and games are typically played using a server cloud, co-ordinating access to games and the data that are being generated through play in both school and home environments will be far simpler, as students will simply be able to log into their accounts to continue access to the same game data that they were engaging with at school.

There is, however, a cost implicit in the adoption of these new models of development and distribution. The shift in focus towards service-based software brings with it philosophical and legal challenges for both consumers and educators considering working with these technologies. Service-based software generates a dataset that is often easily monetised by corporations and developers, and this represents an ongoing concern for consumers, and for users of educational apps and software solutions (Grimes, 2013; Goncharova, 2017). The ways that virtual items are monetised through purchases made with real money, and the ways that game mechanics draw on gambling have come under scrutiny in recent years, particularly regarding the ways that these dimensions of the model are used to appeal to children. The ethical questions pertaining to the service-based software model will need to be reconciled by curriculum designers and school administrators in order to minimise or eliminate the concerns of parents and staff regarding the potentially unethical business practices which are potentially implied by the business model.

8.2.3 *Minecraft* as a generator of new pedagogical possibilities

As this study was completed, virtual and augmented reality are two kinds of technologies which have become available to consumers, and present new opportunities for researchers and educators to build on the creative and collaborative work described in this data. From a pedagogical standpoint, the advent of head-mounted display units opens new vistas in teaching and learning (Domingo & Bradley, 2017). New kinds of simulations, three-dimensional content, and opportunities for exploring the globe will be presented to adventurous learning designers. Future research might abandon traditional desktop systems altogether, and the collaborative digital space inhabited by avatars controlled using mouse/keyboard input devices may use head-mounted imaging to offer opportunities for creative and collaborative play that are not currently achievable (O'Connor & Domingo, 2017; Rupp et al., 2016). Virtual reality may also have significant utility in the engagement of disadvantaged children and adults (Ludlow, 2015). Hardware solutions such as Microsoft's *Kinect* motion sensor have similarly been considered as potential technological tools for new kinds of teaching and learning, with multi-disciplinary applications noted as being purposeful and generative (Tsai, Kuo, Chu & Yen, 2015).

There is also a significant question regarding the cost of this kind of infrastructure deployment. With schools often underfunded and struggling to provide the basics of a print-based literacy curriculum, the additional financial considerations associated with this kind of digital game-based program may prove prohibitive. This is, however, an issue which speaks more broadly to the value judgements which inform government funding allocation, and with the benefits of a game-based literacy program proving significant, a compelling argument might be made that developing school infrastructures to support this kind of curriculum is a worthwhile investment. *Minecraft* is, in many ways, a traditional piece of software. It requires users to be adept with a keyboard and mouse, a touch screen, or a gamepad, and it is viewed through a rectangular screen. Future educators and researchers working in a game-based learning space will need to explore the emerging affordances of hardware, including virtual and augmented reality. These kinds of technologies are still in their relative infancy, but are slowly transitioning their visibility into consumer spaces, and will increasingly influence and shape the cultures of young people. This study can be considered a contribution to the argument that while school resourcing

remains politically contentious, and the value of escalating investment in school technologies is debated across the media spectrum, there is an argument to be made that it is a worthwhile investment, connected to significant outcomes.

8.2.3.1 Future opportunities for digital, game-based data generation

The study design which was adopted for this project employed a range of approaches for data generation. Surveys, recorded interviews, and screenshots were the primary artefacts I retrieved from the study site, and these, along with researcher journals and a very limited set of server logs, comprise the bulk of the dataset. While these artefacts were sufficient within the scope of this study, and the research questions that it attempts to answer, future studies may consider an expanded, and digitally optimised, set of data generation tools which will capture a far more detailed and comprehensive picture of the literacy events occurring during the study curriculum. This may include the deployment of software designed to capture audio and video of games during play. Video-based capture of gameplay, matched with synchronous video of students working in the physical space, would offer a far more comprehensive and nuanced understanding of how the literacy activities occurring in the virtual space are manifesting in the classroom, and the kinds of rich learning events that they are generating. Access to a comprehensive, centralised set of server logs would allow future researchers to draw from a more complex picture of how students are interacting with the digital space by recording keypresses and server activities. A key aspect of future research in this space will undoubtedly involve investigations into the ways that a video game-based curriculum can function as a bridge between the school and lifeworlds of participant students. An initial research interest which I had intended to pursue during this study was a *Minecraft* game which could be played during class, and could then continue to be played during lunch breaks, or after hours. This would offer future researchers a wealth of contextualised data regarding the kinds of student activities occurring in formal and informal literacy spaces, alone and with their friends, and at different times of the day.

8.2.3.2 Teacher Pedagogies and distributed learning in a game-based curriculum

A critical aspect of this work informing future directions in game-based research involves teachers, as the mediators of learning in formal learning spaces, who were not a key research

interest during this study. As described in 8.2.3, game-based research which engages with a school-based study location, and is not undertaken by a practising teacher using her or his own school/classroom, is highly dependent on the capacities of teachers, their ability to understand the study aims, and their technical proficiency in working with digital tools and virtual spaces. This study was focused on curriculum design and pedagogy, in terms of game-based learning and video game integration. As data generation progressed, the approach that was adopted by myself and Cynthia began to focus heavily on the student-generated data emerging from the *Minecraft* play demonstrated by study participants.

A shift towards the role of teachers in game-based learning approaches may prove a valuable research opportunity for future studies. A number of studies have been completed in this growing area of game-based research (del Pozo, Munoz- Repiso & Martin, 2016; Ruberg & Owens, 2017; Becker, 2017), with a number taking place in teacher training programs, with a view to ensuring that early career teachers are ready to work effectively in digital space. Ongoing work, however, must occur to ensure parity across teacher workforces regarding digital teacher literacies. Developing a deeper understanding of the kinds of skills and competencies that teachers must possess to be effective as practitioners of digital game-based learning would be valuable in furthering this work. Similarly, with teachers often describing their working lives as being overburdened with assessments, meetings, and teaching itself, research which attempts to theorise strategies for developing the digital literacies of teachers in a way that does not compromise their daily schedule, is valuable. A research approach which explores gaming literacies from the perspectives of early and late career teachers, and develops an understanding of how teachers at these different phases of their careers can be best supported and developed in terms of their gaming literacies may prove a significant extension of this research.

8.2.4 Identifying student-designed literacy learning during improvised *Minecraft* play

A further aspect of this study which may prove critical as a research orientation for future studies involves enhancing teacher capacities to identify literacy events as they occur in game-based curriculum activities. Gaming is often, by design, intricate and arcane, with multiple systems, rule sets, and cultures operating synchronously (Aarseth, 1997). In many gaming

scenarios, learning and literacy events occur which are difficult to identify without a basic understanding of those systems, or an appreciation of some of the more technical/cultural aspects of individual game titles. Future research directions could pursue teacher-focused strategies designed to make these literacy and learning interactions that are obscured by a lack of game knowledge more visible to teachers and administrative staff. Measurement tools are often used by researchers when considering the efficacy of game-based learning curriculum (Crocco, Offenholley, & Hernandez, 2016), but an approach which introduces teachers to the core principles of video game playing, and thus literacy learning, may be valuable. By adopting this approach, researchers could work with teachers, assisting them to develop an understanding of how and why games are played by young people. This approach would help teachers to identify and recognise when literacy events are occurring during game-based curriculum activities, and to make informed evaluations of their quality and efficacy. In an open-ended title such as *Minecraft*, many of the language and literacy events that emerge from play could be considered breaches of the mandated 'rules' of both the game and of the classroom. The kinds of literacy learning emerging from these kinds of unsanctioned and often improvised activities represent a potential avenue for further research, and in the following section, I describe three approaches to exploring the potentially 'hidden' literacy practices that lie beneath unauthorised and unsanctioned classroom activities.

8.2.4.1 Re-valuing unauthorised behaviour in a game-based learning curriculum

A significant aspect of *Minecraft's* design which provides opportunities for reflection on the 'hidden' qualities of a game-based literacy curriculum involve the ethical questions that can be found in the game's unscripted, unplanned play structure. The unplanned game design designed for this study allowed for both authorised and unauthorised activities, with students choosing to pursue activities which are aligned with the learning objectives of the lesson, or to subvert, alter, or distort them in pursuit of playful thinking, and I argue, the co-construction of new knowledge (Elliott & Bulfin, 2014). During these unauthorised activities, students engaged in a re-definition of the ways that the game is to be played in the classroom context. The data indicate that this may occur in a negotiated and collaborative way (see 6.1 and 6.2), but in

addition to this, participants may choose to re-define accepted in-game practices in ways that subvert or challenge the conventions of classroom play (see 8.4.4.1).

Developing a method for supporting improvised gameplay in a classroom setting proved to be a significant challenge throughout the both the development and data collection conducted during this study. The school's regular approach to humanities and literacy curriculum was typically monologic; students completed essays and worksheets, with digital constructivist approaches which appeal to the new participatory cultures rarely being mobilised. As described by Jenkins (2006) in Chapter 2, participatory culture involves young people engaged with new media literacy practices in roles which fulfil a production-oriented model of classroom education. This approach, however, becomes complicated when one considers an additional layer of unpredictability which rises out of the emergent nature of video game play; namely, the collaborative space as a site of improvised, unscripted play. This reading of student practices, however, is dependent on how an educator privileges the unaltered code that has been officially released by the game's creators, versus unauthorised modifications made by students. As noted in 3.4, Dezuanni, O'Mara and Beavis (2015) describe *Minecraft* as game which 'invites players to develop new expertise and skill to experience the full capacity of the game' (p. 16). This is true of the game's built-in systems of crafting and content creation, but once players move to more advanced levels of play, it also refers to an awareness of exploitable opportunities found in the more arcane areas of the game's design. Consalvo (2007) notes that 'cheating' in a video game is a concept that is difficult to define, and is heavily contextualised by the perception of the 'cheater'. 'Cheating' can describe activities ranging from accessing information on the internet which might give players an advantage, to the direct modification of the game's code to artificially provide players with expanded and extended powers beyond the intentions of the game creators (p. 86). During the invasion of our study server described in chapters 6 and 7, unsanctioned events and activities occurred during *Minecraft* play, by both 'invaders' and study participants, which generated a debate amongst students regarding their perceptions of 'ethical' gameplay. In their view, exploiting the game's code to generate assets at a rate that was not natively supported by the game constituted an infraction of *their* server rules, and the resulting destruction of virtual property was a result of an unchecked violation of

the group's protocol regarding exploits of *Minecraft's* crafting system. While this study ultimately produced findings which contribute to the body of research concerning unsanctioned literacy practices in classrooms, future researchers should recognise the significant opportunities that this dimension of the analysis represents. The value of literacy activities enacted in the virtual space was highly situated, and dependent on the contexts, values, and objectives of each participant in the study context (see 2.2), and further studies are needed to understand the operation, composition, and pedagogical value of informal literacy practices across a range of classroom contexts and configurations.

The emergent, non-linear nature of *Minecraft's* gameplay means that the potential for unauthorised, unsanctioned activities which deviate from the developer-mandated uses of the software are ever-present, and in a multiplayer environment, a single player action may have a dramatic impact on the gameplay of all participants. This requires further research which seeks to understand how these activities can be recontextualised in a formal learning space as being desirable and purposeful, and can be aligned with curriculum objectives. During data collection, the study teacher attempted to intervene by physically stopping the invading students from accessing the server. She seemed unsure if these kinds of deviations, and deliberate attempts to undermine aspects of the classroom activities by the invading students, could generate and sustain learning opportunities for her students. These concerns were alleviated as she observed the literacy events described in the analysis chapters, including creative thinking, collaborative problem solving, and the co-authoring of new in-game texts. It was, however, the outward appearance of damage and chaos that initially rendered as 'hidden' the richness of the literacy events being generated. *Minecraft's* gameplay contains vivid digital recreations of fire and explosions, and despite the apparent chaos that these assets represent, the user operated systems which animate them are complex learning systems. Bareither (2017) describes a form of 'playful virtual violence' taking place during video game play, noting that

in video games there is no actual material damage of living beings or things. Most currently available action games, however, contain very explicit representations of physical violence and allow players to do something with these representations in practices that can be defined as 'virtual'. (p. 2)

In the context of this study, the ‘something’ that students pursued during their play experiences which involved ‘virtual violence’ was overwhelmingly entwined with rich literacy practices. Developing a deeper understanding of the ways that the outward appearance, featuring conflict and, in many cases, action and ‘virtual violence’, of these unsanctioned literacy practices mask the depth and complexity of the thinking involved must be a priority for researchers working in game-based learning spaces.

8.2.4.2 Digital ownership and virtual property

A robust and important discussion amongst both study participants and the ‘invaders’ was generated by the rule-breaking literacy events that transpired during the ‘invasion’ as a result of the emergent nature of *Minecraft* play. Unanticipated events which occur during the playing of an improvised video game title can provide opportunities for teachers to raise discussion in relation to significant interdisciplinary concepts (Gee, 2017) In the context of *Minecraft*, this may include questions regarding what constitutes ‘ownership’. In this study, this tricky, subjective discussion drew together the separate strands of ethics, digital authorship, collaborative project management and the legal status of digital artefacts, and used a real-world scenario to model the conversation. Similarly, the ‘invaders’ were drawn into conversations with the study teacher regarding their activities. While they initially protested that destroying student work was ‘just fun’ and ‘it’s just online’ (and therefore did not matter), the conversation introduced them to ideas around the preservation of creative pieces, respect for the work of others, and digital citizenship.

For many of the students involved in the ‘invasion’ scenario, both study participants and invaders, these were new and challenging concepts. The formal curriculum did not include any significant work in which the ethical boundaries of digital citizenship and content authorship were addressed. While *Minecraft* was a creative digital space in which they were able to engage in Bareither’s (2017) ‘playful virtual violence’, the real-world implications of those practices had not been significantly addressed or explored in their lives as secondary school students. Further research awaits which explores the ways that ‘ownership’ of digital content is conceptualised within a formal learning space, and the ways that students can be enculturated into the complexities of digital ownership. This will also involve a discussion around the implications

that these ideas have for the preservation of their own work, and work by others that they deem important. A planned curriculum could be developed which introduces students to these concepts through scenarios and case studies, but the ‘invasion’ scenario represents a sophisticated, situated simulation of how these issues are enacted in an informal environment, through an unscripted, player-driven digital medium. This was a rich learning opportunity driven by the structural features of a video game, *Minecraft*, which provided a valuable opportunity for the development of complex student understandings; productive learning in their personal and future professional lives as digital citizens. Researchers must be sensitive to the potential for the free-form nature of in-game events to speak directly to students regarding the complexities inherent in concepts of curation and ownership.

8.2.5 *Minecraft* as a text for engaging disadvantaged learners

A research theme which emerged during this project, but was not able to be fully explored due to the constraints of both my research questions and the site itself, involved the power of game-based learning to reconnect disadvantaged and learning needs students with classroom literacy activities. In this study, one student (John) demonstrated significant learning challenges which the school had not been able to effectively address. While John's progress as a classroom participant during the *Minecraft*-based unit proved a valuable part of the dataset, the research questions did not specifically address disadvantage or learning difficulty as research orientations. The data produced by John, then, do not interrogate game-based strategies for engaging disadvantaged and special needs students, it is simply a part of the broader research conversation involving game-based pedagogy. The potential for using a game-based approach, including a game such as *Minecraft*, in engaging disadvantaged learners is significant. As described in 8.4.3, research into the potential for video games to make a significant difference in the school lives of disadvantaged children has been conducted, with a number of different approaches adopted, including the use of the Nintendo Wii with physically disabled students (Sherrow, Spriggs, & Knight, 2016) and exploring the cognitive skills of children with intellectual disabilities through ‘edutainment’ (see 3.2.1) games (Dandashi et al., 2015). *Minecraft*, and games like it, represent similar opportunities for using game-based approaches in schools in order to improve outcomes for disadvantaged students. Future research directions, then, must

be taken in order to more thoroughly understand the game's full utility in contributing to equity within classrooms, and inspiring disadvantaged students to engage with their studies.

Ainscow (2012; 2016) notes that when considering the practicalities of disadvantage and equity in education, it is worth conceptualising them as an 'ecology of equity'. This 'ecology of equity' includes culture, socioeconomic status, national and state-level educational policy, and the economic realities faced by different demographics. Students involved in this study can be considered exemplars of this ecology, with their in-school contexts being co-constructed alongside the realities of their lives outside of school. For instance, study participants involved several ESL students, students with learning disabilities, and students from disadvantaged and, often, challenging backgrounds.

Research has attempted to move beyond simple questions of whether students have access to computers by identifying the critical dimensions of inequality of technological opportunity (DiMaggio & Hargittai, 2001), theorising the role of socioeconomic status in network access (Warschauer, Knobel, & Stone, 2004), and exploring the role of emerging technologies in working with people with cognitive disabilities (Braddock, Rizzolo, Thompson, & Bell, 2004). Gorski (2009) describes a need for equitable access to technology in multicultural education spaces, noting that

we must never write about, speak about, or encourage philosophical intersections of multicultural education and technology without acknowledging digital inequities. For example, we must acknowledge that innovative uses of technology for multicultural education are innovative only for the people who have access to them. (p. 360)

This position describes physical access to technology, but also teaching and learning strategies which empower learners to make effective use of technology. In the context of this study, this frames the work that was undertaken with Chaiya; access to the technology alone did not create a desirable outcome in terms of engaging with an ESL student, but inviting a specific literacy practice into the classroom allowed her to reframe her technology use in a way that addressed equity between herself and her non-ESL classmates. Makinen (2006) supports this position, noting that simply ensuring that physical access to technology for students is not

enough to ensure that people are enabled to participate fully and equitably in society. Dobransky and Hargittai (2006) note that there is a significant need for ‘public policy that encourages access to assistive technologies that are more affordable and more up-to-date to help bridge the divide between people with and without disabilities’ (p. 330).

These issues regarding equity and access represent a significant opportunity for future research. Research in which a video game-based program is used as a strategy for addressing inequality through the engagement of disadvantaged and disabled students remains limited. Previous work has touched on these aspects of game-based research, including studies which used 'edutainment' software to reach students with intellectual disabilities (Saad, Dandashi, Aljaam, & Saleh, 2015; Marino, et al., 2014). Future work in this area, however, might use a commercial video game such as *Minecraft* instead of an ‘edutainment’ title which can lack the cultural currency necessary to ensure that students connect in meaningful and purposeful ways (see 3.2). This approach may require further research into the optimal composition of game-based lesson design which is specifically intended for disadvantaged students. This would allow teachers and researchers to develop strategies for working with students who may be economically disadvantaged, including students with behavioural/disciplinary issues, or for whom schooling is socially and/or culturally challenging.

In the following section, I describe some of the limitations affecting the nature of data generated by this study. While some of these limitations are contextual, and are a result of the study location and the students and teachers available, others are due to deliberate choices that were made during the initial study design, and represent a conscious decision to orient the study towards specific objects of inquiry.

8.3 Study limitations

Social research often involves a constant process of reflection and decision-making as new data emerges from study locations, and approaches and methods need to be modified and iterated. As these decisions are made, whether as part of the initial study design, or as a part of the recursive processes of a study, aspects of the data will be prioritised, and many might be

minimised or discarded. In the following section, I will reflect on aspects of data generation and study design which limited my ability to collect and analyse data from a range of different possible perspectives, and reflect on what these limitations may suggest for future directions in game-based research.

8.3.1 Study design

The study design that was initially pursued involved a linear, sequential weekly program in which new activities were introduced, the student experience guided and mediated by the requirements of the curriculum, and a set of formative assessments used as tools to evaluate and interpret student learning. I originally intended to develop a study curriculum which more closely resembled a traditional print-based study program at the suggestion of the study teacher, with a set of sequential weeks, activities scheduled on relevant days, and assessments embedded throughout the unit in a strategic and purposeful way. I was mindful of the school's discomfort with some elements of a video game-based approach, and I felt that curriculum design was one dimension of the study that could be used to alleviate some of the tensions that existed between myself and the school's administration. I had not, however, anticipated the technical limitations that I would find at the site (see 8.3) which eroded a number of aspects of the linear study design, requiring a quick response which could ensure that the study could effectively progress. This included a less scheduled approach, and the elimination of the weekly learning sequence, which could not be sustained due to a lack of guaranteed functionality. In collaboration with the study teacher, a new, open-ended curriculum was developed which was deliberately responsive to the work that students were actively demonstrating an interest in pursuing. The study's capacity to purposefully answer the research questions was enhanced significantly by these deviations from the original design. The primary research question specifically asks about ways to 'use *Minecraft* to generate rich literacy learning' (see 1.2). The revised study design addressed the primary research question by allowing the shape, tone, and rhythm of the classroom to more closely match those of informal game play. By allowing students to focus on literacy activities which specifically interested them, and looking for ways to identify the evidence of learning that they represent, the potential of game-based learning was maximised in ways that a more traditional, linear curriculum was unable to.

The study design that I had originally created prior to establishing a relationship with the school which would allow me to engage game-based data generation was significantly more taxing from an infrastructural perspective than the study which was ultimately implemented. The success of my study depended on the willingness of the school to allow me to incorporate a video game text as part of the Year 8 curriculum. My initial vision for the study design involved a '24-hour classroom', intended to take advantage of the connectivity afforded by *Minecraft* by hosting student-generated study data on an external server which students could access at any time, for any duration. I was interested in exploring the potential for students to take the opportunity of a mobile, remotely hosted 'classroom' space, located virtually in a digital game server, to engage in literacy activities outside of scheduled classroom times. As described in 8.3.2, the school's approach to security, particularly regarding online safety, was rigorous and preventative, and despite my efforts to advocate for the safety and security of an externally-hosted *Minecraft* server (for example, security keys, limited user numbers, and ongoing moderation) I was unable to successfully negotiate an approach which aligned my original study aims and the concerns of the school leadership community. Similarly, the study curriculum, which attempted to preserve the open-ended, improvisational nature of *Minecraft* play while ensuring that activities and multimedia products created by students could be assessed, needed to be significantly reviewed by me and the study teacher in order to ensure that it could be feasibly implemented. It was not considered, by the study teacher or the school administration, as authorised, formal curriculum, and the option of allowing students to 'opt-out' at any time (see 4.6.2) made these kinds of formal structures difficult to implement.

A key challenge during analysis involved the curation of effective tools which enabled me and the study teacher to design pedagogies which engaged with video game-based media. Bill Green's 3D model of literacy (Green, 1988) offered a framework for analysis of the dataset which focused on the operational, cultural, and critical literacy practices found in the dataset, and allowed me to effectively draw out the simultaneous literacy learning which occurred. Green (2012) notes that the 3D model has been subject to a range of iterations since its initial publication, and was used as a theoretical framework for a number of digital literacy research projects. Initially, I attempted to locate a single solution for the analysis of game-based

material. I intended to locate an historical precedent for analysing in-game media, and to align it with the dataset that the study had produced. The dimensions of analysis did not, however, lend themselves to a single analytical strategy, and I moved to a more diverse approach which allowed me to align specific analytical approaches with samples drawn from the data. The range of digital and game-specific methodologies (see 4.4) approached game-based research projects from many different perspectives, including visual literacy, ethnography, multimodality, and systems analysis. This study methodology, then, used Green as a primary analytical framework, and subsequently drew on with more recent, specifically-digital approaches overlaid as required.

The decision to construct the study around an entire class cohort was also something that was, on reflection, a further limitation. This was, however, a limitation emerging from the data collection method rather than the class itself. Developing an awareness of the kinds of artefacts which would support a broader, class-based dataset would have offered new directions regarding the kinds of data that I was collecting – for instance, video of the class at work, or preloaded software on each student laptop which could capture live footage of their *Minecraft* play. By doing this, I would have had access to data highlighting a range of different phenomena occurring during play. Body language, eye movements, and physical interactions between students may have provided additional opportunities for analysis which was situated, to a greater degree, in the physical classroom. *Minecraft* play in motion, similarly, would have provided a different texture to the data analysis, with movement and animation offering an opportunity for data analysis. In order to effectively manage this kind of data generation, I would have needed significantly more engagement with the school's IT department, and a willingness on their part to provide the security permissions which would allow the installation of these kinds of capture software.

A possible option that I could have followed would have been to narrow the study design down to a small group of purposefully selected students, with a mixture of high and low academic achievers. The class that was allocated to me was noted by the study teacher and the school's principal as a particularly difficult and problematic cohort. Amongst the group of students who did engage with the study curriculum, none was considered by the school to be high performing

nor academically gifted; the data produced by the participating students do not represent a range of potential student capabilities. This did, however, enable me to consider the possibilities of *Minecraft* for a non-academic, disadvantaged group of learners, which offered its own insights. A more varied cohort of participants, including high performing or gifted students presents a research orientation which future studies could more fully explore.

While *Minecraft* was an effective game for use in this kind of study, there are significant limitations to the use of *Minecraft* as a study text which I was not necessarily aware of at the time of the study's design. A key orientation of this analysis involves the improvisational and open-ended nature of *Minecraft* play, and while those are key strengths in the game's commercial power and popularity amongst young people, they are not easily integrated into the demands of formal curriculum design. *Minecraft* has no prescribed narrative, which makes it a difficult text to consistently advocate for in a formal English/literary space, and fails to ostensibly align with features common to language and literacy education (character analysis, narrative voice, themes and issues, and so on). This is, of course, dependent on teacher perspectives on the kinds of texts that constitute readiness for an educational context. A teacher who is wedded to a more traditional, print-based conception of literacy education might struggle to reconcile her views on the importance of sequential, print and visual texts with the fragmentary, user-generated storytelling which emerges from informal video game play. Teachers in literacy spaces who are interested in technology, by the same token, might become frustrated at the challenges of implementing a video game-based curriculum in their schools, from an infrastructure or policy level. In order to work through these tensions, teachers would need significant understanding of how the game can be used as a player-driven story generator, and how that can be translated into effective learning design (Cope & Kalantzis, 2016) in the context of their school's culture, infrastructure, and philosophical approach to literacy learning.

The nature of *Minecraft* play also made monitoring student behaviours and ensuring that they were kept engaged with desirable learning tasks difficult. The *Minecraft* game world that is generated is a vast and complex digital space. While it can be challenging to comprehensively monitor student activity during class time, I argue that engagement and productive learning are

encouraged by ensuring that teaching staff are active participants in the digital world. As a participant observer, working in the virtual space, I was able to walk with students through their digital constructions, observe and comment on the ways that they collaborated, and could experience the play of the game alongside study participants. I was significantly advantaged in this regard as I had prior knowledge of *Minecraft* and the game's systems, while Cynthia, as teacher, struggled to participate effectively in the game, and ultimately chose to observe the students in class, while understanding that while it was her classroom it remained my study, as she moved among them while watching their screens. In order to assist Cynthia to teach in the digital environment as an in-game participant, I would have needed to engage in an extensive tutoring program with her, in which she was given the tools necessary to understand *Minecraft*, to decode the actions of student-controlled avatars, and to enact productive pedagogies which function effectively in a game-based learning environment. This approach would require sensitivity to her background, the culture that she grew up in, her prior knowledge of technology and gaming, her age and education, and her overall interest in developing her skills in that area. This would have greatly changed the focus of the study, which was described by the research questions as being focused on students and study curriculum.

This study was limited to a single class and discipline – in this case, humanities. I was not able to engage in cross-curricular data generation, such as running the study curriculum with the same cohort in two different discipline areas, and I was not given access to a second set of students, or the same students, to run the study curriculum in an alternative discipline area. The study design, as a result, was not built to generate this kind of expansive, multi-disciplinary data featuring different student cohorts. This had the effect of limiting the kind of data that I was able to generate. By adopting a single-discipline approach, despite the often cross-discipline imperatives of a humanities curriculum, I did not work with students in a mathematics or science space, and therefore the mathematical/geometrical learning which is described in the analysis chapter was conducted through the prism of a humanities classroom; while the primary research question of this study specifically aligns the data generation with literacy learning in a Humanities and English context. A fully integrated curriculum might have been a better fit for a study using a video game text, particularly one that was interested in a broad set

of student skills, knowledge and understandings, rather than a focus on print literacy, numeracy, or design abilities. I did not focus specifically on any one form of literacy activity, and this broad approach might have been better matched to a study environment in which multiple, simultaneous disciplines were being taught. Similarly, while Chaiya's *Minecraft* work represents a rich set of analysable data, the study context which surrounds it was one with a humanities focus. The surrounding curriculum imperatives, and the kinds of support structures offered by the regular classroom teacher, could have been matched to her design work in a learning space dedicated to, and under the guidance of, design-based content, such as an art or graphic design class.

8.3.2 Duration and limitations of access to students

The data generation period was limited to a single hour a week, to be spread across a three-month period. This was negotiated with the study teacher, who was willing to volunteer a single period of humanities to the study. I was also able to access students during the lunch break of the day that the lesson was occurring. Contact with the students beyond these two opportunities was not possible, and I was not permitted to contact parents. As a result, I was not able to use this study to understand, analyse, or compare the lifeworlds of participant students with their lived classroom experiences. Both of these factors represent a significant limitation in both the dataset and the available analysis. I could not immerse myself significantly in the culture of the school, I could not follow the students through an entire school day in order to develop an understanding of how their typical days as students in the school were conducted, and I was not able to observe their learning in other disciplines. My movement inside the school was confined to the study classroom, and the administrative block. An expanded site context would have enhanced the depth of the dataset, allowing me to observe the digital practices that students were exposed to throughout an entire school day, and would have allowed me to view the kinds of approaches to teaching and learning that students were regularly experiencing across multiple study disciplines. This would have also allowed the study to develop a sense of the out-of-school digital practices being pursued by participant students during school hours.

8.4 Site limitations

Site selection can be a complex process, and finding a ‘perfect’ study environment is an elusive objective for any social researcher. In the following section, I describe the aspects of the research site which needed to be negotiated, while contextualising them as limitations of the dataset.

8.4.1 Technical limitations

The study that was originally envisioned was one driven by the creative adoption of a contemporary digital text (*Minecraft*) underpinned by sound learning principles, in pursuit of a productive approach to literacy learning. As previously noted, this proved difficult, with site selection immediately revealing itself to be problematic, as most schools that were approached showed either disinterest or hostility towards the technological objectives of the project. The study school was selected as it was open to pursuing this kind of technology-based literacy practice largely due to an existing relationship that I had with current staff, and due to the focus on technology for learning described in 4.1.3. As the study’s infrastructure requirements and general IT support needs were introduced to the school, via conversations with the study teacher and the school’s head of IT, it became obvious that the scope of the study would need to be dramatically wound back, as the school’s existing technology and security settings would not support the kinds of literacy learning events that I hoped to generate and capture. I had originally intended to allow students to participate in a single, shared *Minecraft* space which would be accessible during formal class time, but also after hours, creating a 24-hour learning environment from which data could be generated through observations and server logs taken across the day, and into the evening. This approach would have required an externally hosted *Minecraft* world, secured using an authorised reseller of *Minecraft* servers, with access being heavily regulated and limited to students who possessed the server password, myself, and the study teacher. This approach was deemed risky by the school principal, who felt that student sites would be at risk of infiltration by sexual predators, and the school would have little legal recourse due to the server space being controlled by a third party. I argued that a commercial server environment would allow greater security over monitoring access due to the advanced support tools and ongoing, after-hours support provided by a commercial provider, but

ultimately, I was not able to successfully advocate for this position. We attempted to replicate the shared server space using the school's internal network, and I had hoped that students would be able to access a collaborative *Minecraft* space which was hosted on the local network. Due to the security settings located at the school, at an ISP (Internet Service Provider) level, and at a departmental level, we were unable to create a stable server environment in which students could comfortably work, and the idea of a shared, round-the-clock learning space was abandoned.

The shared LAN servers, stored on individual student laptops, was a compromise which affected the efficacy of the study curriculum, and data generation itself. Ultimately, the security concerns proved to be an ongoing challenge, yet in the case of the 'invasion', the lack of effective security protocols, and student knowledge of how to subvert the local network restrictions, yielded several pieces of valuable data. A further ongoing challenge posed by the local network restrictions involved the site blocking of school/department-defined objectionable and controversial content. All video game-related media were banned from the school network and student laptops. This was not limited to installations of individual games, or web-based applications like Facebook. The school's filtration was effective in banning ancillary and paratextual content, for example video game reviews, Wikis, and forums. I argue that while the genres may be atypical of a traditional study curriculum, by accessing these paratexts students were engaging in literacy practices (reading, critical analysis, visual and spatial literacy and so on) which the school does position as desirable from a teaching and learning perspective. The school's security settings effectively sought to remove all video game related media from the school, regardless of content, tone, or educational legitimacy. This was problematic for the study, as students were unable to access paratextual resources on their laptops, and needed to use personal devices to access unauthorised learning materials. A further complication arising from these restrictions involved student-distributed workarounds which allowed them to access unauthorised content, such as the TOR browser, a military-designed web browser used to circumvent heavily regulated digital environments, such as those found in China or the Middle East. The use of this kind of software, however, could have

potentially led students to genuinely dangerous online content, such as prohibited drug-related and sexual materials.

A tension existed in site selection for this study between seeking out an ‘ideal’ research location which presented an appropriate, flexible infrastructure that supported technology-based learning, and the often messy and complicated realities of secondary school digital resourcing (Selwyn & Bulfin, 2015; Bulfin, Johnson, Nemorin, & Selwyn, 2016). I consciously avoided dismissing schools that were limited in their technological capacity, as one of my research interests involved developing game-based curriculum that could be possibly replicated across the public-school sector, rather than privileged schools with a specific digital focus. I had considered the challenges inherent in developing a game-based curriculum in low-SES study sites, and the strategy that I selected was to use *Minecraft*, a game which could run on the kind of relatively weak hardware that is commonplace in secondary schools. The question of selecting a video game that could run on a broad variety of machines was, however, only one dimension of the kinds of technical limitations that are possible in a heavily regulated secondary school environment. As discussed in 8.3.1, I did not explore the current affordances and limitations of technology use within the school with IT staff as I assumed that the mandate given to me by Cynthia and the school principal was a sufficient provision regarding my capacity to conduct the study.

Reflecting on this approach, I suggest that a full audit of the school’s technological capacity be performed prior to the commencement of data generation for digital research project such as this. It should not focus solely on system performance, but also on security, connectivity, and software installation. Working more closely with the school’s IT department during study design and calibrating the design in order to work within the affordances of the study site would have reduced the amount of modification to my process during data generation. While I do not believe that this approach would have caused me to select a different video game, it may have caused me to approach the deployment of *Minecraft* in a way that minimised the disruption to the curriculum. This could be achieved by designing the study from inception as being intended for LAN/Wi-Fi play only, and developing data collection tools focusing on local laptops, in co-operation with school IT staff.

8.4.2 Participant selection

I was required to collect consent forms from all study participants, in which the aims of the study were clearly and succinctly presented to parents for review and sign-off. Most students returned these consent forms signed by a parent or guardian, with only two students being denied access to the study curriculum on religious/cultural grounds. These students were offered an alternative, print-based curriculum with which they could engage for the duration of the study curriculum, approved by the school principal. Despite the consent offered by parents, and the authorisation offered by the school's management and administration, the study teacher was not comfortable with ensuring that the game-based curriculum was framed as a regular, compulsory piece of assessed classroom learning. Instead, the study curriculum was presented to students in an 'opt-in' basis, and at any time during the study, they could choose to simply cease participating and move to the print-based alternative curriculum, as per the conditions of ethical approval. This proved to be a challenging approach, as it undermined the legitimacy of the game-based curriculum, and problematised my ability to advocate to unconvinced students regarding the positive learning outcomes. This proved especially difficult with the girls in the class, many of whom already treated this kind of commercial, non-mobile video gaming with a lack of interest, and in cases where they could not immediately or easily master the skills needed to play *Minecraft*, they were able to simply abandon the study curriculum and not participate. Consequently, the dataset does not reflect the learning outcomes which might be achieved by students who are not engaged with digital content, and cannot advocate a position which suggests that students who are disengaged with print and digital pedagogies might benefit from a game-based approach to literacy learning. The data generated by this study were overwhelmingly produced by ten students who were already heavily engaged with digital media and gaming culture (John, Rick, Glen), or who were engaged with other forms of digital culture, but were willing to give a game-based learning program a chance (Chaiya). The overall number of participants can be considered a further research limitation. While I note in 3.7.2 that my selection of this particular classroom was based on availability and access, rather than any specific feature of the class composition, all students

participating in the study did not necessarily produce rich or valuable data, and over half did not participate in the study curriculum once it had commenced.

The study teacher, Cynthia, allowed her classroom to be used as a site of data generation for this study, and was a progressive and adventurous educator who had historically attempted to expand the school's capacity for multimedia-based literacy work. The school's staff were, in many ways, conservative educational voices, and many teachers had been incumbent in their roles since the 1980s and earlier. By contrast, she was a strong advocate for digital literacy practices, and expressed discomfort during interviews when discussing the failure of the Impact Centre (see 5.1.3.1) as the school's major technological project. There was, however, an ongoing tension during data collection regarding our perceptions of the overall project aims, and how they should be achieved. The external pressures being placed on the school (detailed in chapter 5.1) and the subsequent retreat into more conservative and traditional pedagogies were clearly in Cynthia's mind throughout data generation, and she described an awareness during interviews of the potential for this study to contribute to negative perceptions of the school's practices (Beavis & O'Mara, 2016).

While Cynthia was in a leadership role within the school, which empowered her to invite this study into her classroom, enthusiasm for the exploration of game-based curricula was not evenly distributed amongst the school's internal stakeholders. Cynthia proved to be an advocate for this work in terms of assisting the establishing and design of the study curriculum. This was conditional, and she was unable to engage in the change management conversations which are required between teaching and administrative staff. Her solutions to some of the challenges presented by stakeholder management, such as ensuring that the study was non-compulsory and easily abandoned by student participants, were successful in ensuring that data generation continued, but altered the variables of data generation in ways which impacted on the shape of the dataset.

8.5 Final comments

At the time of this study's implementation, *Minecraft* was already beginning to receive attention from teachers and researchers (Newman, 2012; Martin, 2012). The game's reputation

as an innovative software package that had emerged from the community-driven spaces of independent video game development had already been established in both game enthusiast and research communities. The game's status, however, as a cultural phenomenon amongst young people was still in its infancy, and the participants in this study represent pioneers in the game's trajectory as an educational tool. In the intervening years, *Minecraft* has become regarded as a game offering significant educational potential across a range of cross-disciplinary applications in both traditional and game-based curriculum contexts.

The game's possibilities continue to be explored by researchers and classroom teachers who remain engaged in an ongoing conversation regarding best practice for the game's application across a range of disciplines (Dezuanni, O'Mara & Beavis, 2015; Nebel, Schneider, Schledjewski & Rey, 2017). This study represents a contribution to that ongoing research, arguing that while debates regarding the pedagogical value of *Minecraft* and, indeed, commercial video games overall ensue (Willett, 2015), the game's potential continues to reveal itself. The student activities described in this thesis demonstrate a powerful range of potential uses in a classroom context; as a text for rich literacy learning, as a platform for digital collaboration, a toolbox for creative design, and a generator of playful, improvised storytelling.

The primary research question asked by this study questions how secondary school curriculum can use *Minecraft* during class as a generator of rich literacy learning. The study's use of *Minecraft* involved improvisational, highly contextual literacy practices which embraced student-designed learning and teaching, and promoted collaboration and creative thinking. If a curriculum which leverages the power of video games for literacy learning is to be effectively implemented in formal learning spaces, an approach which accommodates the surprising, and often unplanned nature of game-based literacy events is vital. The construction of *Minecraft*-based lessons may need to be reconceptualised by both teachers and researchers in terms of facilitating these less traditionally structured literacy practices. Future studies should explore this from student, teacher and school leadership angles, developing resources which can assist educators to effectively identify and evaluate in-progress literacy events. This will allow teachers to understand the kinds of digital literacies that students demonstrate during play,

ensuring that significant examples of student-authored knowledge and skill development can be recognised.

The 21st century has revealed itself to be a tumultuous and transformative period in the evolution of consumer technology (Selwyn, Nemorin & Johnson, 2017; Henderson & Selwyn, 2015). Contemporary schooling has been significantly transformed through the mass adoption of affordable, internet-enabled devices, with young people often deeply engaged with the rapidly evolving world of technology, online media, and participatory culture. Interactive models of media production and distribution similarly continue to evolve, and the role of content production as an integral part of the experience of engaging with contemporary texts continues to become more significant in the cultural lives of both young people, and their teachers. Education, therefore, has also been profoundly impacted by these significant shifts in the way people consume and create media, and it has become increasingly important for schools to respond quickly and purposefully to these new ways of engaging with texts that the changing media landscape demands. Schooling, however, remains central to the learning lives of young people. The role of the teacher continues to involve the assessment of student needs, the construction of exciting learning opportunities, and the selection of rich, engaging texts which will support students' productive futures. Increasingly, these texts must draw on the cultural literacies of digital media in order to ensure currency and relevance in the lives of students.

This study aimed to respond to these challenges by exploring *Minecraft* as curriculum to generate literacy practices and understandings. As with many research projects, the journey from initial idea to thesis was one fraught with challenges and surprising deviations. Managing school-based perceptions of a game-based approach, challenging security policies, resourcing and infrastructure availability, and the ongoing pressures of ensuring that lessons aligned meaningfully with learning outcomes became significant dimensions of this research. Despite the challenges and tensions regarding video games in secondary schools, the findings suggest that the game-based curriculum described in this thesis is an important and highly relevant approach to the taking up of 'new literacies' (Lankshear & Knobel, 2017; Knobel & Lankshear, 2006). For teachers who pursue a *Minecraft*-based model of curriculum design, a game-based

approach offers significant new strategies for designing digitally literate classroom spaces through by using a popular game. By using a game-based curriculum in a traditional classroom context, the students with whom I worked were able to demonstrate a range of literacy practices and dimensions of digital literacy expertise that were previously unidentified by their teachers. *Minecraft* allowed study participants to access powerful opportunities for demonstrating aptitudes in complex forms of collaborative and creative learning. In the game's blocks, biomes, and systems, these students found a way to re-connect meaningfully with literacy learning, and to view their classroom as a vibrant, engaging resource where they could experiment with language, media, and digital texts. With the classroom constructed as a participatory media space, students were offered a form of learning which aligned with their lived experience of contemporary digital culture. By adopting this approach, the previously disparate student worlds of home and school were more purposefully, and authentically, integrated.

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Appendix A: Chaiya's letter

Minecraft: mode Creative

Creative

By: Chaiya

Giving idea

By: Sumaya and Amanda

In mode creative they have all the equipment in the game for you to make houses, building and the other stuff. I think in this mode are for everyone because it's easy and you can make whatever you want in anytime because they have everything for you not like survival mode example: for survival mode you have to go find a place and foods to live in the world, in the game have three modes: survival, hardcore and creative.

At first I don't really understand the game and I don't know what to do so I not playing the gamen, the one of the teacher come up to me and asks what you think about the and I say I don't like it "it for the boys" the he ask me what do you like to do, so I say "I like drawing. Then he tells that they have mode creative. When he tell me I look at his face, I feel like that he want to me try so I try, it going well, I've been playing it for 2-3 days and I feel like it, it like a game that I like to play on Facebook called City Vill. I been playing this game for 3-4 weeks now, I've made SpongeBob and a castle and waterfall. It took me to make 2-3 for each of them. Sometimes my friends ask me why you playing it? Why you always on minecraft, I say "I don't know it because I like to create thing?" Amanda and sumaya are helping and gave me some idea what should I do and what should I make.

Appendix B: *Invasion* fieldnotes (October 19, 2012)

There were two classes today - two humanities classes, one in the morning and one in the afternoon.

The students are increasingly agitated with legacy schooling, and ask me questions about Minecraft on sight. Most of them don't even know my name - but they *do* know that I represent something alien in a school context, and when they see me, they start firing off questions:

"When are we going to start?"

"What else do you play?"

"What should I do about this game?"

"What will we be able to do in Minecraft?"

Over and over again. But, I don't mind, because I love their obvious enthusiasm.

The morning class kicked off with an almost blanket rejection of Cynthia's legacy curriculum. I read through her handouts - ten or so pages on the history of the sugar industry in Australia called 'The Journey Of The Jelly Bean', produced by CSR. There were worksheets attached, and the intention was to teach students low level economics. I could spot trouble brewing when I entered the room, and I saw fingers gliding on trackpads instead of tapping at keys. They were obviously not writing - and I knew that they were playing games of some kind. However, I didn't suspect that it was Minecraft, until I started listening to their conversations:

"We need seeds."

"Does anyone have torches?"

"I have built a crafting box over there."

They were obviously playing Minecraft, but there was something else rather interesting happening.

They were playing it together via LAN, but it was the 'naughty' boys who were playing it. And, they were doing it quietly. The last time I'd seen them, they were restless, noisy, and disengaged. Here, they were co-operative, collaborating, and deeply engaged in what they were doing.

I talked to Cynthia about it, and she said that she wasn't going to stop them, as it was by and large, too interesting. She suggested that I go and have a chat to them. So, I did.

I asked them what they liked about Minecraft.

"It's fun." said Timothy. "I get to play with friends."

"I get better every day." said Rick.

I asked them whether it was more engaging than work on paper. They said that it was. When I asked why - and here's an interesting thing - Joe, a boy who rarely shows up, who has been placed in programs designed to socialise him and develop his literacy skills, had this to say:

"It's more relaxing."

More relaxing?

Hang on. Aren't we told that the *opposite* is true? Every week, I hear another learned scholar assuring me that rather than being relaxed, kids are *over-stimulated* by computer games, and that they are destroying the ability to concentrate.

Yet here, the boys calmly, confidently worked on their self-created Minecraft projects, occasionally looking up to make a joke, or to talk about what they were doing, or to ask for assistance, and Joe - the most fearsome of all - told me that it was a *relaxing* experience.

I asked them to tell me *how* they go about working on a project - what are the steps?

"I just started doing it." said Joe, "I work for supplies, Timothy mines and collects resources, and Rick designs the buildings, and we go from there."

I asked them who taught them to do that.

"Nobody."

Cynthia was *extremely* interested in this, and her attention was drawn rather specifically to Joe. She really emphasized the fact that Joe is a student with *significant* learning difficulties, and significant behavioural problems in class - and she was stunned at the way he had behaved, sitting quietly and working for 70 minutes without a break. And, on top of that, with two other boys who normally get up to mischief with him.

And, again, at the end of the class, they didn't pack up - they stayed, working, until they were forced to leave.

The afternoon's class, however, was an extremely significant one. I couldn't have predicted what was to happen.

2pm on a Friday is hardly known as the most stable and scholarly of times - but, the class entered the room, and were instructed to continue with the sugar industry work. They asked if they could play Minecraft if they finished, and Cynthia said that they could. But, only if they finished their work.

Of course, they immediately started playing Minecraft. I think Cynthia realised that - but, she wanted to see what would happen.

That morning, I'd asked if I could come into their servers and see what they were doing. They said that was okay. So, I fired up the Netbook and did a scan of the LAN network.

Three servers appeared. The boys were running three separate Minecraft worlds.

I looked up, and all of the boys in the class - and there were 15 or so - were sitting in a long row, and were working on various projects inside the three servers. It was absolutely fascinating to see - all of the cliques and groups had disintegrated, and they were asking each other questions, looking for advice, requesting resources, collaborating on design, and acting as knowledge producers in terms of *Minecraft's* mechanics.

I asked Cynthia if I could go over and work more closely with them. She said that it was fine.

So, I asked them which server they were on - and Rick told me the name. I joined and went inside.

I teleported to Rick, and watched, as the boys continued preliminary work on a structure. Timothy was creating the windows, while Gabriel and Joe laid down the foundations and floorboards, and Rick began constructing the walls.

I watched as they worked together, devising solutions to design problems: "Where do we put the stairs? How should they go?"

They

"Can you guys meet me at the top?"

And, they did. The three who were working on that particular structure climbed to the top and stood with me, so that I could take a picture of them. They were so engaged, and kept asking me questions - and wanting to talk to me about the design decisions they had made. There was such *pride* in their voices. I asked Rick to take me on a tour.

He took me downstairs to show me his bar. I asked him what the ceiling was made from.

"Spiderwebs." he said.

"That was my idea." said Joe, "I came up with that. Doesn't it look awesome?"

And, it did. And the bar looked like, well, a bar. He'd built a miniature bar in a massive treehouse, with a glass bridge separating two separate buildings.

I asked them how long it had taken them to do it and they said 'a couple of days'.

Rick led me through the rest of their *Minecraft* world:

He showed me his bedroom, and seemed proud of the design. He was responsible for the construction of beds for everyone, and had spent quite a bit of time working on how the rooms could be accessed by the rest of the building.

The bridge linked two separate parts of the outpost. Build out of glass by Rick and Joe, it stretches across a chasm which leads to the ocean.

Rick led me through Timothy's bedroom.

"Who created the pictures?" I asked.

"I did." Timothy said, "My stepfather taught me how."

"Really?"

"Mmm-hmm."

All the while, I listened - they were negotiating the rules of the server, negotiating the rules of play, establishing territory, establishing ownership, devising and delegating roles, collaborating on the development of design, negotiating function and form, and working on the mechanics of *Minecraft*, the server software, and the client software. This was no 'play' – but highly evolved and complex set of self-directed cognitive sequences, which they executed in a negotiated, collaborative space. The aimlessness of conservative imaginings of 'play' was nowhere to be seen, and I really did marvel at their ability to work together and co-ordinate such a sophisticated set of self-generated activities.

But, trouble was brewing.

Three clients joined the server. They were not from inside the classroom.

"Someone's in here." Joe said loudly, leaning forward. "Which of you is it?"

There was a sudden flurry of activity, as they tried to identify who was running the rogue clients.

"Josh, is it you?" Timothy snarled.

"No."

"Gabriel?"

"No, it's not - it's coming from outside. Who *is* it?"

They looked at me.

"Is it you?" Joe exclaimed.

I told him that it wasn't - I only had the one client running, and he'd already seen it.

Out of five sets of speakers, I heard an explosion and watched the screen shake.

"They're destroying the buildings!" Rick yelled, "Where are they?"

They weren't in the room. They were somewhere, out in the school grounds. I was absolutely riveted by what was unfolding.

By this point, Cynthia and an integration aid were standing back, watching. They were transfixed by what was unfolding.

"Disconnect everything." said Joe, "We need to lock it down *now*."

My Minecraft client was severed from the LAN, and the boys crowded around Rick's netbook.

"Let's fill the server slots with people so that they can't come in." said Gabriel, "We need to all join at once."

I rejoined, and the rest of the server was immediately filled by students.

"Everything's on fire." Joe said, "We need water right now. Can someone build? We need to get the water out of the lake and up onto the building."

"I'll do it." said Gabriel.

"Come with me, Rick - let's check out what they destroyed..."

This was *fascinating*. I walked over to Cynthia, who shook her head, scarcely believing it.

Sue, the aid, said: "I always thought they were just playing around. I had no idea what they were doing. *Look at them.*"

"I know." Cynthia whispered, "I know!"

Because, there they were - no longer a fragmented group of disengaged, disinterested students, slogging their way through ancient photocopies for no observable purpose. They had coalesced into an organized, reactive, collaborative team - who were setting, completing, and delegating tasks with zeal.

Afterwards, Cynthia pointed out something quite fascinating to me.

The class, typically, is fragmented, and there are distinct social groups - nerdy boys, naughty boys, girly girls, non-girly girls, and so on. Here, *Minecraft* had dissolved those categories - there was some kind of cohesion, as Joe, typically 'naughty', gave direction to Gabriel, who needed help from Timothy, who was asking questions of Josh... seeing them united in this kind of thinking shocked Cynthia a bit.

Cynthia ducked out of the room for a few minutes, before coming back. She'd been a few doors down to see who was invading the server - a group of boys in another class were the culprits. She found this incredibly amusing.

So, I sat down with the boys, and asked them if that was normal.

"Yep." said Joe, "They come in and wreck stuff."

"Always?"

"No, not always." he said, "Sometimes they come in, and we work together. Today, they wanted to blow shit up."

It's like there's some counter-narrative running in parallel with the typical classroom narrative, and it was exhilarating to see it brought out into the light. No *wonder* traditional curriculum seems to fail - the classroom narrative, the one that we assume is the dominant, simply *isn't*. Here, in this cramped, stuffy, claustrophobic classroom, these boys had allowed me into private, subterranean world of dislocated, student-led learning experiences. I thought back to the morning's session - the sugar assignment - and I wonder if it isn't outrageous to claim that in many ways, they had (unconsciously) re-created the conservative, legacy-based curriculum inside this clandestine, subterranean classroom. If the sugar assignment was designed to teach them about resource management, production, economics, transport and logistics, project management and role delegation in the supply chain - then surely, these were

all things they were informally teaching themselves about during their playing of *Minecraft*. And, the idea that their hidden classroom doesn't recognize the physical boundaries of the classroom space - batches of students sorted by age, contained inside rooms which are contained inside buildings - suggests even deeper complexities that I'm very eager to explore.

I like that idea. A *subterranean classroom*. A distinctly narrativised, digital classroom that runs concurrently beneath authorized classes. What a concept. I wonder if this notion of an illicit classroom environment is appealing to a student like Joe, who has utterly rejected legacy curriculum - and I wonder what we're going to be able to do with it.

At the end of the class, I found myself suddenly under attack by a *torrent* of students from the other classroom. They demanded to know who I was, what I was doing, whether they could be involved in the study, how did I know what *Minecraft* was - they seemed shocked and elated that an adult had even the *slightest* knowledge of *their culture*, let alone an ability to actively engage with it. As I said to Cynthia, though - I read it as a reaction to the *promise of technology*. Although, obviously, I'd rather believe that they simply saw me as an extremely cool guy - the truth is that they are starved for recognition, and seem fatigued by the constant, relentless othering of the things that they care about. In the school, games and gaming are dangerous and illicit enemies of learning - but to these boys, so united in their love of the game, and so willing to coalesce into a single, functioning unit in defense of their owned, alternative learning environment, they were nothing of the sort.

I think Cynthia was sort of stunned. She is not a woman who is prone to blasts of emotion - she keeps her cards close to her chest. But even she couldn't fail to be energized by everything that we had learned, and the events that had transpired. Particularly in terms of Joe - she told me that she'd simply never seen him behave like that, and she had no idea that all of this activity was occurring. More importantly, she had no idea that all of these valuable and powerful learning experiences were being conducted, by the students, right under their noses.

Cynthia is extremely energized by all of this - and really, who can blame her?

Her primary concern, and mine, is working out exactly how we take all of this and fashion it into something academically valuable, without slaughtering the golden goose. I think this is where the non-chronological, matrix based curriculum is going to be so important - we could have predicted *none* of this, but if I went through the activity matrix, I'm sure I could have pulled out a whole *range* of assessments and shaping strategies.

Appendix C: Interview with John (November 23, 2012)

DE: Tell me a little bit about yourself?

John: I'm 14 years old, like to play games like TF2 it's a really funny game.

DE: Yeah? What do you like about TF2?

John: Umm, it's like, how it works and stuff like that. I haven't really got into it though like it wanted me to play it, like how to, like, I want to have a shot and chat to other players about what they're doing and stuff like that on Steam and get my friends though to help me out.

DE: So, to learn how to build stuff?

John: Yeah.

DE: For Team Fortress?

John: Yeah.

DE: Have you built anything yet?

John: Not yet, I'm still getting to the stuff.

DE: Sure, sure.

John: Yeah, 'cos, I just started yesterday.

DE: Right, ok.

John: So I'm just getting my friends to help me along the way and stuff like that.

DE: Have you done any programming before? Is this your time doing this stuff?

John: No. first time.

DE: What made you want to do it?

John: Umm, because I played the Minecraft version of TF2 then it made me want to play the real version of TF2.

DE: Yep.

John: That's how it got it got me into it.

DE: Yep, TF2's fun. Would you play in a group or would you play on your own in TF2

John: I play on my own, I play in a group and stuff like that.

DE: Do you play with the other guys?

John: No.

DE: They don't play TF2?

John: No. Apart from 'Gabriel'.

DE: He plays it?

John: Yep.

DE: He plays on the PC?

John: Yep.

DE: Oh, he does?

John: Yeah, on the PC on Steam

DE: So, what else are you playing, what else do you like to play?

John: Ummm, Minecraft, Counter Strike and stuff like that.

DE: Counter Strike? So, pro level games?

John: (laughs) yep.

DE: Are you good at Counter Strike?

John: Getting there, just getting there.

DE: It's a hard game, does it bother you that it's hard?

John: Nah, I like a challenge.

DE: So you're playing, you wouldn't be playing the bots, you'd be playing Counter Strike for real with real players?

John: Yeah

DE: How long does it take you to get good? I mean, how long have you played it?

John: I watched tutorials on YouTube about how to get better and better. Uhh, and I'll show you to look up blogs and stuff like that. What you need to get to know the first time you play.

DE: When you are looking up stuff about how to play Counter Strike and how to become good at it are you talking about strategies or ...

John: Yep.

DE: You're looking up strategy guides? About how you move around the game world?

John: Yeah, yeah.

DE: Do you look up stuff about all the numbers on the guns and stuff as well, like damage?

John: Yep. Yeah.

DE: How do you choose which weapons to use?

John: If its long range I use a sniper. If is just short distance, I use a pistol or like a rapid fire gun will get me there.

DE: Sure, Sure. There's a lot of counting in Counter Strike, isn't there? I mean, you have to do, does that bother you?

John: Nah.

DE: How's Maths in school?

John: Pretty boring.

DE: But you have to do arithmetic in Counter Strike, don't you?

John: Yep.

DE: Because you have to buy things, you have to manage the money, you have to do a lot of that kind of stuff. Is it different?

John: Yeah.

DE: Why is it different?

John: Because maths in reality is boring but with games it's not boring, it's funner (sic).

DE: Why is it fun?

John: Cos you don't have to learn like in class. You can learn by yourself in the game.

DE: Yeah.

John: Just makes it way more funner.

DE: What's wrong with learning in a class? Why don't you like learning, is it boring? Why is it boring?

John: Yeah, because they keep on going on and on and on.

DE: You mean talking to you?

John: Yeah, too long, just wanna get out of there.

DE: What's an interesting class?

John: Ummm, mostly PE

DE: PE? That's your favourite class? Why PE?

John: Because its way more fun, you can run around and stuff like that,

DE: What's not fun? What's the worst?

John: I'd say science.

DE: Science? Why science?

John: Just I've barely learnt any stuff since last year. He just keeps repeating the same thing. That's what I don't like about it.

DE: It keeps repeating itself?

John: Yeah.

DE: What are the teachers like?

John: They're good in a way.

DE: In what way?

John: Sometimes they're good when they're happy when you do your work but sometimes they're not and they take away your netbook when you're playing games.

DE: Is the netbook important to you?

John: Sometimes. When we don't want to listen to the Mr or Mrs all the time.

DE: Do you prefer school with the computer?

John: Yep.

DE: If you could go through school without the computer would you like that?

John: I would not like that.

DE: Why not?

John: Because it's just boring.

DE: What does the Netbook do for you? So you use it for gaming?

John: Gaming, minecraft, to do a little bit of learning. Like using 'Jack Plus'

DE: What?

John: Jack Plus it's another thing we use to get onto the books like that what we have.

DE: Yeah, ok.

DE: Do they give you educational games?

John: Yeah.

DE: What are they like?

John: (whispers) I don't like them.

DE: That's ok. What's wrong with them?

John: What they have, we have at home. So, we don't have to use them because we already have them at home.

DE: Which ones were good?

John: Ummm, none of them.

DE: How come?

John: I don't know they just don't work for me.

Appendix D: Data Overview

Data type	Volume
One on one interviews	15 hour-long interviews throughout the study with students and school staff.
Classroom audio	Three hours of audio recordings of classroom activities.
Screenshots	Screenshots of student <i>Minecraft</i> play taken by the student researcher, or offered by students as evidence of meaningful activities.
<i>Minecraft</i> map data	<i>Minecraft</i> .JAR files retrieved from the school server by the student researcher and I.T support.
Fieldnotes	10 1-2000 word pieces of reflective fieldnotes recorded by the student researcher during significant events in the study.
Student reflections	Student paratexts requested by the study teacher reflecting on the game-based curriculum.