Digital games: motivation, engagement and informal learning

Thesis

Digital Games:

Motivation, Engagement and Informal Learning

Ioanna Iacovides

BSc (Hons) Psychology
MSc Human Communication and Computing
MRes Educational Technology

Thesis presented for the degree of Doctorate in Philosophy

Institute of Educational Technology
The Open University

April 2012

Abstract

This thesis investigates the relationships between motivation, engagement and informal learning, with respect to digital games and adult players. Following the reconceptualisation of motivation and engagement (as forms of micro and macro level involvement respectively) three linked studies were conducted.

In the first study, 30 players were interviewed via email about their gaming experiences. The resulting set of learning categories and themes drew attention to learning on a game, skill and personal level, which arose from micro-level gameplay and macro-level interaction with wider communities and resources. The second investigation consisted of eight case studies that examined how involvement and learning come together in practice. Participants were observed in the lab during two gameplay sessions and kept gaming diaries over a three week period. A method for categorising game-play breakdowns and breakthroughs (relating to action, understanding and involvement) was developed in order to analyse several hours of gameplay footage. The previous categories and themes were also applied to the data. The findings suggested a relationship between macro-involvement and player identity, which was further investigated by a third survey study (with 232 respondents). The survey helped to establish a link between identity, involvement, and learning; the more strongly someone identifies as a gamer, the more likely they are to learn from their involvement in gaming practice.

Four main contributions are presented: (1) an empirical account of how informal learning occurs as a result of micro and macro-involvement within a gaming context, (2) an in-depth understanding of how breakdowns and breakthroughs relate to each other during play, (3) a set of categories that represent the range of learning experienced by players, and (4) a consideration of the role player identity serves with respect to learning and involvement.

Acknowledgements

First and foremost, I offer my deepest gratitude to my supervisory team: James Aczel, Eileen Scanlon and Will Woods. Their encouragement and critical contribution has made pursuing a PhD a hugely valuable and rewarding experience. Special thanks to Josie Taylor for getting me started and to Patrick McAndrew for helping me to finish.

I am also grateful to the Institute of Educational Technology for supplying me with the resources that I required. In particular, I would like to thank Dave Perry, Paul Harris, Phil Downs and Kevin Mcleod for helping me set up and run my observation studies. Further, I am indebted to John Richardson and Alan Woodley for the feedback they provided on survey design. I have benefited considerably from the academic support provided by CREET and from being able to participate in a number of seminars and conferences. I'd like to acknowledge the ESRC for funding my research and Mangold International for the software INTERACT™. This thesis would not have been possible without the participants who took part and I extremely grateful for the time and energy they contributed.

In addition, I am thankful to all those who provided a sounding board to my research. I'd especially like to thank my peers, Pauline and Eunice, for their moral support and Paul, Stefan and Rob for the enthusiastic discussions about gaming. I have been fortunate enough to forge many friendships through the postgraduate community at the OU and would like to thank all my friends for providing me with much needed encouragement (and the occasional distraction!). I am particularly grateful to Bethany, Stefan, Marc, Ben, Jen, Davey, Ulises and Minh, for proofreading the final version of this thesis.

I would also like to thank my family: my Dad and his wife Maria, my brother Christos and sister Katerina, my aunts Geraldine and Katrina, my uncle Hector and everyone else who provided their love and support. Finally, I would like to dedicate this thesis to my mum – she should be here to share in this achievement. I have reached this point because she taught me to believe in myself (and because she said yes to that Game Boy all those years ago!).

Table of Contents

List of Tables

List of Figures

1. Introduction

Digital games have come a long way since the early 1960s when *Spacewar!* was developed by a group of students at the Massachusetts Institute of Technology. Originally intended to demonstrate the power of computer technology it was not long before people saw the commercial value of producing games for entertainment, whether in the form of arcade machines or home consoles such as the Magnavox Odyssey (Chatfield, 2010). While male teenagers may have been the initial audience, digital games have now reached the mainstream. Poole (2004) for instance, describes games as "just part of the cultural furniture" (p. 2) while Crawford (2012) argues they are an increasingly common part of our everyday lives. The gaming industry continues to expand, with different types of games appealing to wider audiences than ever before. For example, when *Call of Duty: Modern Warfare 3* was released in November 2011, it broke previous sales records by making $400 million in the US and the UK within 24 hours – in contrast, the film *Harry Potter and the Deathly Hallows: Part 2*, broke global box office records in the same year by making $80m in one day (Stuart, 2011). Meanwhile, recent developments such as social network games (e.g. *Farmville*) and the use of motion control devices (e.g. Nintendo's Wiimote, Microsoft's Kinect) have helped open up games to new audiences. Many of these games are easy to access on PCs and mobile devices such as phones and tablets (e.g. downloadable games such as *Angry Birds*) and others use mimetic interfaces (e.g. the guitar shaped controllers for *Guitar Hero* games) which are easier to learn how to use since players are already familiar with the movements required. More people are playing games than ever before, due at least in part to the rise of these sorts of casual games which require less of a time and energy commitment from players (Juul, 2010).

1.1 Background and research aim

Throughout this period there have been investigations into what motivates people to play games and what makes games so engaging (e.g. Malone, 1981; Yee, 2007). In addition, claims have been made about the potential of using games for education (e.g. Gee, 2004;

Gibson et al., 2010) where there is an interest in trying to “harness the motivational power of games” to make learning more fun (Kirriemuir and McFarlane, 2004; p.2). However, it is not always clear how effectively games used within educational contexts are able to achieve specific learning outcomes. For instance, O’Neil, Wainess & Baker (2005) found little evidence concerning the effectiveness of games in a review of the literature. It has been argued that this lack of evidence “may indicate that learning through immersive worlds involves a more complex understanding of learning, one that is not so easy to tie to specified learning outcomes” (de Freitas, 2006, p. 18). In addition, researchers such as Squire (2008) highlight the need for a more rigorous examination of how players interact with games and the sorts of thinking they engage in during play as it is still not clear how and what people learn through games.

A range of studies have been carried out which do examine game based learning within the context of formal education. For instance, Joiner and colleagues (2007; 2011) investigated the use of a racing car simulation game called Racing Academy that was being used to support Mechanical Engineering students learning at University. This involved pre and post-play assessment of motivation and learning to examine motivational aspects and pre and post-test to establish whether learning had occurred. The evaluation revealed significant learning gains and that the students did find Racing Academy enjoyable. However students were highly motivated towards their subject matter to begin with (as indicated by pre-test scores). Though Joiner et al. (2007; 2011) do not address this issue within their research; perhaps part of the reason students enjoyed the game and were able to learn from it was because they liked tinkering with the mechanical properties of cars in the first place? There is still much to be understood about why people play the games they do, what sustains their involvement and what they gain as a result of their experiences.

Building upon previous work that examined player involvement and learning within episodes of gameplay (Iacovides, 2009) this thesis investigates the relationships between motivation, engagement and informal learning with respect to digital games. The research

draws upon a number of fields including Psychology, Education and Human Computer Interaction (HCI) but also contributes to the emerging interdisciplinary area of Games Studies. Much of the work in this area has focused on children, however player demographics have been changing (e.g. the average age of a UK games player is 28 years old; Pratchett, 2005; and 37 years old in the USA; Entertainment Software Agency, 2011). Thus, this work focuses on adult players. By exploring how and what players learn from their involvement with digital games, this thesis contributes to a theoretical and empirical understanding of how motivation, engagement and learning come together within this context.

1.2 Key terms

Before going on to provide an overview of this research, it is important to clarify some of the key terms used within the thesis. The first of these is "digital game". Several attempts have been made across disciplines to try and define what games are. Roger Caillois (1961) for instance, considers games from a sociological perspective, describing playing them as an activity "which is essentially: free (voluntary), separate, uncertain, unproductive, governed by rules, make-believe" (pp. 10-11), while philosopher Bernard Suits (2005) argues that playing a game "is the voluntary attempt to overcome unnecessary obstacles" (pp. 54-55). Digital game designers such as Jess Schell (2008) have suggested that "a game is a problem-solving activity, approached with a playful attitude" (p. 26) while Sid Meier once stated that "a game is a series of interesting choices" (cited in Rollings & Morris, 2000, p. 38). In a comprehensive review of the definitions of games, Juul (2005) presents the *classic game model*, in an attempt to provide a definition of games which includes digital games. He suggests:

> *A game is a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels emotionally*

attached to the outcome, and the consequences of the activity are optional and negotiable.

(Juul, 2005, p. 36)

As Calleja (2007a) argues, Juul helps to provide a formal definition for what a game is, allowing for a discussion of how digital games may differ, e.g. in terms of how "they tend to enable a wider potential for action and expression than is possible in more traditional games which provide the basis for the classical game model." (p. 24).

However, the purpose of this thesis is not to present a formal definition of either digital games or traditional games, nor is it to compare the two. The focus is on players, and how their interactions with digital games relate to motivation, engagement and learning. Therefore, Habgood's (2007) working definition was adopted where a digital game is viewed as "an interactive challenge on a digital platform, which is undertaken for entertainment" (p. 18). Similarly, the term "digital game" is used, as opposed to "video game" or "computer game", in order to encompass all forms of digital game regardless of platform (i.e. whether they are played on home computers, game consoles, handheld devices, mobile phones etc.). The word "game" will also be used as shorthand for "digital game". In occasions where traditional games such as card or board games are referred to, their non-digital status will be made explicit.

Within the thesis, references will also be made to "gameplay" and the practice of "gaming", where gaming includes play as a practice but also relates to wider activities such as reading reviews or discussing games with others. This focus takes into account the social side of gaming, not just in terms of playing with others but also with respect to what Egenfeldt-Nielsen, Smith and Tosca (2008) call the "metaculture" which exists around and beyond the game. In order to consider informal learning in this context, it is important to examine episodes of play but also to look beyond these by addressing aspects of player culture. For the purposes of this research, the term "informal learning" refers to the learning that results from player involvement with leisure time gaming.

Though the next chapter will introduce the concept of informal learning in more detail, the process and outcomes of learning will be further addressed in Chapter 5. In addition, the term “engagement” is used to refer to the experience of being involved in gameplay while “motivation” is used to refer to the reasons why players choose to engage in different games in the first place. It can be argued that the two concepts are connected, since some sort of motivation is necessary in order for the player to pick up a game in the first place (before any engagement is experienced) although subsequent experiences of engagement may motivate a player to keep playing, or even to quit. The next chapter will provide an overview of the relevant literature in the area, but these concepts will be further explored in Chapter 4 where motivation and engagement are reconceptualised as forms of macro and micro-involvement respectively. The following section provides an overview of the research and outlines the structure of the thesis.

1.3 Thesis structure

This initial chapter introduces the thesis through providing some background and rationale, key definitions and an overview of the structure.

Chapter 2 provides a review of the relevant research in the area focusing on theories of learning and how they relate to games, models for discussing engagement and motivation, and on the studies that have investigated gameplay and wider gaming experiences. The chapter also delineates some of the gaps in the literature and concludes with a rationale for the main research aim: to investigate the relationships between motivation, engagement and informal learning within the context of digital games.

Chapter 3 introduces the methodology adopted and outlines the phases of the research conducted, where each phase builds upon the previous one. The overarching aim is decomposed into a number of research questions which are subsequently addressed through a conceptual analysis of engagement and motivation frameworks, a series of email interviews, a set of case studies, and a survey. Each of these is explained in more

detail, while the chapter also includes a consideration of alternative methods and relevant ethical issues.

In Chapter 4, the following research questions are addressed:

1. *What motivates people to play games?*
    a. *What factors affect this motivation?*
2. *What factors affect engagement during play?*

Within the chapter, a conceptual analysis is described where engagement and motivation are reconceptualised as forms of micro and macro-involvement respectively. Following Calleja (2007, 2011), the term micro-involvement is used refer to instances of gameplay, while macro-involvement is used to discuss players' general motivations and any gaming-related activity that occurred outside of play. This allowed a more dynamic understanding of how learning and involvement influence each other on different levels. The results of the first study, where 30 players were interviewed via email about their gaming activities, are also presented with respect to answering questions 1 and 2.

Chapter 5 considers learning in relation to the following research questions:

3. *How do players describe learning within the context of gaming?*
4. *What links can be identified between motivation, engagement and learning from player accounts of their gameplay experiences?*

The analysis of study is presented in terms a set of informal learning categories and a number of themes developed on the basis of the interview data. The categories begin to establish both how and what players learn through their involvement with gaming, while the themes highlight the importance of influences such as community and identity. These categories and themes serve as a starting point for considering how learning and involvement relate to each other.

In Chapter 6, the research relates to an exploration of how learning and involvement come together in practice through investigating:

5. *How can we identify breakdowns that occur during play?*
    a. *How do players attempt to resolve these breakdowns?*
    b. *What role do breakthroughs play in this process?*
6. *What does examining breakdowns and breakthroughs tell us about how involvement and learning come together in practice?*
7. *What evidence is there that players are learning in addition to learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

The results of a second study are reported based on the analysis of observation, interview and diary data collected as part of eight case studies (involving seven individual players and one pair). This multiple case study approach enabled a clearer understanding of how learning and involvement relate to each other during play through an examination of important breakdowns and breakthroughs. The analysis included testing a set of conjectures (based on the literature and the previous interview study) that related to possible relationships between learning and micro-level involvement. The link between micro and macro-involvement was also considered. The previous categories and themes were applied to consider how players learn through play and their macro-level involvement with games and different resources.

In Chapter 7, an additional research question was explored to further investigate the issue of player identity in relation to community involvement:

9. *Does player engagement with these communities and resources relate to how they identify themselves as gamers? If so, how?*

The chapter presents the findings of a questionnaire study (involving 232 respondents) which investigated how players learn from their involvement with games and gaming related resources on a larger scale. The questionnaire analysis provides a consideration of player identity and its relationship to involvement and learning.

The thesis concludes with Chapter 8 where the research findings are brought together to consider the contributions made and situate them within a wider research context. The limitations of the work are also reflected upon and suggestions are made concerning directions for future research.

2. Literature review

This chapter reviews research on motivation, engagement and learning in relation to digital games in order to locate the research described in this thesis and to identify gaps within the literature. Section 2.1 considers learning theories and models that have been used to describe learning through gameplay while Section 2.2 looks at motivation and engagement. Section 2.3 introduces a range of studies that have examined gameplay and the wider gaming experience to illustrate the research in the area and the variety of methods used. The chapter then concludes with the overarching research aim of the thesis in Section 2.4.

2.1 Game-based learning

This section looks at the different types of learning theories that have been applied to games (Section 2.1.1) and considers game-based learning in relation to informal and formal contexts (Section 2.1.2).

2.1.1 Learning theories

Several learning theories have been used to describe how learning occurs through gameplay and as a basis for supporting the design of educational games. A behaviourist approach can be used to focus attention on how drill and practice during gameplay serve to reinforce desired real-world behaviours (Bogost, 2007). While many games will require repetitive actions and increasing motor skill, educational games designed with primarily behaviourist principles in mind have been heavily criticised. For instance, Egenfeldt-Nielsen, Smith and Tosca (2008) point out that edutainment ("any electronic games that use entertainment in the service of education", p. 211) relied heavily on behaviourist learning principles leading to games that exhibit a separation between playing the game and learning from it. Egenfeldt-Nielsen (2006) describes an example of this in the form of a game called *Maths Missions Grades 3-5: The Amazing Arcade Adventure*, where the player has to answer mathematical problems correctly in order to receive an amount of

money they can then use to play an arcade game (within the Maths game itself). He criticises this approach for the lack of a connection between what is being taught and the arcade game which results in an experience that "is no different from a mother promising her noisy child an ice cream if he will be quiet and do his homework" (Egenfeldt-Nielsen, 2006, p. 191). Further, the lack of integration also means that gameplay is actually interrupted by the learning content.

Constructivist approaches have also been applied to discuss how learning occurs during gameplay. Simply put, this view perceives learning as a process whereby knowledge is actively constructed through interacting with the world and building upon previous knowledge, something which games frequently require players to do (Rieber, Luke & Smith, 1998). Gee (2004) points out that well designed games increase the rewards for new skills learned and push players "to operate within, but at the outer edge of, his or her resources, so that at those points things are felt as challenging but not 'undoable'" (p. 71). In this way players are continuously learning, practicing and mastering skills, and adapting their knowledge to deal with the challenges presented to them. The focus from this perspective is on how the player explores the game world and constructs "knowledge in a meaningful and personal way" (Egenfeldt-Nielsen et al., 2008, p. 215). Bogost (2007) uses *SimCity* as an example of a game that can be used to exemplify constructivist learning principles. Through constructing and managing their own cities, players are able to reflect on the design of systems, thus helping to "cultivate higher-order thinking skills" (p. 240). When blended with Vygotsky's ideas on social learning, constructivism can also take into account the social aspects learning within this context. For example, Nardi, Ly and Harris (2007) were interested in examining the zone of proximal development in relation to conversations between more and less experienced *World of Warcraft* players.

A variant of the constructivist approach, labelled constructionist (e.g. Kafai, 2006), involves encouraging students to make their own games (Kafai et al., 1998; Rieber, Luke, & Smith, 1998; Habgood, Ainsworth & Bedford; 2005a). This work seems inspired by

Papert's work with LOGO (Papert, 1980) where "the active approach to knowledge and the use of external artefacts facilitating the learning experience is essential" (Egenfeldt-Nielsen, 2006, p. 197). For example, Kafai et al. (1998) carried out two studies; the first examined students designing their own games to teach fractions to younger children, while the second involved trainee teachers carrying out the same task. The findings indicated this was no easy task for those taking part and emphasised the need for conceptual design tools to aid the participants to more effectively integrate content within the game. However, the designs produced became noticeably more sophisticated over time, while the studies indicated how teachers and students can benefit from each other's perspectives in relation to producing mathematical games. Further, Kafai (2006) argues that this approach helps students develop technological fluency in terms of how they use certain tools and in terms of how those tool encourage new ways of thinking. With the development of software tools such as *GameMaker* (which make game design more accessible) and the inclusion of tools for users to generate their own content within games like *Little Big Planet* and its sequel (where players can design and share levels), the potential is growing for players to be producers rather than just consumers.

More recent literature has also considered the wider context within which gameplay occurs and how this relates to learning. For instance, Gee (2004) points out how games encourage learning when he discusses player participation in 'semiotic domains' and 'affinity groups'. He argues that 'critical learning' occurs when people learn to play new video games since they are learning a new 'literacy'. This literacy includes multi-modal texts and graphical representations. Through gaming, players learn to participate in 'semiotic domains' made of words, pictures, and/or anything that is used to communicate different types of meaning. These domains are associated with specific 'affinity groups' of players whose knowledge, skills, tools and resources contribute to form complex systems of distributed parts. These can be seen to make up a community of practice where players can gain resources from fellow members to help them to solve problems within, and sometimes outside of, the specific domain. Gee sees this activity as evidence of 'critical

learning' which occurs when a player thinks about the domain at a meta-level and can come up with novel yet recognisable meanings. Players will eventually come to think about and critique games as systems within genres, rather than as simply games that they play. Egenfeldt-Nielsen et al. (2008) describe Gee's approach as a socio-cultural since digital games are viewed as "tools for constructing viable learning experiences" that "mediate discussion, reflection and analysis" (p. 216). The authors point out that this perspective is particularly useful for understanding the activity that occurs within and around games that have strong social networks. A socio-cultural approach is particularly apt for examining participation in Massively Multiplayer Online Games (MMOGs), such as *World of Warcraft (WoW). WoW* is a fantasy role-playing game, where players can explore a vast virtual world, join guilds of other players (communities established as part of the game) and engage in quests to achieve rewards and power-ups (artefacts that will make their characters stronger, e.g. magical swords).

Some of the discussions about gameplay in the literature that adopt a more socio-cultural approach do refer specifically to the notion of communities of practice (Lave & Wenger, 1991; Wenger, 1998). In this theory, "the primary focus is on learning as social participation" and participation refers to "a more encompassing process of being active participants in the *practices* of social communities and constructing *identities* in relation to these communities" (Wenger, 1998, p.4). For instance, Shaffer (2006) discusses how "epistemic frames" can be used to situate players within and help them develop professional practice. For example, in the *Pandora Project*, players engage in the practice of professional mediators in the context of xenotransplantation (when organs are transplanted from one species to another). Epistemic frames are "ways of knowing, of deciding what is worth knowing and of adding to the collective body of knowledge and understanding of a community of practice" (Shaffer, 2006, p. 223). Shaffer argues that epistemic games give students the opportunity to participate and learn within authentic simulations of real world practice. Squire and colleagues (Squire, 2008) adopted a slightly different approach through implementing an afterschool program. Children, from lower

socio-economic backgrounds with little technological background, were initiated into a gaming community of practice (in this case, into the practice of becoming a good *Civilization III* player). Expert players acted as mentors and by the end of the program students had developed knowledge of gaming strategies, geography, history, and game design. This knowledge resulted not just from playing the game, but because of how the game had motivated them to find out more about different areas through consulting external resources such as library books.

Gee (2004) echoes these ideas about learning when he points out that his perspective fits in well with Lave's view that "learning is a change not just in practice, but in *identity*" (p. 190). He goes on to discuss the learning that occurs from the adoption and experimentation of different identities, as well as from being able to reflect upon the relationship between old and new identities. These identities compose a tripartite that consists of the player's real world identity (the player himself), their adopted virtual identity (the character they create and play) and a projective identity (which concerns the aspirations the player has for their character and entails the fact that this character is their own creation). The projective identity essentially stresses the interface and interactions between the real world person and virtual character. While Gee argues that all deep learning is tied in with the notion of identity, critical learning will only occur when the player is willing to see him or herself as someone who can learn, use and value the new semiotic domain. This will only happen in the space where the learner is able to "transcend the limitations both of the virtual identity and the learner's own real world identity" (p. 66), which is what the projective identity allows the player to do. Gee uses an example of how this works in relation to his Elf avatar 'Bead Bead' in *Arcanum* (a fantasy role-playing game). In this case, 'Gee' refers to his real world identity, 'Bead Bead' to his virtual identity, while 'Gee *as* Bead Bead' refers to his projective identity. It is within this latter identity that Gee recognises his emotional connection to his creation (a mixture of pride both "in and with himself") since it allows him to be both "active" and "reflexive" (p. 58) resulting in a more powerful learning experience. It is worth pointing out however that Gee

is talking about identity in terms of players reflecting on their in-game avatars, rather than in terms of how players identify as members of different communities or groups. The latter is something that the research reported in the thesis will consider further in relation to learning.

2.1.2 Formal and informal learning

In terms of the research on games and learning it is useful to make a distinction between formal and informal learning. The distinction is often used to reflect the context in which the learning takes place as opposed to whether the game being used has been explicitly designed for educational purposes. For instance, a commercially available game being used within a classroom environment would still be considered an example of formal learning. There have been several attempts to classify informal learning (e.g. Livingston, 2001; Sefton-Green, 2003) but Vavoula and colleagues (2005) presents a typology which focuses on defining formal and informal learning in terms of control over the processes and goals of learning, and with respect to intentionality (Figure 2.1).

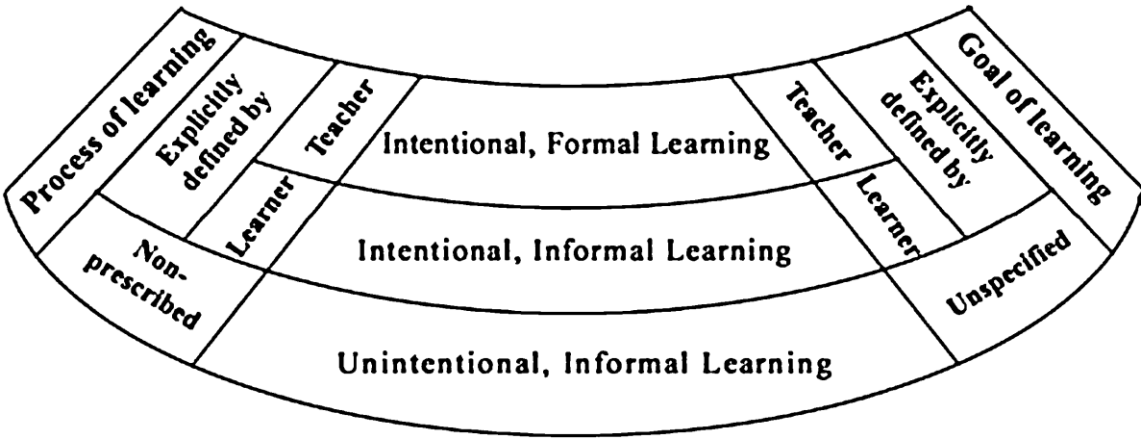


Figure 2.1: Typology of informal learning (Vavoula et al., 2005)

In the example given earlier of using a commercial game in the classroom, the teacher would have explicitly defined both process and goals and so it is an example of intentional, formal learning. However, the focus of this research is on the learning that occurs during gameplay – usually a voluntary, leisure time activity – which could be

classified as unintentional, informal learning. Vavoula and colleagues suggest most studies of informal learning have focused on deliberate learning by the learner, e.g. when visiting museums and so it would seem there is a need for more studies examining the unintentional side. It can be argued that digital games can offer researchers a good opportunity to focus on exactly this sort of learning. The following sub-sections describe examples of models that have been used to describe formal and informal learning with respect to games. A more in-depth consideration of how learning has been examined in different contexts will be provided in Section 2.3.

2.1.2.1 Models of formal learning

Attempts have been made to apply models of formal learning from the field of education and training to analyse the learning that occurs when playing digital games. For instance, O'Neil Wainess and Baker (2005) carried out a literature review within the area of games and learning. They evaluated learning outcomes within 19 empirical studies using Kirkpatrick's four levels for evaluative training (Kirkpatrick, 1994) and Baker and Mayer's (1999) CRESST model (so called because the researchers developing it worked within the "National Center for Research on Evaluation, Standards, and Student Testing" at the University of California). The studies focused on published journal articles, which used adult participants and contained some quantitative or qualitative information about the effectiveness of the games used. Despite the fact that thousands of studies have been published in the area, only 19 met these criteria and were included in the review. It appears that many studies in the area do not back up the claims made about games with empirical evidence.

Kirkpatrick's model describes four levels that are used to evaluate training programs, usually within the business sector. Level 1 is Reaction (which refers to how participants react to the program in terms of satisfaction), Level 2 is Learning (which relates to how the program affects knowledge, attitudes and skills), Level 3 is Behaviour (which relates to how well the training transfers to other contexts) and Level 4 is Results (referring to how the training program impacts on the company as a whole – essentially a macro-level view

of the effect of implementation). Out of the 19 studies included in the review, five could be classed under Level 1 (reaction) and Level 2 (learning), 11 addressed Level 2 (learning) alone, two to Level 3 (changes in behaviour) and only one to Level 4 (benefits to employer).

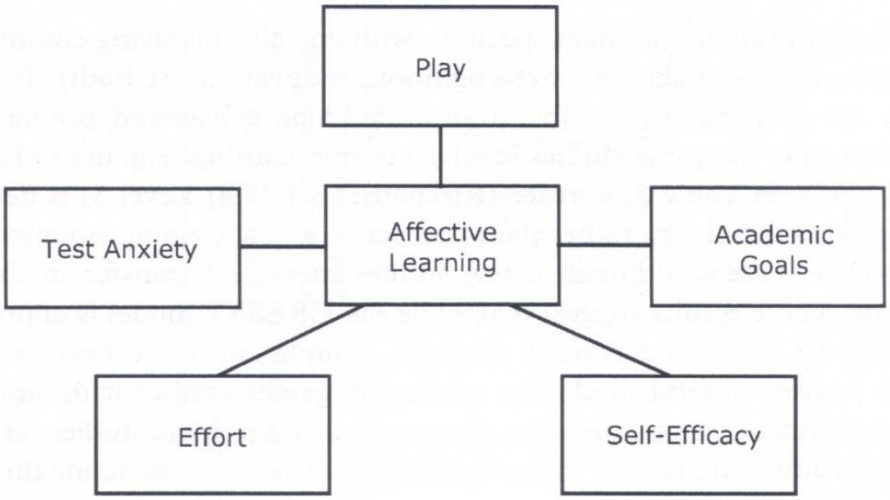


Figure 2.2: Affective/motivational model (O'Neil & Wainess, 2006)

The CRESST model was developed by Baker and Mayer (1999) to examine the cognitive learning that students engage in. It consists of five different components including: Content understanding, Problem solving, Collaboration (with others), Communication (of thoughts and ideas), and Self-regulation. O'Neil et al. (ibid) only counted a category if it was explicitly measured (so, for instance, collaboration was only counted if the study included a specific measure of it, not if it was investigated as part of the process). As a result, seven studies were classified as having examined content understanding (one which involved assessing collaboration), 16 measured some form of problem solving (with only one also looking at communication), and no studies were classed under the self-regulation category. The authors suggest that while the model was useful for examining adult learning on a micro-level, the existing model should be adapted to include an affective or motivational view of learning that might be more useful for evaluating the use of games and simulations. They proposed an additional Affective/Motivational model of learning consisting of: Academic goals, Self-efficacy, Effort, Play and Test anxiety (Figure

2.2), although this was not used to analyse the studies included in the review. However, it is not clear how the model would be applied in practice, e.g. how do you assess play exactly?

O'Neil and colleagues conclude that with respect to the use of games for learning, "the evidence of potential is striking, but the empirical evidence for effectiveness of games as learning environments is scant" (O'Neil et al., 2005, p. 468) while they also suggest that both Kirkpatrick's levels and the CRESST model of learning are useful ones to apply when classifying learning outcomes. However, the authors recognise that learning outcomes also depend on how instructional strategies around the game are employed. Similarly, de Freitas (2006) argues that the mixed evidence within the area "may indicate that learning through immersive worlds involves a more complex understanding of learning, one that is not so easy to tie to specified learning outcomes" (p. 18). This suggests a need to develop a more in-depth understanding of what learning through games actually entails, something which this thesis aims to provide.

2.1.2.2 Models of informal learning

There has been some research focusing on the unintentional informal side of game-based learning. For example, Pelletier and Oliver (2006) decided to focus on the learning process that occurs during game play itself, without looking for specific learning outcomes. They developed a method based on Activity Theory (AT), a socio-cultural approach. Having emerged from Vygotsky's views on learning, AT is based on the idea that all human activity is mediated by tools (not necessarily material), which are used by the subject (the main actor within the activity system) to realise the object (the subjects intentions), thus resulting in an outcome. The initial subject-tool-object triangle was expanded to take cultural and historical context into account by including the community in which the activity occurs, the rules that the community follows (both explicit and implicit) and the division of labour within that community (Figure 2.3).

Engestrom (1987) argues that “contradictions” (i.e. breakdowns between the nodes within the system or even between systems) are an important stimulus for learning. Pelletier and Oliver (ibid) were specifically concerned with exploring how contradictions influence learning within instances of observed play and used Kuutti’s (1996) further refinement of AT to analyse their occurrence.

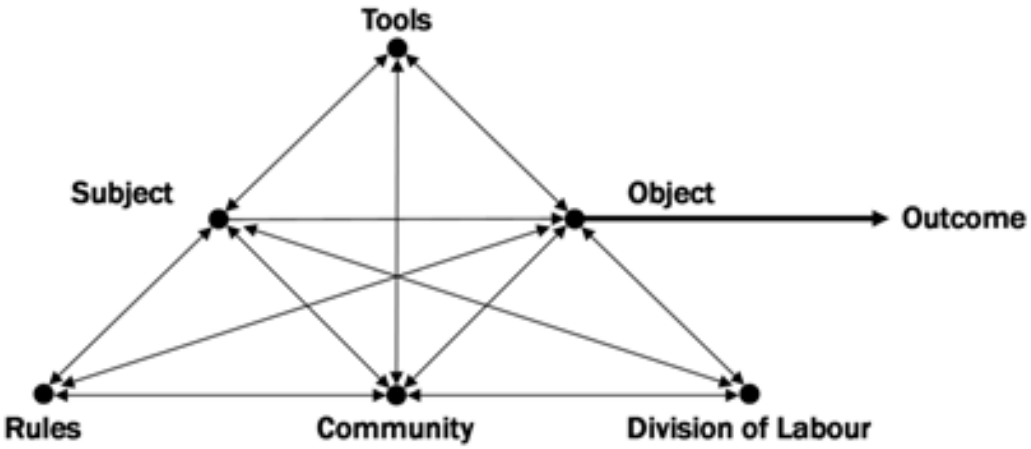


Figure 2.3: Activity theory triangle (Kuutti, 1996)

The three levels of analyses proposed by Kuutti are:

- Activities (high-level plans, e.g. building a house).
- Actions that contribute to the activity (e.g. building a wall).
- Operations that contribute to each action (e.g. laying a brick), which are routine or automatic unless something goes wrong (a contradiction arises).

Pelletier and Oliver (ibid) tested their method of analysis in three different case studies (looking at two different games). Player’s activities were broken down into actions and operations carried out during play, while special attention was paid to contradictions that occurred. The authors note however, that while the detailed analyses allowed them to document the learning that occurred, they needed to make inferences about the reasons behind the operations carried out. As a result, they attempted to come up with a set of rules based on proposed explanations of player behaviour to represent the rule set within the AT triangle. This set of rules can be viewed as a set of strategies the player turns to

when learning a new game, e.g. “spot unusual objects and click on them” (p. 335). The authors conclude the method helped them to analyse the process by which players learn game strategies and suggest that the analysis of learning in this context is essentially an analysis of how player learns to play the game. In particular, they see the method developed as being useful for helping educators consider which specific game might be useful to use under differing circumstances. However, it could be argued that by not taking the player’s perspective into account, it is not clear how far the inferences made actually motivate player behaviour.

As Pelletier and Oliver (ibid) note, the decision to focus on “problematic or ‘contradictory’ moments” as sources of learning does not necessarily mean “that learning is reducible to problem solving” (p. 332). However, it does provide a focus for analysis, especially with respect to considering informal learning during instances of play. Different approaches to considering breakdowns are discussed in Section 2.3.4, while the specific approach adopted within this thesis is outlined in Section 6.2.

2.2 Motivation, engagement and games

Perhaps the most commonly cited reason for the interest in games and learning is to do with the fact that games are considered motivating and engaging, as there is much interest in how this can be “harnessed” for more educational purposes (e.g. Kirriemuir and McFarlane; 2004; Mitchell & Savill-Smith, 2004). Section 2.2.1 discusses the theories which relate to the concept of games being “intrinsically motivating” and how this relates to learning, while section 2.2.2 describes how motivation and engagement have been understood outside the context of learning.

2.2.1 Games as “intrinsically motivating”

Game-playing is generally seen to be something that players engage in as an activity for its own sake (Juul, 2005), i.e. gameplay serves as its own reward. Another way of describing this is to say that games are “intrinsically motivating”. One of the earliest theories relating motivation to video games came from Malone (1981) who identified three

ways in which games provide intrinsically motivating experiences, through *fantasy*, *challenge* and *curiosity*. *Fantasy* refers to the way players can imagine themselves in contexts using vivid realistic images provided by the game. A distinction is made between extrinsic (where the fantasy depends on the skill) and intrinsic fantasy (where the fantasy not only depends on the skill, but the skill helps to build on the fantasy). *Challenge* depends on the degree of difficulty and level of uncertainty to drive players. The four factors which contribute to challenge are goals, uncertain outcome, self-esteem and toys vs. tools (where toys are used for their own sake with no external goal and tools are used to achieve an external goal). In order for the challenge to be an effective motivator, a balance must be struck with the game being neither too difficult nor too hard. Finally, *curiosity* refers to the way players continue to play a game in order to find out what will occur after certain actions are taken. A further distinction is made between sensory curiosity (attention-attracting changes that involve our senses) and cognitive curiosity (driven by a desire to bring coherence to our knowledge structures).

Malone and Lepper (1987) extended this framework by adding another individual motivation, and three interpersonal motivations. The additional individual motivation refers to the way in which games can give players a powerful sense of *control*. It is worth noting that it is the player's perceived control that increases motivation, as opposed to the level of control they actually have. To increase a sense of control the game needs to be contingent on the player's responses, provide the player with a number of choices, and enable the player's actions to have 'powerful effects', where the difference in outcomes between choices is obvious. The three interpersonal motivations are *cooperation*, *competition* and *recognition* (of our efforts by others). These factors help motivate players by increasing their sense of satisfaction through helping others, comparing themselves favourably to others, and/or having their efforts recognised by others. Malone and Lepper note that these interpersonal motivations can be decomposed into individual motivations (e.g. competition can be used to increase a sense of challenge) and that they can sometimes be considered extrinsic (e.g. recognition). However, the authors argue "these

interpersonal factors do provide intrinsic motivations that would not be present in the absence of other people" (p. 242).

Linked to the concept of intrinsic motivation is the experience of "flow" (Csikszentmihalyi, 1990). "Flow" occurs when someone is so engaged in the task at hand that their attention is focused, they feel more in control, they do not feel self-conscious and nor do they realise how much time has passed. There are nine characteristics of flow: a balance between the challenge and skill level, the merging of action and awareness, the existence of clear goals, clear feedback, focused concentration, a sense of control, a loss of self-consciousness, a reduced awareness of time and a sense that the activity being engaged in is intrinsically rewarding. Prensky (2001) describes how this experience occurs in gamers once they achieve a mental state where there is an optimal match between the challenges presented and the player's ability to solve them, resulting in a thoroughly engrossing experience where the motivation to play is so strong it overpowers all other concerns (e.g. players will not feel tired or hungry). While achieving a state of flow during digital game play can be seen as evidence of intrinsic motivation (Paras & Bizzochi, 2005), Egenfeldt-Nielsen et al. (2008) argue that although the concept might explain why people enjoy playing digital games, it is too general to explain why they choose to play them over any other activity that can provide a flow experience.

2.2.1.1 How do intrinsically motivating games relate to learning?

Although empirical research carried out by Malone, Leper and colleagues has provided support for their work on intrinsic motivation (e.g. Lepper & Malone, 1987; Malone & Lepper, 1987; Cordova & Lepper, 1996), Habgood, Ainsworth and Benford (2005b) question the empirical basis of some of the work carried out, particularly in relation to the notion of endogenous (intrinsic) and exogenous (extrinsic) fantasy. More specifically, Habgood et al. suggest that Malone's claim that intrinsic fantasies are "more instructional than extrinsic fantasies" (Malone, 1981, p. 361) is unfounded since he did not measure any learning outcomes. Although Malone recognizes this limitation in his own work, Habgood et al., note that since Malone's theory was introduced "the literature has not produced a critique of endogenous fantasy" (Habgood et al., 2005b, p. 484). Habgood and

colleagues suggest an alternative perspective on the intrinsic integration of learning content within games based on incorporating game mechanics, the concept of flow, and the use of visual representations. Meanwhile, Whitton (2007) argues that while much of the literature in this area references the work of Malone and colleagues, the argument that "if the motivational factors associated with games could be transferred to learning then the learning would be more effective", is "little questioned" (p. 38).

Figure 2.4: Guitar shaped controller for Nintendo Wiimote

Another criticism of Malone's framework is that while it may give us some idea of what game features are engaging to players, it does not say much about what motivates people to play digital games in the first place. Further, Egenfeldt-Nielsen (2006) notes that Malone's theory was based on research into children's responses to manipulations of drill-and-practice games. Arguably, these look very different to the commercially available titles available today, especially in terms of graphics. The recent introduction of new games controllers such as dance-mats, motion sensitive controllers and guitar shaped peripherals (Figure 2.4) have led to very different forms of game play (Jenson & de Castell, 2008a). Arguably, improvements in graphical realism and different interaction techniques could result in different experiences of engagement and learning that have yet to be determined. Further, Egenfeldt-Nielsen et al. (2008) point out that despite the later

inclusion of interpersonal motivators in Malone's work, there is too narrow a focus on the structure of the game itself without sufficient attention being paid to the social dynamics that occur around game the game and the context within which it is played. For instance, the theory would have trouble explaining the claim that video games "are surrounded by strong social networks, which facilitate the learning experience" (Egenfeldt-Nielsen et al., 2008, p. 216).

As part of research examining engagement in relation to learning, Garris, Ahlers and Driskell (2002) present a model of instructional games and learning. The model aims to link the game features that support learning to the processes by which learners are engaged and to desired learning outcomes (Figure 2.5).

Figure 2.5: Input-Process-Outcome Model (Garris et al., 2002)

The authors note there is an implicit assumption within the research literature on instructional games and learning (including the work carried out by Malone and colleagues), that pairing instructional content with certain game features will engage learners and lead to the desired learning outcome. However, they do not question this assumption themselves but instead aim to make it more explicit. After reviewing the literature, they go on to identify a number of game features that can be manipulated in order to elicit desired behaviour from learners. These features are: *fantasy*, *rules/goals*, *sensory stimuli*, *challenge*, *mystery* and *control*. The authors describe how these game characteristics, in combination with instructional content, should trigger an iterative game

cycle of user judgments, system feedback and user behaviour that, through debriefing, can lead to desired learning outcomes. The outcomes can be *skill-based*, *cognitive* (in the form of declarative, procedural and strategic knowledge) and *affective*.

The game cycle in their model is seen to be “a defining characteristic of computer game play – that users are engaged in repetitive play and continually return to the game activity over time” (p. 445). It would seem then that a key feature of engagement is the desire to repeat the same behaviour. While the authors go on to define motivation as “the willingness to engage in a task” (p. 451), they do not define engagement explicitly. However, they do refer to the term “persistent reengagement” as “sustained involvement” (p. 454). In terms of further research, Garris et al. suggest that although they have pointed to factors that initiate engagement, there is a need to explore how this process is sustained over a period of time. In addition, the model was developed in order account for instances of formal learning (at least in terms of intentionality) since it refers to instructional content, debriefing and learning outcomes. Further, it should be noted that this model treats games very much as a vehicle for delivering content and as such, ignores the possible impact that context could play with respect to player motivation and learning.

While it is clear that games can be intrinsically motivating, it is less apparent then whether they would remain so when used within an educational environment (and the framework presented by Garris et al., gives us no way of taking these external factors into account). For instance, Whitton (2007) conducted a number of interviews with adult learners, and found that while the participants were largely positive towards game-based learning only two of them agreed that they would find games intrinsically motivating within an educational context. Similarly, Squire (2005a) found that not all students were receptive to the idea of using a commercial game within a classroom environment. He suggests that motivation is something that emerges from a combination of student goals and histories, game affordances and institutional context. Meanwhile edutainment has been critiqued for

a variety of reasons, including the fact that titles often do not support an integrated learning experience and contain little in the way of intrinsic motivators (e.g. Egenfeldt-Nielsen et al., 2008). It would appear that using games as a way to increase motivation for learning is not straightforward, and perhaps, as Pelletier (2009) suggests, the desire stems from a conceptualisation of games that does not fully appreciate what is going on when people engage in gameplay and related activities.

2.2.2 Other motivation and engagement research

There has also been an interest in investigating motivation and engagement, without a consideration of how these concepts relate to learning. For instance, in order to address the question of why people play MMOGs, Yee (2007) developed a model of motivations for online games, based on the factor analysis of survey data from 3000 MMOG players. The model categorises players in terms of whether they are motivated by *achievement*, *social aspects* or *immersion*. The achievement component can be further subdivided into *advancement*, *mechanics* and *competition*, the social component into *socialising*, *relationship* and *teamwork,* and the immersion component into *discovery*, *role-playing*, *customisation* and *escapism*. While the framework can allow for a comparison of different individual motivations for playing online games, Calleja (2007a) argues that Yee's categories group together such diverse experiences that they lose some of their explanatory power. In addition, while the model gives us an idea of individual motivations for digital gameplay, it says very little about how engagement works as a process and so is less applicable to examining specific instances of play.

Self-determination theory (SDT) is a general theory of motivation which has recently been applied to games (Ryan, Rigby & Przybylski, 2006). SDT addresses factors that can support or undermine both intrinsic and extrinsic motivation, although Ryan et al. (ibid) do argue that those who play games will be intrinsically motivated to do so. Ryan and Deci (2000) describe the arena of SDT as "the investigation of people's inherent growth tendencies and innate psychological needs that are the basis for self-motivation and

personality integration, as well as for the conditions that foster those positive processes" (p. 68). The theory refers to three specific psychological needs: *competence* (need for challenge), *autonomy* (sense of volition) and *relatedness* (how connected someone feels to others). In applying this theory to games, Ryan et al. (2006) developed the Player Experience of Needs and Satisfaction scales based on SDT and including additional assessments for 'presence' ("the sense that one is *within* the game world"; p. 350) and 'intuitive controls' (to assess the interface between the game and the player, and the mediating effect of this on each psychological need). The authors predicted that the game features that support the development of perceived autonomy, competence and relatedness would help increase motivation, which in turn would have an influence the experience of presence and wellbeing. Essentially, they argue that people play games in order to satisfy these psychological needs.

Ryan et al. (ibid) carried out four studies in order to test out the PENS scale, with the final study employing Yee's model of player motivation in MMOGs (Yee, 2007) for comparative purposes. The authors conclude that their hypotheses were largely supported by their experimental manipulations since measures of autonomy and competence were associated with game enjoyment and preference for future play. Further, intuitive controls appear to increase both enjoyment and preference for future play by enhancing player's experience of in-game competence in particular. In addition, the findings of the final study indicated that game enjoyment and preference for future play were significantly correlated to autonomy, competence and relatedness for MMOGs, while autonomy and competence were also positively associated with mood after play. However, with respect to Yee's assessment of player motivation types, none of his categories related to game enjoyment or preference for future play, while post-play mood was only negatively associated with achievement and immersion. In terms of presence, the authors argue that their findings have helped to explore the psychological side of this experience both theoretically and empirically. Specifically, they found that there was a positive link between intuitive controls and presence and that presence is increased by feelings of greater autonomy and

competence. The authors conclude that presence occurs when the player can focus on the game-play rather than the controls, and that “perhaps more importantly, presence is directly related to how game play itself satisfies psychological needs” (p.361). This supports the suggestion that the controls used will have an impact on the gameplay experience. The authors suggest that the model they have presented is essentially a starting point for research in this area.

Calleja (2007a; 2007b) also presents a model of MMOG player motivation, this one based on participant observation and interviews. After reviewing the literature on virtual environments and digital games (as opposed to learning and digital games), and the use of the terms “presence” and “immersion”, Calleja notes that the term immersion is often used as a synonym for strong engagement and that it is also used to describe the sensation of being within a virtual environment (which the term presence is also used to describe). He concludes that “the metaphor of *immersion as deep absorption* [has become] conflated with a metaphor of *immersion as traversable space habitation*” (p. 94; Calleja 2007a). Iacovides (2009) also notes that the confusion over the term immersion has carried over into the area of games and learning research, as it is rarely defined explicitly. Another example of how different definitions are used to describe involvement comes from Lindley and Sennersten (2008) who use specific definitions of immersion and engagement that relate to schema theory, for analysing game play. According to schema theory, actions are determined by hierarchically organised plans (or schemas) where “the highest-level schema represents the overall intention or goal (e.g. buying a present), and the lower-level schemas correspond to actions involved in accomplishing that intention (e.g. taking a train to the nearest shopping centre)” (Eysenck & Keane, 2000, p.148). Accordingly, Lindley and Sennersten (2008) define a game play schema as “a cognitive structure for orchestrating the various cognitive resources required to generate motor outputs of game play in response to the ongoing perception of an unfolding game” (p. 3). In relation to this, engagement is referred to as a “process for schema selection or development” while immersion “is explained in terms of the levels of attentional demand in

schema execution" (p. 1). Douglas and Haragadon (2000) also consider schema theory in relation to game play, suggesting that the schemas people have shape both their expectations and the enjoyment they experience. The authors use the term immersion to refer to a form of non-critical involvement with a familiar schema, while engagement refers to a more critical stance of complex schemas where we are able to evaluate it from outside the text (or game presumably). These examples serve to indicate the variety of definitions used within the area and the need to be explicit about the terms being used.

As an alternative to the metaphor of immersion, Calleja (2007a) proposes the Digital Game Experience Model (DGEM) which describes aspects of players' experiences with reference to six "frames" where "each frame represents a modality of meaning through which the role-playing experience is interpreted and performed" (pp. 236-237; Figure 2.6). The player experience can be described with reference to how the *tactical, performative, affective, shared, narrative* and *spatial* frames come together in different ways during instances of play (the DGEM and each of the frames is introduced further in Section 4.1.1). In later work Calleja refers to the model as the Player Involvement Model, and the tactical and performative frames are renamed ludic and kinaesthetic respectively (Calleja, 2011). When the player internalises each of the relevant frames, it can result in what Calleja calls "incorporation": "the subjective experience of inhabiting a virtual environment facilitated by the potential to act meaningfully within it while being present to others" (Calleja, 2007a, p. 257). Each of the frames describes experiences that range on a continuum from conscious attention to internalized knowledge, which will eventually lead to incorporation as the player internalises each of the frames during the process of play. Calleja (ibid) states that his focus was on the "various forms of engagement with digital games, ranging from their general motivations and attractions to a detailed analysis of moment by moment involvement in gameplay" (p. 6). While he does not define either term explicitly, he uses "engagement" and "involvement" interchangeably. Within the DGEM, he uses the term "macro-involvement" to refer to player's "general motivations for engaging

with games" and "micro-involvement" to refer to "the moment by moment instance of game play" (p. 9).

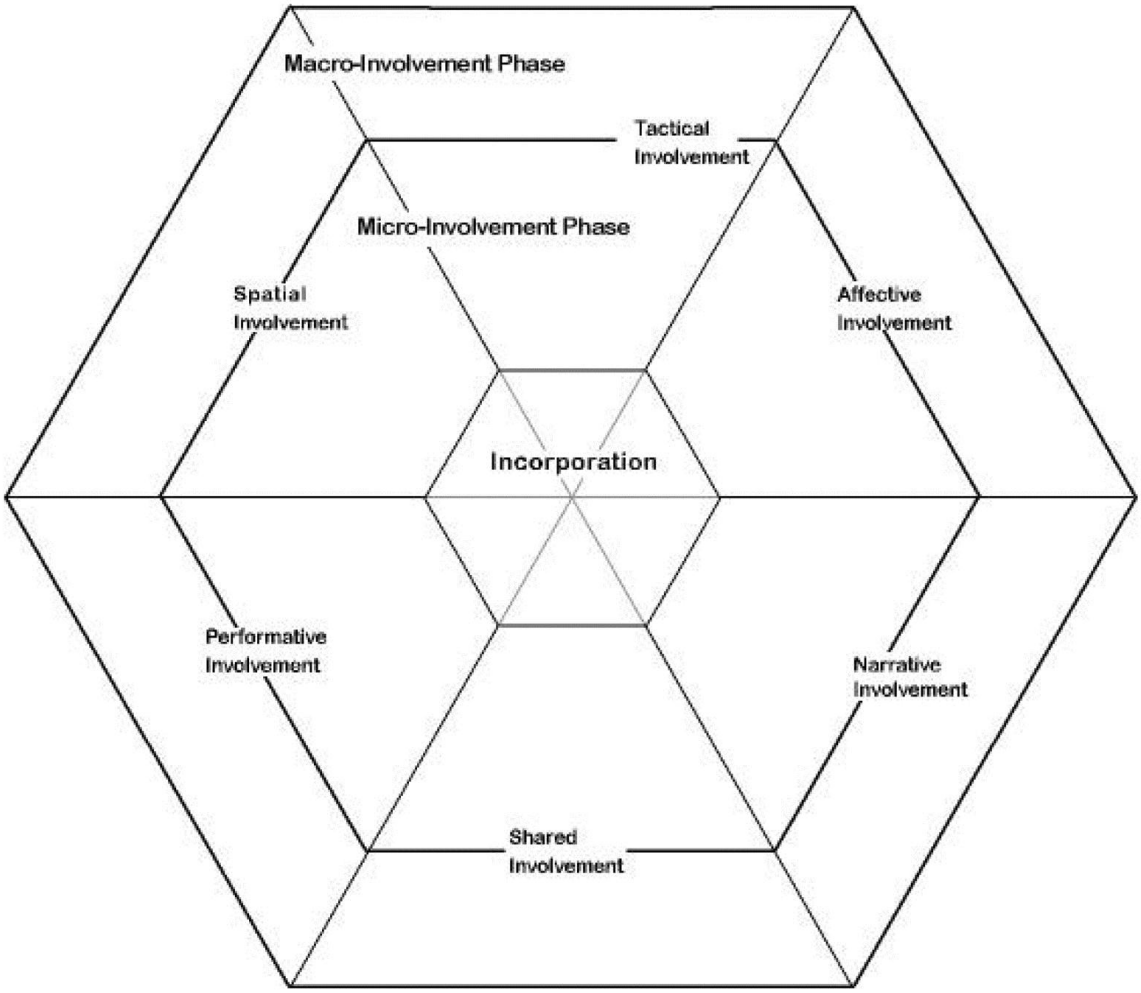


Figure 2.6: The Digital Game Experience Model (Calleja, 2007a)

The DGEM is primarily a descriptive framework that allows for qualitative comparisons between different instances of play. More importantly, the description of how the player incorporates the different frames is significant from a learning perspective as it gives researchers a way of understanding how the relationship between the learning and involvement is experienced by game players. The model suggests a very close relationship between the two, as deeper involvement can only be experienced through successful internalisation during play, i.e. through a process of learning (Iacovides, 2009). This fits in with the idea put forward by researchers such as Gee (2004, 2007) and designers such as Koster (2005) who suggest that the processes of learning and playing

are mostly synonymous. The DGEM distinguishes between general motivations to play games and the engagement that occurs during play, allowing for a consideration of how the macro and micro-levels feed into each other. However, it was based on the study of MMOGs so there is little work applying it to the study of single or co-located play. Therefore, it is not clear whether the metaphor of incorporation is relevant to all forms of digital game play. The research reported in the thesis will apply the DGEM to assess a range of game-play experiences and assess its utility for considering the relationship between involvement and learning (reported in Chapters 4 and 5).

2.3 Examining gameplay and the wider context

The previous sections described a variety of theories and models which have been used to understand motivation, engagement and learning within the context of games. The remainder of the chapter introduces a number of ways in which games have been examined namely in terms of: intentional formal learning (Section 2.3.1), unintentional informal learning (Section 2.3.2), considering different audiences and gender (Section 2.3.3), evaluating the experience of gameplay from a Human Computer Interaction perspective (Section 2.3.4) and looking beyond instances of play (Section 2.3.5). While there is some overlap concerning what different studies have investigated, these distinctions serve to highlight the variety of methods adopted and the differing emphasis of the work that has been carried out within the area.

2.3.1 Studies of intentional, formal learning

Reviewing the literature in the area of game-based learning suggests that the majority of studies focus on the issue of intentional learning within a formal context. A large proportion of these studies tend to focus "not on learning *per se* but on issues of curriculum integration based on inferences about the game itself (its content), rather than from instances of play" (Pelletier & Oliver, 2006, p. 341). For instance, de Freitas and Oliver (2006) introduce a framework to help practitioners to evaluate which games would be most effective to use within specific educational contexts by considering issues along

four different dimensions: pedagogic considerations, mode of representation, learner specification and context. The authors applied the framework to two examples of games being used, suggesting in one instance: “had the designers of the game considered the four-dimensional framework in advance of game design they would have identified a better fit between the needs of the curriculum and the best form of use of the game to mediate the learning activities” (p. 261).

In terms of how game-based learning in formal contexts has been evaluated a variety of methods have been used. Whitton (2007) suggests that the most common approach is to use a pre and post-test design, although mixed method approaches are also quite common. For instance, Joiner and colleagues (2007) carried out an investigation into the use of a racing car simulation game called *Racing Academy* that was being used to support students studying Mechanical Engineering at the University of Bath. In total, 161 participants took part in the study (146 male, 15 female; average age 18 years). The evaluation consisted of a combination of methods including pre and post-play questionnaires examining domain identity and motivation (based on self-determination theory), pre and post-play tests to establish learning within the subject area and open-ended interviews with both students and teachers who used the game (although the qualitative results from this study are yet to be reported). The quantitative measures indicated that *Racing Academy* helped facilitate students’ learning since a significant improvement occurred between pre and post-test. Due to the quasi-experimental nature of the study, a control group was not included so unfortunately, it is difficult to conclude for certain that the improvements noted were purely the result of students playing the game. Further, while the students found *Racing Academy* to be motivating and enjoyable, and also felt competent and put effort into the game, they were already highly motivated with respect to their subject matter prior to the intervention. Thus it is not clear whether the game is able to positively influence motivation towards engineering.

Miller and Robertson (2009) provide another example of games being used to support learning effectively within an educational context. They found playing *Dr Kawashima's Brain Training* for 20 minutes a day over 10 weeks helped to improve primary school children's Math skills. A pre and post-test design was used to measure speed and accuracy of responses, with 71 children aged between 10 and 11 years old taking part, in three different schools. The first school (21 children) played the *Brain Training* game on the handheld Nintendo DS console (Figure 2.7), the second school used "Brain Gym" techniques (31 children) and the third acted as a no treatment control (19 children). The Brain Gym is a collection of targeted activities supported to integrate body and mind in order to bring about changes in areas such as concentration, physical coordination and academic subjects such as Maths.

Figure 2.7: Nintendo DS handheld games console

While all scores improved between the pre and post-tests, the most significant difference was for children within the DS handheld group, especially in relation to accuracy. Children within the Brain Gym condition did spend less time on activities however, than those in *Brain Training* game group. Accordingly, comparisons between groups should be treated with caution. While the study does indicate the positive effects of using such a game to

support the development of Maths skills within a formal educational environment, Pivec (2009) notes that with respect to games like *Brain Training,* "practice makes perfect and by practising a cognitive test on any task, the participant will always improve" (p. 7). It's not very surprising then that the children who used the game showed an improvement in their scores, especially since they spent more time on the activities. In this case, the game may have had less to do with 'causing' learning and more to do with motivating students to practice for longer.

Several literature reviews have been carried out which look at the effectiveness of games used for educational purposes, many of which show mixed results (e.g. Randel, Morris, Wetzel & Whitehill, 1992; O'Neil & Wainess, 2005) or focus on recommendations for the future use of games within education (e.g. Kirriemuir and McFarlane, 2004). Mitchell & Savill-Smith (2004) highlight a number of areas where games have shown some success including the teaching of basic skills (such as reading and maths), engaging adolescents (in topics such as body awareness and safe sex), social skills (including collaboration) and vocational learning (specifically in relation to simulations). The reviews indicate that using games in education does not always achieve the desired result and suggest adopting this approach is not always straightforward. For instance, in addition to identifying potential practical barriers such as lack of technical support and access to equipment, de Freitas (2006) highlights additional challenges to consider such as: the assessment and accreditation of learning outcomes, considering the appropriateness of the context, managing learner expectations and providing teachers with the knowledge and support they require.

The issue of assessment also relates to learning transfer, as there are no guarantees that something learnt within the game-world will be applied outside of this context. Egenfeldt-Nielsen et al. (2008) suggest that it is the role of the teacher to ensure that the transfer of skills and knowledge is made explicit. Additionally, de Freitas (2006) argues that the level of representational fidelity is crucial in this respect as the closer the game or simulation is

to reality, the more likely transfer will be. O'Suilleabhain (2008) points out that transfer is a problematic issue for learning in general and questions about how useful games are in this context are usually about "whether there is a specific piece of learning gained 'in there', as it were, in the game-world, which can be of help 'out here' in the real one" (p. 350). He suggests that learning in games should be thought more of in terms of developing expertise and so "one-shot" attempts at measuring transfer (which many studies attempt) are unlikely to reveal much of an improvement.

An alternative way in which learning has been evaluated is in terms of engagement. Whitton (2007) used a questionnaire developed to assess engagement as a measure of educational effectiveness. While the measure was used in addition to self-report, the assumption that engagement can be used as a primary indicator of learning seems questionable. This is especially so in relation to educational games a distinction often occurs between engagement with the game itself and engagement with the intended learning from the game (something which Whitton does note). Similarly, Pontual-Falcao, Price and Sheridan (2009) suggest that, in general, there is a need to "extend the concept of engagement to explicitly include factors that enable us to identify more clearly how engagement maps to learning" (p. 1). As a result of examining how children used interactive table-top devices to explore the behaviour of light, the authors noted distinctions between: engagement with the system (e.g. the table-top and how it worked), engagement with the activity (e.g. trying different arrangements out randomly) and engagement with the concept (e.g. reflecting on how light worked). Research examining the issue of engagement needs to provide explicit definitions of engagement that point out exactly what is being engaged with.

Egenfeldt-Nielsen et al. (2008) echo the concern over the issue of engagement when they discuss playing vs. learning. The problem they note is that students can be so involved in the gameplay without necessarily having to deal with what they are supposed to be learning (in terms of the goals the teacher has set). Prensky (2001) suggests that

commercial game designers face a similar challenge in terms of how to keep players engaged in the game while also getting them to develop the skills required to progress. However, it is an even bigger challenge for designers of *educational* games since they have to effectively integrate learning outcomes with engaging game play. Otherwise there is the risk that they might end up with what Papert (1998) refers to as "Shavian reversals" ("offspring that keep the bad features of each parent and lose the good ones"; p.2), i.e. boring games that fail to support learning. Habgood and colleagues argue that one way to avoid this when designing educational games, is to consider the intrinsic integration of learning material with respect to (1) the game mechanics, (2) the concept of flow, and (3) the use of visual representations (Habgood, Ainsworth, & Benford, 2005b; Habgood, 2005).

2.3.2 Studies of unintentional, informal learning

In general, there is less research in the area which focuses on unintentional informal learning. This may be partly due to the difficulty of assessing it (Vavoula et al., 2005). As Squire (2002) recognises (in terms of playing commercial games for leisure purposes) "we know very little about what they are learning playing these games (if anything)" (p. 4). It has been argued that there is need for more naturalistic studies of play that examine the processes and outcomes of play in relation to game design and social context (Pelletier and Oliver, 2006). While Pelletier & Oliver (ibid) provide an example of a study which focuses on learning during gameplay, they also point out that, due to the small sample size, "these case studies should not be seen as samples from which to make generalisations about learning in games, but demonstrations of a method of analysis by which learning in games can be investigated empirically" (p. 334). Research in the area would benefit from further observational studies of gameplay, something which this thesis seeks to address.

There is some evidence from experimental studies that supports the view that games can improve player's cognitive abilities, for instance. This includes visual selective attention

(Green & Bevelier, 2003), problem solving (Ko, 2002; Pillay, Brownlee and Wilss; 1999) and the development of cognitive strategies (Pillay, 2002). However, the testing procedures used in these studies are not particularly representative of how gameplay occurs in more natural settings. Further, it is not clear whether a participant's knowledge of the fact they will be tested may turn any learning observed into something that is experienced as being more akin to a formal educational context, rather than as part of a voluntary, leisure time activity.

An alternative way in which unintentional informal learning within games can be examined is through observing instances of collaborative play. For example, Schott and Kambouri (2006) carried out an observational study of pre-adolescents' console playing within the home where they left camera equipment and instructions for participants to use over a week long period. The participants also kept a record of time spent playing and progress achieved in single and group play sessions. The analysis focused on a specific instance of collaborative game play between four boys they name as 'owner', 'expert', 'novice' and 'pc gamer'. The boys are observed engaging in collaborative play of a single-player game, with each of them offering advice and suggestions, although the 'owner' tended to keep hold of the controller. Schott and Kambouri highlight evidence of 'scaffolding' (where support was provided when the player was seen to be struggling) and view the session as an example of 'situated learning' since the boys effectively turned a single-player game into a group activity of social value. The authors also point out that there is a need to develop more systematic methods for examining both the nature and function of this type of play. However, the study only reports the observations from one group of players, so it is difficult to generalise on this basis.

In terms of examining the process and outcomes of collaborative learning, there is more of a focus within the research literature on learning that occurs when playing online in MMOGs, rather than on co-located play. For instance, Nardi, Ly and Harris (2007) examined chat logs of player conversations within *WoW* for evidence of learning, as part

of their ethnographic fieldwork. Using Vygotsky's construct of "the zone of proximal development" (the gap between what a learner can do alone and with the help of someone more experienced) and grounded theory, they conclude that there were three main types of learning that occurred: *fact finding*, *devising tactics/strategies* and *acquiring the game ethos*. The authors were surprised to note that the role that emotions played within the discourses they studies as emotion is not usually mentioned in relation to learning and the zone of proximal development. More often than not these emotions were "generally lightweight, playful, and without lasting consequence" reflecting how players were "relaxed and engaged" (p. 9). Given that that this was a qualitative analysis of player discourses, this appears to be a subjective assessment. However, the authors point out that these emotions occur (however "lightweight") because players are already excited about the game, and so it would be quite difficult to design educational games that are as compelling (given economic constraints). Nevertheless, their tentative suggestion that "emotion provides salience to the learned facts, heightens attention, and adds interest" (p. 4) would be an interesting focus for further research.

2.3.3 Considering audiences and gender

Further, it would be interesting to see how the types of learning identified by Nardi et al. (2007) can be found for games that are not MMOGs and whether players exhibit the same sort of emotional reactions when dealing with co-located players. This is especially relevant when considering how successful Nintendo has been at marketing its latest generation console, the Wii, to a broader audience. The Wii has been marketed as a social console, that you can play on with friends and family (Figure 2.8) and, according to their latest consolidated financial statement, it has managed to sell 89.36 million units since its release in November 2006 (Nintendo, 2011). Nintendo's strategy to expand the market by targeting new audiences and "expand the gaming populations" (Iwata, 2008, p. 6) was successful, even during a time of economic recession. A report from Futurelab about gaming in families reinforces the fact that player demographics are changing (Ulicsak, Wright & Cranmer, 2009). Juul (2010) notes that the recent emergence of *casual*

games has helped lower the barriers of access to gaming and to widen its appeal. Juul defines casual games as games which are very usable, easily interruptible, juicy (i.e. they provide excessive positive feedback), with emotionally positive fictions and that are lenient in the way they punish failure (these dimensions are further explored in Section 4.1.1).

Figure 2.8: Nintendo promotional image showing the whole family playing the Wii together

As yet, there is little research that examines the emergence of the casual player in terms of involvement and learning. Consalvo (2009) notes that much of the research in the area has tended to focus on the *hardcore* players, i.e. on "those that have seemed most stereotypically fanatical or 'obsessive' in their interests." (p. 51). Her research provides an exception to this, where a fan community surrounding the casual game *Mystery Case Files: Return to Ravenhurst* was investigated. The findings revealed casual players acting in a hardcore way (i.e. showing they were heavily invested in the game and its online community by engaging in forum discussions, posting reviews and providing advice to other players). This raises questions about what makes a game or a player casual. Juul (2010) suggests the solution is to consider both simultaneously in terms of: how games "can be *more* or *less* flexible towards being played in different ways" and also how players

"can be *more* or *less* flexible toward what a game asks of a player" (p. 53). According to Juul, a stereotypical casual player is opportunistically interested in games and inflexible in terms of how much they want to invest in a game. Meanwhile, a stereotypically hardcore player is generally more flexible, i.e. willing to spend varying amounts of time on play, but also enjoys more inflexible games (which require knowledge of game conventions, a consistent and lengthy time investment etc.). This thesis adopts these definitions of hardcore and casual, although the terms are further explored in relation to learning and involvement within Chapters 5, 6 and 7.

The idea that casual games are able to lower the barriers of entry can also link to the research on gender and gameplay. Jenson and de Castell (2005) point out that certain literature in the area (such as Gee, 2004) tends to dismiss gender differences on the basis of large scale quantitative data which indicates that women have been increasingly buying and playing games, e.g. the Pew report by Lenhart, Rainie and Lewis (2001), which found 57% of US female teenagers play online. Jenson and de Castell note that despite these statistics, other research shows that more boys play games than girls and they have an earlier and more sustained exposure to and experience with gaming spaces (e.g. Kafai, 1998; Jenkins, 2001). Further, they suggest that there is a tendency in the literature on gaming to construct girls'/women's game choices and play styles as distinctly "female". For instance, through stating girl gamers have a preference for role-play games that contain animal/creature based characters and for games that allow for exploration while they reject sports and violent games (Schott & Horell, 2000, p. 50).

However, Jenson and de Castell (2008b) argue that statements relating to how girls like to cooperate and boys prefer to compete say more about how gender is performed (Butler, 1999) then they do about innate preferences. The authors emphasise the importance of recognising the experience and investment put into specific games by players, where the development of competence depends on access and practice. With this view, the gender differences observed can actually be explained by variations in player competence: "We

have come to realize that many of the characteristics routinely attributed to gender---like the preference for learning with one's friends rather than on one's own, an avoidance of competitive gameplay, a tendency to proclaim one's own inability or to characterize an activity as 'too hard', to express a lack of interest in computers, to experience 'motion sickness' when playing computer games---all of these now appear to be less characteristic of girls than characteristic of novice players" (De Castell, Boschman & Jenson, 2008, pp. 13-14). The fact that it is competency that underlies preferences, as opposed to gender, is something Carr (2005) has also emphasised in her research on a girl's game club. This thesis does not explicitly address the issue of gender differences but will consider how competence and experience relate to motivation, engagement and learning.

2.3.4 Human-Computer Interaction perspectives

2.3.4.1 Measures of experience

Alongside the increasing popularity of games, there has been a recent move within the field of Human Computer Interaction (HCI) research towards evaluating the user experience as a whole (rather than focusing purely on outcome measures). This is especially relevant when evaluating entertainment technologies (Mandryk & Atkins, 2007).

The move also parallels the recent interest in considering affective issues (including motivation) in relation to use of technologies for learning (e.g. Jones & Issroff, 2005). Arguably, the methods being developed to evaluate how users interact with technology can be used to study the game-play experience in terms of the learning and engagement experienced by players during episodes of play. After reviewing the literature on games and HCI, Mandryk and colleagues conclude that there is a need to develop an objective, quantitative measure to evaluate the user experience of entertainment technologies (Figure 2.9). In order to address this gap, Mandryk and colleagues tested the efficacy of physiological measures as a way of evaluating collaborative entertainment technologies

(Mandryk & Inkpen, 2004; Mandryk, Atkins & Inkpen, 2006; Mandryk, 2007, Mandryk & Atkins, 2007; Mandryk, 2008).

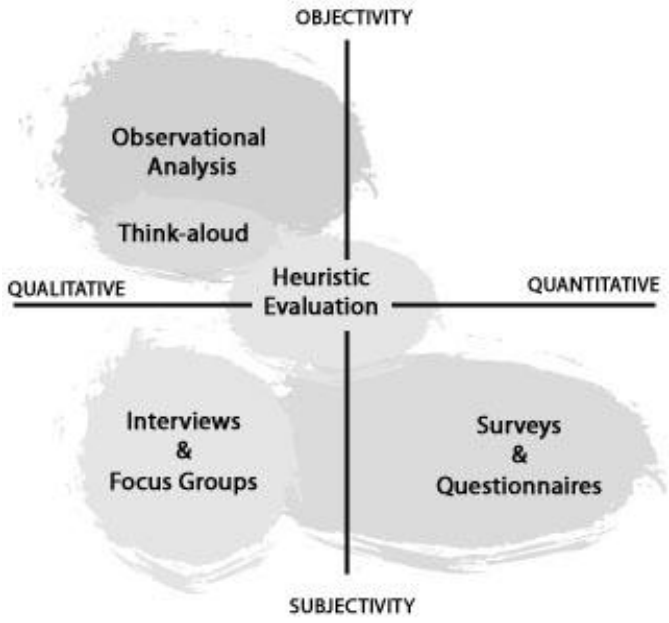


Figure 2.9: Methods for evaluating entertainment technologies (Mandryk & Atkins, 2007)

As part of Mandryk and colleagues' research, Mandryk and Atkins (2007) describe the development of a continuous model of emotion based on physiological data. The model was informed by a user study where 24 male participants played in three conditions: alone, with a stranger and with a friend (measures only taken from a single participant, so 12 data sources were used in total). The order of conditions was counterbalanced, the same game and stranger used, while participants engaged in five-minute episodes of play on *NHL 2003* (an ice hockey game) on the PS2. The ProComp Infiniti system and sensors and BioGraph Software from Thought Technologies were used to measure heart rate (HR), electromyography (EMG) and galvanic skin response (GSR). HR and is computed from an electrocardiogram (EKG). HR has been used to reflect emotional activity and to distinguish between positive and negative emotions. EMG relates to changes in muscle activity and is indicative of tension. It has been used to differentiate between positive and negative emotions, where activity over the cheek (zygomaticus major) indicates positive emotion (EMG_smiling) and where activity over the brow region (corrugator supercilii)

indicates negative emotion (EMG_frowning). Finally, GSR provides a measure of skin conductivity, indicating arousal. Although other measures were examined in previous research (such as respiration rate; Mandryk & Inkpen, 2004), the authors decided that these four measures would be the most useful for evaluating the emotional experience during gameplay.

The physiological data collected from participants by Mandryk and Atkins (2007) was normalised by turning the signals into percentages (to compensate for large individual differences associated with this type of data). The signals were then used as inputs to a fuzzy logic model, with physiological arousal and valence (whether an emotion is positive or negative) as the two outputs. Arousal and valence have been used to classify emotions within a 2D space by Lang (1995).

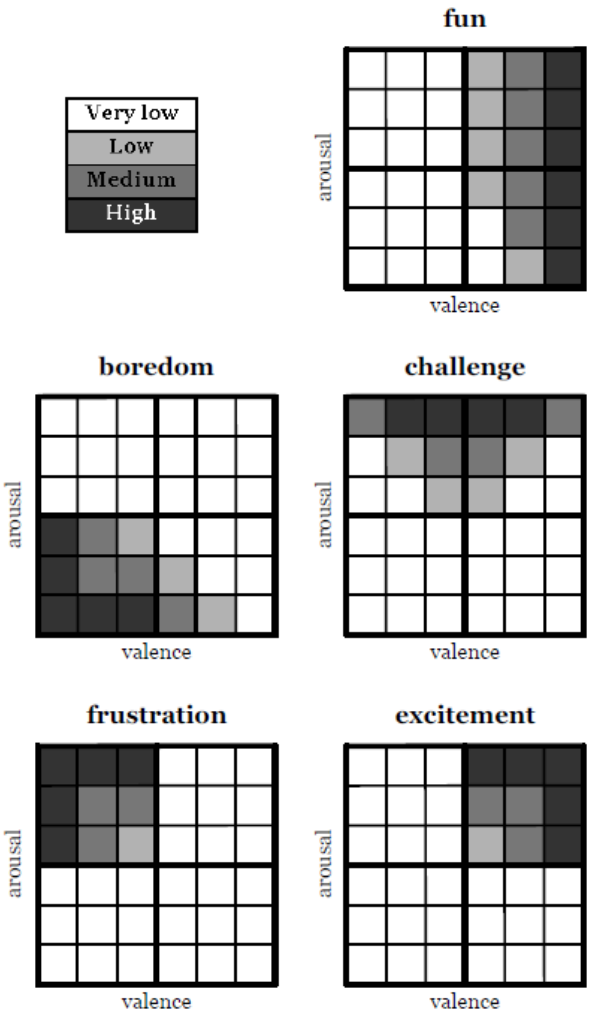


Figure 2.10: Representation of emotion in arousal-valence space (Mandryk, 2005)

The model produced by Mandryk and Atkins (ibid) was based on 22 rules relating to the theory of how physiological signals map onto the concepts of arousal and valence. For example, if (EMGsmile is mid) and (EMGfrown is high) then (valence is low). The resulting measures of arousal and valence were translated into five emotions on the basis of 67 rules. These rules related to how the measures constitute: boredom, challenge, excitement, frustration and fun (the same five emotions the participants were asked to rate subjectively). For example, if (arousal is high) and (valence is midLow) then (challenge is medium). The data from six participants was used to produce the model, while the other six were used to ratify it. Figure 2.10 shows how the authors represented these emotions within an affect grid of arousal-valence space. The x axis indicates increasing positive valence, while the y axis indicates increasing arousal.

Mandryk and Atkins (ibid) were specifically interested in how the presence of a co-located player influenced the experience of gameplay. A repeated measures MANOVA was used to analyse the modelled emotions (based on the physiological data) where the five emotions served as the dependent measures and the play condition (stranger, friend, computer) as the independent variable. The results indicated a significant difference for *fun* and *excitement* only. There were no significant differences between conditions for reported emotions but there were similar trends within the reported and the modelled data. Comparing modelled (objective) emotions to reported (subjective) emotions revealed significant correlations for *fun* and *excitement*, but not for *boredom* or *frustration*. Meanwhile, *challenge* showed an inverse correlation between subjective and physiological reports. The authors suggest this was due to the strategies players employ to make a task more or less challenging, e.g. trying to relax to improve performance. They conclude by claiming that the modelled emotion is an objective and quantifiable metric for evaluating entertainment technology that can be used to reveal variance between and within conditions. While the model may be able to distinguish between conditions, only two out of the five modelled emotions actually correlated with subjective reports. It would seem

further research is required before this method is fully able to capture the emotions experienced by players, e.g. frustration and challenge.

The use of physiological data may be useful with respect to making comparisons between different cases but (as the work carried out by Mandryk & Atkins, 2007 suggests) the collection and analyses of such does require an in-depth and complex approach. This is in due in part to the fact that it is not always clear what emotions are being measured through such readings (Mandryk & Atkins, 2007; Hazlett & Benedeck, 2007). In addition, biosensor measures are not consistent across experimental sessions and also subject to other physiological happenings (e.g. digesting) which can make it difficult to make comparisons between groups (Mandryk & Inkpen, 2004). EMG values can also be muddied by talking or laughing during the evaluation and so caution is required when examining the data from conditions involving more than one participant (Mandryk, 2008). Further, in relation to the work carried out by Mandryk and colleagues, it is not clear whether a gameplay period of five minutes is really long enough for the players reach levels of deep involvement in an activity. The prospect of having continuous information about what is going on within a specific moment of play is an appealing one however and Mandryk and Atkins (2007) do suggest that this data might also be useful in combination with video data to identify incidents when a change in emotion occurs. Similarly, Hazlett (2008) proposes that this kind of data can be used in real-time to indicate when significant reactions and events have occurred, which the player can then be asked about afterwards. This approach was attempted in relation to the observational studies reported in Chapter 6 (Section 6.2.1.2 provides a discussion of how effective the approach proved).

While other researchers have begun to use physiological data to examine the gameplay experience, such as Lindley, Nacke and Sennersten (2008) (who also used EMG as a measure of positive and negative emotion, and GSR as a measure of arousal, in addition to eye tracking as a measure of attention), there are other approaches to gaining information about emotion and affect during play. For instance, Isbister and colleagues

(2007) developed the Sensual Evaluation Instrument (SEI) as a tool to support the self-assessment of affect across different cultures. The instrument consists of nine small clay objects that a user can hold in their hands to signify different emotions as they work through a system, or in this case while playing the point-and-click PC adventure game *The Curse of Monkey Island.* A pilot test was carried out with 24 participants (12 in Sweden, 12 in USA) after which the authors acknowledged that the instrument could do with some tweaking. They do suggest however, that it has the potential to elicit emotional feedback that may be difficult for participants to verbalise. The authors mention that further studies are planned to compare self-report, physiological measures and the SEI but at the time of writing, these have yet to be published. While the SEI may not be the most practical way to assess a player's engagement, especially when playing games that demand more sustained attention and quicker reactions, the research raises some important issues. First, the authors note that emotional reactions are notoriously difficult to measure, even when using biosensor data as this "offers the difficulty of interpretation of signals – for example, it is not possible to tell the difference between joy and anger (Bentley et al., 2005, p. 4)". Further, it highlights the role culture and language can have when discussing emotion. As such, even if an apparently objective measure (e.g. based on physiological data) is being used, the way in which the signals are interpreted as emotions will also be subject to cultural and language effects.

The assertion by Mandryk and colleagues that questionnaires cannot provide an objective measure of experience is also questionable. For instance, Calvillo-Gamez, Cairns & Cox (2009) propose a theory for understanding the experience of playing video-games based on an evaluation of interactions that occur during play. This involved a grounded theory approach where game reviews were analysed in order to elicit the Core Elements of the Gaming Experience (CEGE). CEGE relates to the interaction between the game and the user (i.e. the player) where the process of play is affected by: *control*, *ownership* and *facilitators*. *Control* depends on the player learning to manipulate the game and the controllers, *ownership* refers to the player taking responsibility for their actions which the

gamer rewards him or her for, and *facilitators* are the most subjective elements of CEGE, which relate to external factors such as previous experience and aesthetic values. Calvillo-Gamez and colleagues validated their theory by developing a questionnaire and carrying out an experiment to test it, where two versions of the same game were compared. Participants were asked to play *Tetris* using two different controllers (a QWERTY keyboard and a knob-like device) for 15 minutes within a lab environment. After each session they filled in the questionnaire about their experience. The authors found enjoyment within the keyboard condition to be significantly higher than in the knob controller condition, with a significant difference in *control* scores (but not *ownership* or *facilitator* scores). This led to the conclusion that the lack of *control* in the latter condition led to a negative gaming experience in the case of playing the knob controlled game. The approach adopted by Calvillo-Gamez et al., suggests it is possible to develop objective measures in a questionnaire format which can be used to compare gaming experiences. The drawback of using a questionnaire in this way however, is that it does not provide a continuous assessment of gameplay since it is applied after the session and would be quite intrusive if play was interrupted on a frequent basis so players could fill it in.

2.3.4.2 Breakdowns, breakthroughs and critical instances

Another way to consider the gameplay experience is to focus on the problems that occur during play. For instance, Barr (2007) used a collective case study approach (examining 5 games, played by 5 different people) to investigate the relationship between the interface and the values expressed during gameplay. The concept of video game values are defined as “player’s beliefs about preferable conduct within games” (p. 4). The approach included a variety of methods including taped observation, concurrent think aloud, DVD capture of gameplay, semi-structured post-play interviews and analysis of game documents. Barr emphasises the importance of the researcher having first-hand knowledge of the games being played within a case study approach. Activity Theory was used to analyse instances of game play, in terms of contradictions and breakdowns, while grounded theory was used to uncover the values expressed during play.

Barr (ibid) acknowledges the contribution of Pelletier and Oliver (2006) in terms to using Activity Theory to analyse gameplay, though he makes a point of distinguishing between breakdowns and contradictions. Breakdowns may be indicative of contradictions and a contradiction may lead to a breakdown but not vice versa. Barr suggests a breakdown occurs when the flow of an activity is interrupted. The term “flow” is not used in the Csikszentmihalyi sense however. Rather, Barr is referring to the general flow of an activity and so a breakdown occurs when the wrong actions are carried out, e.g. a player pressing a button by mistake causing their avatar to jump instead of duck. While these disruptions are a common part of gameplay (and usually overcome quickly), Barr argues that repeated breakdowns within an activity are likely to indicate “systemic breakdowns” which reflect “underlying contradictions” (p. 160) within an activity system (e.g. repeatedly pressing the wrong button can indicate poor design). Essentially, the term contradiction is used to refer to more serious issues. However, Barr was not explicitly concerned about the relationship between learning and involvement during play. The main goal of his research was to consider gameplay as a form of human-computer interaction with respect to the developing the concept of video game values and investigating how contradictions occur between these values.

Iacovides (2009) used similar methods to Barr in order to explore the informal learning that occurs within game play (i.e. in terms of progressing within the game) and how this learning relates to the experience of player involvement during episodes of play. The methods consisted of a combination of observed game play and a post-play cued interview in which a recording of the game play was reviewed with the participant. In usability testing, critical instances are defined as “an event that has a significant effect, either positive or negative, on user task performance or user satisfaction with the interface” (Gabbard et. al, 1999, p. 54). This definition was adopted as a guideline for selecting which game play instances or themes should be analysed further, with a focus on events that affected player satisfaction and their overall experience during gameplay. The DGEM was then used to analyse these critical instances in terms of what was being

learnt and what kinds of involvement were being experienced, by describing the process of internalising the relevant frames. It was concluded that the DGEM did prove useful for identifying how deeper levels of involvement actually depend on internalisation (which can also be described as through a process of learning), since incorporation will only occur once the relevant frames have been internalised successfully. However, due to the small number of cases examined, it was noted that there was a need for further studies before any generalisations could be made concerning the relationship between involvement and learning and to establish whether the metaphor of incorporation could be applied to all types of games.

The notion of critical instance analysis relates to the idea of breakdowns in the sense that critical instances relate to particularly significant problems. Ryan and Siegel (2009) also used the concept of breakdowns for examining the experience of gameplay, to try and understand "embodied learning" in games, i.e. how the player goes about learning to play within the game. In this case, breakdowns are generally described as occurring "when actions we take to accomplish something no longer seems [sic] to work" (p.1). Drawing upon the earlier work of Marsh et al. (2001), Ryan and Sigel make a further distinction between interaction and illusion breakdowns: where a *breakdown in interaction* refers to what they describe as "the natural breakdowns" that lead to learning within the game and a *breakdown in illusion* refers to a loss of "immersion" (in terms of absorbed attention). Ryan and Siegel argue that the former are part of normal gameplay, but unlike the latter, they do not disrupt the experience of flow (in the Csikszentmihalyi sense). As a result of their analysis of gameplay, they present four main categories of breakdown, that relate to: perceiving the environment, developing strategy, taking action, and meaning making. However, they do not always make a point of indicating which of them (and their associated sub-categories) are interaction or illusion breakdowns. It is implied that most types of breakdowns stem from interaction issues but that some of these can also lead to further breakdowns in illusion.

In recent work, Sharples and colleagues (Anastopoulou et al., 2008; Sharples, 2009; Vavoula and Sharples, 2009) offer an additional perspective, using critical incident analysis to identify breakdowns and breakthroughs with respect to gathering mobile technology design requirements and evaluating learning within an educational context. In this instance, breakdowns are "observable critical incidents where a learner is struggling with the technology, asking for help, or appears to be labouring under a clear misunderstanding" while breakthroughs are "observable critical incidents which appear to be initiating productive, new forms of learning or important conceptual change" (Sharples, 2009, p. 10).

Vavoula and Sharples (2009) discuss how they considered breakdowns in relation to micro, meso and macro-levels, that relate to usability, learning and wider organisational issues respectively (and where breakthroughs only seem to occur in terms of learning on the meso level). In their research, the focus was on learning with mobile technologies within a formal educational context rather than on games, and so the macro-level is used to refer to institutional issues such as evaluating the impact of the a new technology on existing classroom practice (as opposed to the DGEM definition which relates to motivation and activities which occur outside of play).

The literature presented in this section indicates the number of different ways in which breakdowns have been defined and applied. In this thesis, the concept is addressed further in relation to analysing how involvement and learning relate to each other during instances of gameplay, with the specific definition being used for analysis presented in Section 6.2.1.1.

2.3.5 Taking a broader view of gaming

Most of the research from the fields of game-based learning and HCI understandably focus on evaluating instances of gameplay. However, it is also important to consider the activities and influences that relate to the wider practice of gaming. For instance, Bond

and Beale's "good game design factors" (based on a grounded theory analysis of a variety of game reviews) indicate how external factors such as price can affect whether someone decides to play a game in the first place (Bond & Beale, 2009). The fact that they based their analysis on reviews also hints at further external factors that could influence a player's decision to play something (i.e. the opinion of the review itself).

Instead of viewing games in purely interactional terms, they can be viewed as cultural objects that exist within a wider media ecology, as Walsh and Apperley (2010) suggest. Walsh and Apperley draw upon Galloway (2006), in order to discuss how gameplay depends on a cybernetic relationship between *operator* (i.e. the player) and *machine* (i.e. the software and hardware) actions. Galloway also makes a further distinction between diegetic and non-diegetic actions. The terms are adopted from literary and film theory, where *diegesis* refers to "the game's total world of narrative actions" and *nondiegesis* to "gamic elements that are inside the total gamic apparatus yet outside the portion of the apparatus that constitutes a pretend world of character and story". Thus gameplay itself consists of four types of actions: diegetic machine and operator actions, and nondiegetic machine and operator actions. Galloway argues that adopting this conceptualisation of gamic action allows him to include actions that other approaches might take for granted, like pressing the pause button (a non-diegetic operator act). Similarly, Walsh and Apperley (ibid) emphasise how non-diegetic actions can resonate within the game-world even though they are external to it, indicating the importance of taking different kinds of actions into account.

De Freitas and Oliver (2006) also refer to the distinction between diegetic and nondiegetic, as part of their framework for evaluating games. Again, the authors use diegesis to refer to the internal representational world of a game but they also argue that the term helps to "highlight the difference between being immersed within the game and the process of critical reflection that take place outside of the game" (p. 254). While this makes sense in the context of de-briefing after using a game in a formal setting, it also

suggests that reflection only takes place outside of play, something which contradicts Galloway (2006). In Galloway's analysis, a cut scene is a *diegetic machine* act and the player's movement in the game world a *diegetic operator* act. However, the player configuring their inventory is a *non-diegetic operator* act and a character's death is a *non-diegetic machine* act. All of these can take place during a session of play, and Galloway's analysis offers a more complex relationship between diegesis and nondiegesis than de Freitas and Oliver suggest. Perhaps, Schön's distinction between reflection in action (while on your feet) and reflecting on action (after the event) would be useful here (Schön, 1987). A player may be performing in a *non-diegetic operator* act when they reflect on their inventory options, but it is still an important part of the experience of gameplay to consider, as is any other *non-diegetic* "meta-analysis of gameplay" they engage in (Galloway, 2006, p. 13). Galloway's model of gamic action helps to focus attention to the different types of actions which may occur in relation to learning, although he does admit that the model lacks a consideration of the interactions between two or more operators.

One concept which could be useful for considering how gameplay emerges as a meaningful practice, is that of "gaming capital". The notion is based on Bourdieu's (1984) work on "cultural capital" and can be used to:

> *…capture how being a member of game culture is about more than playing games or even playing them well. It's being knowledgeable about game releases and secrets, and passing that information on to others. It's having opinions about which game magazines are better and the best sites for walkthroughs on the Internet.*
>
> (Consalvo, 2007, p. 18)

Consalvo discusses how "paratexts" can help players to acquire gaming capital. Paratexts are external resources that can "surround, shape, support, and provide context for texts" (p.182). With respect to gaming, games themselves can be considered to be the primary texts, whereas some examples of paratexts include walkthroughs, previews, YouTube videos, blogs, reviews, magazines etc. that relate to games. Players can thus increase

their knowledge about games and gameplay practices by using different forms of paratext. Some of this knowledge may also translate to greater competence within specific games. Both the concept of gaming capital and the notion of paratexts would be helpful for considering motivation and informal learning in relation to community membership. They could also be useful for discussing game-related activities that occur outside the experience of play, e.g. consulting a game guide.

Some work has been carried out which considers gaming capital and paratexts within an educational context. Walsh and Apperley (2010), for instance, were interested in how young people accumulate and exchange gaming capital (and how this relates to other forms of capital, e.g. social, cultural and symbolic as identified by Bourdieu, 1984). Further, Walsh (2010) provides a description of two case studies in order to illustrate "examples of system based literacy practices emerging from their participation in projects where they explored, researched, played and designed digital games and digital game paratexts in classrooms which openly acknowledged their gaming capital" (p. 29). In both cases, students who had previously struggled with meeting the National Literacy benchmarks standards in English (within Australia), were able to meet them after playing games, producing paratexts based on them (such as game reviews) and even using Powerpoint to design their own games. Walsh argues that by making the curriculum more relevant to these students' life-worlds, and through acknowledging and valuing students' gaming capital, the students were able to engage in powerful meaning making practices (beyond playing) that led to increased proficiency in the design of school-based texts.

Studies outside of formal education have also considered gaming and learning within a wider context. For example, Oliver and Carr (2009) adopted a communities of practice approach to explore how and what people learn through their involvement in the MMOG *World of Warcraft.* Further, the authors made a point of not wanting to separate out the learning practices players engaged in from the real-world context within which play took place. As such, the investigation focused on couples who play together as a way of taking

interactions that occurred both within and out of the game-world. In terms of what people learnt, a grounded theory analysis indicated one of the main markers of learning to be the management of different resources including: *ludic* (in terms of the skills, knowledge and practices of gameplay), *social* (in terms of making and maintaining friends and being involved in guild administration) and *material* resources (regarding physical resources in the real world). In terms of how people learnt, the findings from the interviews carried out were described using a number of concepts from Wenger (1998). These include descriptions of how the players developed increasing participation (e.g. moving from trying out their partner's account to getting their own), how they engaged in legitimate peripheral participation outside of the core activity of playing the game (e.g. commenting on someone else's play or debating whose turn it was to use the better computer), different trajectories of participation (e.g. inbound trajectories which lead to identification with the community), how multi-membership of communities could cause conflict (e.g. having to leave the game to deal with a crying baby) and how conflicts in and out of the game were resolved (e.g. developing rules about which characters they could play when). The authors suggest that previous research has focused mainly on the ludic elements of gameplay, but that the social and material elements indicate other areas that would be particularly relevant to distance education students. As such, they conclude there is scope for further research into the area, where a communities of practice perspective would be helpful with respect to designing and analysing virtual worlds that support learning.

Squire (2005b) presents a detailed analysis of how a specific game (the cult-classic and notoriously difficult fighting game *Viewtiful Joe*) encourages players to develop new skills and mastery. Gameplay was analysed as an activity system through the consideration of player generated FAQs (frequently asked questions) as examples of expert gameplay practice. He describes how players learn to "read" the game as semiotic system, learning which signs they need to pay attention too, while figuring out the strategic importance of possible fighting moves, understanding game system patterns and properties, and continuously monitoring their progress within the game. Specific episodes of gameplay

are supplemented with paragraphs from the FAQs in order to “show how expert gamers represent their practice for other gamers and display their identities for which may give them better accolades” (p. 11). Squire relates the way experienced players develop “ways of seeing” what is important within the game-world to the skills students need to develop, suggesting that anyone who wants to design games for education needs to appreciate “that helping us ‘see’ patterns is one of the most compelling qualities of the medium” (p. 23). He also emphasises the need to take a holistic view of gameplay and the importance of also looking outside the experience of play.

2.4 Research aim

One important note to make about both the Oliver and Carr (2009) study and Squire’s (2005b) is that they are looking at player involvement in relation to one particular game. While this kind of in-depth study is extremely useful in terms of understanding how players relate to the mechanics of a specific game, it says little about how people interact with games in general. This is significant when considering the fact that more and more people are playing games, but we know little about whether their experiences of involvement and learning differ. It is unlikely that everyone who plays games plays them in the same way and engages in the all the practices that Gee (2004; 2007) describes. For instance, when Squire (2005b) gives an account of a particularly difficult game to persevere with, he admits to asking himself “Why do I want to do this?” (p. 26), and not being particularly sure of the answer. It cannot be the design of the game itself, since “*Viewiful Joe* is difficult enough that many players never finish it at all” (p. 8) so something else seems to be motivating him to continue. Further, in much of the literature where the issue of identity is discussed, the term is used to refer to how people identify with their avatar or character within the game-world rather than in terms of how they identify as players. However, this focus misses out on the consideration of how identifying as a gamer (hardcore or otherwise) relates to issues of motivation, engagement and learning.

The literature presented in this chapter suggests that there is a need for “more rigorous research into what players do with games (particularly those that don’t claim explicit status as educational), and a better understanding of the thinking that is involved in playing them” (Squire, 2008, p. 167). This kind of research would also help address the need for more studies examining the unintentional side of learning (Vavoula et al., 2005) and the fact that there is a lack of research examining learning in relation to instances of play (Pelletier & Oliver, 2006). In particular, more naturalistic studies of gameplay would help to contribute to our understanding of what learning through gaming actually entails. Further, it is not clear how engagement is sustained over time nor or how concepts such as gaming capital and identity relate to motivation, i.e. a further exploration of macro-level involvement is required.

Through taking a broader view of gaming and adopting methods from the fields of HCI and games studies, the research reported in this thesis aims to evaluate gaming through investigating instances of gameplay and the activities that occur around it. A variety of terms are used to describe different aspects of gameplay so key terms will be defined explicitly throughout the thesis. As stated in Chapter 1, for the purposes of this research, *engagement* refers to the experience of being involved in gameplay and *motivation* refers to the reasons why players choose to engage in different games in the first place and what makes them come back to a game. The two concepts appear connected, since some sort of motivation is necessary for the player to pick up a game in the first place (before any engagement is experienced) but subsequent experiences of engagement may motivate a player to keep playing, or even to stop. In terms of learning, the focus is mainly on the *unintentional informal learning* that occurs in order for players to progress within the game, whether they achieve this alone, or through collaboration with others (directly or indirectly through the use of paratexts). These key terms (engagement, motivation and informal learning) will be revisited and refined throughout the thesis. This thesis aims to address the following overarching research question:

How do motivation, engagement and informal learning relate to each other within the context of digital gameplay?

The following chapter outlines how this overarching question was broken down into a set of sub-questions to be investigated through a consideration of people's experiences of gameplay and wider gaming practices.

3. Methodology

The previous chapter provided a review of the relevant literature before outlining the main research aim of this thesis: to explore the relationships between motivation, engagement and informal learning within the context of digital games. The current chapter considers some of the methodological issues that relate to the study of games and introduces the methods adopted for the purposes of this thesis. Egenfeldt-Nielsen et al. (2008) point out that there are several different ways in which the study of games has been approached, where the methodology chosen should be "best suited to answer the question at hand" (p. 8). They also outline four specific areas of focus within the field:

i. *Rules*: involving the study of one or more games in terms of how they are designed and structured, e.g. Tosca's (2002) "close reading" of Resident Evil X: Code Veronica X.
ii. *Play*: where the activity of playing the game is the main area of interest, e.g. Wright et al. (2002) examining the in-game chat logs of Counter Strike players to explore the social character of FPS games.
iii. *Culture*: in terms of subcultures that evolve around games and how gaming relates to wider cultural patterns, e.g. William's (2002) analysis secondary texts (such as news articles) in order to examine how games have been portrayed in the US media.
iv. *Ontology*: where researchers address the philosophical foundations of games, e.g. Juul (2006) presenting a definition of video games.

Regarding this thesis, the focus is not on game rules or ontology but on players and culture in order to examine learning and involvement with respect to the gameplay experience and the wider practices players engage in. There will be some consideration of the games themselves (i.e. in terms of how players interact with them, rather than in terms of analysing how they have been designed). As Galloway (2006) points out, gameplay involves both operator (i.e. the player) and machine (i.e. the software and hardware)

actions, so it is important to consider both in relation to each other. Further, the interest in gaming culture is due to the suggestion from authors such as Gee (2004; 2007) that learning in this context does not just result from gameplay but also from how players interact with game-related domains and groups. While there has been some research into communities of players that exist around specific games, especially in the context of MMOGs, e.g. Steinkuehler (2004), Nardi, Ly and Harris (2007), Oliver and Carr (2009), there is less research which looks at how players interact with game-related communities in general. Consalvo (2007) does consider how players use a variety of paratexts, but her aim was to explore the concept of cheating and so her focus was not explicitly related to issues such as engagement and learning. In order to examine motivation, engagement and informal learning which may occur as a result of gameplay and wider community interactions, a variety of methods will be required.

This chapter describes the overall research approach adopted in this thesis in Section 3.1 before going on to introduce each of the studies that address different aspects of the overarching research question. This includes a consideration of the methods chosen to carry out each study and the rationale behind them. Section 3.2 introduces the first phase of the research project which included a conceptual analysis and an email interview study with different players, providing an initial investigation into the concepts of motivation, engagement and learning. (As a result of the conceptual analysis, engagement and motivation were subsequently reconceptualised as micro and macro-involvement respectively – this is further explained in Chapter 4, although it is also reflected in the wording of the later research questions). Section 3.3 describes the methods adopted within the second phase of the research, which involved a multiple case study approach to look at how involvement and learning come together in practice. The third and final phase is outlined in Section 3.4, where a questionnaire study which was carried out to contextualise the findings of the research. Section 3.5 then provides an overview of the ethical considerations of the research before the chapter concludes in Section 3.6.

3.1 Research approach

As the previous chapter and the introduction to this one the introduction indicates there is not a single approach to games studies research. The question remains then as to how to approach the investigation of motivation, engagement and informal learning within this context. In particular, this thesis has been influenced by Popperian ideas which emphasise the importance of developing knowledge through critical testing. As Aczel argues:

> *Given that observation is theory-laden; that accounts are selective; that knowledge is produced in a socio-historical context; that situations have multiple perspectives; that knowledge about learning is neither handed down from on high by scientists in white coats, nor by mystics in coloured robes, nor by politicians in primary-coloured ties; Popperians conclude that it is not in general methods of production that warrant knowledge, nor even the authenticity or authority of the knowers, but the extent to which knowledge is tested critically - theoretically or empirically.*
>
> (Aczel, 1998, p. 20).

Calvillo-Gamez (2009) provides an example of how a critical rationalist approach can be applied to the study of video games. Through producing generalisable and falsifiable statements regarding user experience and testing these through experiments, he developed a model of the Core Elements of the Gaming Experience (CEGE). The model, which emphasises the importance of player control, ownership and facilitators in relation to the enjoyment of single-player games (Calvillo-Gamez et al., 2010), was discussed in Section 2.3.4.1. This thesis adopts a similar developmental approach, where the findings produced within each phase of the research builds upon the previous findings, i.e. the analysis in Phase 1 produced certain theoretical conjectures which were tested in Phase 2, while the findings in Phase 2 are further addressed in Phase 3.

From this perspective, rigour is achieved through critically assessing the evidence available and recognising the potential limitations of resulting interpretations. Additionally,

validity depends on the elimination of erroneous ideas as "although we can never know if we have found the truth, there is the potential to discover error" (Aczel, 2006, p1.61). Through this process, a more accurate understanding can be developed of how motivation, engagement and informal learning relate to each other within the context of gaming.

Table 3.1: Overview of studies carried out

Study 1: Email interviews			
Timeline	Participants	Methods	Aims
October 2009 – January 2010	30 players 20 Male, 10 Female Age: 20-58yrs	Snowball sampling method for recruitment Email interview with structured questions sent in two blocks and follow-up questions asked at the end if required	To investigate how players refer to motivation, engagement and learning within the context of gaming
Study 2: Case studies			
Timeline	Participants	Methods	Aims
April – September 2010	Eight cases with nine participants 1. Matt (M, 24, gamer) 2. Katy (M, 23, gamer) 3. Linda (F, 59, non-gamer) 4. Justin (M, 32, gamer) 5. Alex (M, 41, gamer) 6. Nick (M, 29, non-gamer) 7. Amy (F, 28, non-gamer) 8. Natasha (F, 31, non-gamer) & William (M, 32, non-gamer)	Participants recruited from initial email interview study Initial interview, observation of gameplay within the lab, collection of physiological data, post-play cued interview, diary-interview method. Study took place over three weeks with players coming into the lab to play on three occasions. Daily gaming diary kept over three week period. Final interview based on the entries.	To explore how learning and involvement come together in practice, i.e. during gameplay and in relation to wider gaming related activities.
Study 3: Gaming survey			
Timeline	Participants	Methods	Aims
April – May 2011	232 respondents, recruited from departmental mailing lists and online platforms at the Open University and University of East London 125 Male, 106 Female, 1 Other Age range: 18->65yrs	Snowball sampling method for recruitment with invitations sent to departmental mailing lists and online platforms at the Open University and University of East London, UK 18 item survey consisting of Likert scales and two open ended questions	To investigate gaming habit and preferences on a wider scale and how they relate to gaming identity

A Popperian influenced approach allows for the use of mixed methods since the emphasis is less on the type of methods adopted and more on the claims resulting from the methods employed. The emphasis is on presenting claims as potentially falsifiable statements which can be critically assessed. As “The qualitative investigation can clear the ground for the quantitative – and the quantitative be suggestive of differences to be explored in a more interpretive mode” (Pring, 2000, p. 259) there is little need to choose one set of methods over the other. Table 3.1 provides an overview of the methods adopted within each of the studies.

3.2 Phase 1: Setting the scene

3.2.1 Research questions

In order to explore the issue of how motivation, engagement and learning relate to each other within the context of games the following set of sub-questions were asked as a starting point:

1. *What motivates people to play games?*
    a. *What factors affect this motivation?*
2. *What factors affect engagement during play?*
3. *How do players describe learning within the context of gaming?*
4. *What links can be identified between motivation, engagement and learning from player accounts of their gameplay experiences?*

An interview study was carried out in order to address each of these questions. However, while examining frameworks that could be used to identify engagement and motivation for the purposes of analysis, it soon became clear that there was a large amount of overlap between some of the different models within the literature. As a result, a conceptual analysis was conducted where the Digital Game Experience Model (DGEM) was adopted as an overarching framework. Motivation and engagement were subsequently reconceptualised as forms of macro and micro-involvement respectively. The conceptual analysis and the findings from the email interview study are discussed in Chapter 4 in

terms of how they answer research question 1 and 2. Chapter 5 discusses the findings from the study in relation to addressing research questions 3 and 4. Phase 1 consists of both the conceptual analysis and the first study carried out. The rest of this sub-section outlines the methods adopted for study 1 and the procedure involved.

3.2.2 Design and piloting

This study investigated why people play games (motivation), what factors affect their desire to keep playing (engagement), how they learn to play games and what else they might learn within this context (informal learning). Questionnaires have been developed to consider these sorts of concepts, such as Yee (2007) examining player motivations and Calvillo-Gamez et al., (2009) using a questionnaire to distinguish between two different gaming experiences in terms of the core elements of gaming. In the latter case there was some consideration of learning, at least with respect to how mastering the controller can contribute to a sense of control and improve the overall gaming experience. Generally speaking however, there is a lack of research that explicitly tries to link motivation, engagement and learning. Without having a clear idea of what these links might be, the option of a closed questionnaire was not considered appropriate for answering the research questions outlined above.

Interviews have also been used previously within this area, often in conjunction with other methods of data collection. For instance, Joiner et al. (2007) used interviews with students and teachers as part of an evaluation of Racing Academy. However, while interviews have been used to ask players about their involvement with games, e.g. Calleja (2007a), there has not been much focus on informal learning within this context, at least not outside the realm of MMOGs. Whitton (2007) adopted a phenomenographic approach when asking people about both their motivations for playing games (digital and non-digital) and their attitudes towards the use of games in education, but again her focus was on formal rather than informal learning contexts. A variety of interview formats could be used including face-to-face interviews and email interviews. Researchers of MMOGs have also carried out interviews within the virtual worlds of players (using game avatars), e.g. Calleja (2007)

as part of an ethnographic approach but this was inappropriate as the purpose of the investigation was to talk to a wide range of game players about their experiences with games in general (and not just about MMOG experiences).

Before deciding on the format for this study, piloting took place in order to test potential questions and two different formats. Two face-to-face interviews and two email interviews were carried out with people known to the researcher, the only requirement was that the participants had at least some experience of playing games (Age: 24-31yrs; two male, two female). The final version of questions was emailed to two colleagues of the researcher who were known to enjoy playing games. Their feedback ensured that the questions made sense, the wording was clear and the number of questions was manageable. The piloting process helped to refine the interview questions and allowed for a comparison of face-to-face and email formats.

This comparison and the fact that there is similar reliability and validity between email and face-to-face interviews (Hamilton & Bowers, 2006) led to the final decision to interview participants via email. While the email format does lack the spontaneity of face-to-face interviews (and of interviews carried out on instant messaging channels), the asynchronous nature of the medium also allows participants to be more reflective in their responses and to respond in their own time (Bampton & Cowton, 2002). During piloting, the face-to-face participants often had to pause and think, with one participant commenting that he would have liked more time to consider his answers as he had not really thought about some of the issues raised before. One of the other disadvantages with email interviews is the loss of physical cues such as body language, which may help when interpreting responses during analysis. That said, not all interviews involve the analysis of this kind of data, while the use of text characters such as emoticons – e.g. a smiley face to indicate humour in the form of ☺ – does provide some further insight into the tone of what is said. Further, Brampton and Campton (2002) argue that carrying out an interview via email means there is less potential for interviewer bias. They also point

out that the researcher is also able to follow up on any interesting responses through further email contact (which would be more difficult with after a face-to-face interview). In addition, there is also the added bonus of not having to transcribe the audio data in the case of email interviews.

As a result of the piloting, it was decided to split the final set of questions into two sections in order to ensure that participants were not daunted by being sent a long list of questions. This also meant that the semi-structured email interview would come across as a conversation between the interviewer and respondent, rather than a one-shot open-ended survey. Table contains a list of each set of questions sent to participants.

Table 3.2: Email interview questions

First set of questions	
1a.	What sorts of video games do you play? e.g. adventure games, puzzle games, FPS
1b.	What gaming platforms do you use? e.g. PC, Nintendo Wii, Sony PSP
1c.	How often do you play games? e.g. Daily, once a month
1d.	When do you usually play? e.g. during lunch, late at night, at weekends
1e.	How long does a typical session last? e.g. half an hour, 6 hours
2a.	What motivates you to play video games, in general?
2b.	Do you have different reasons for playing different games?
2c.	Do you play games with other people?
2d.	If so, why?
2e.	Do you talk about games with other people?
2f.	Are there any games that you don't play?
2g.	If so, why not?
Second set of questions	
3a.	How do you approach playing a new game?
3b	How do you get better at it?
3c.	What keeps you engaged in a game?
3d.	What would make you stop playing?
3e.	What do you do if you get stuck?
4a.	Do you think you learn anything from playing games?
4b.	Do other people ever help you learn how to play games?
5.	Is there anything else you'd like to add?

The questions first asked participants about what they liked to play and what their sessions were normally like before asking them to respond to questions which related to motivation, engagement and learning. Questions about other people were also included in order to tap into the social contexts in which people both play and discuss games. The items concerning different aspects of game play (genre, platform, frequency, context and

duration) were included to give an indication of different player habits and preferences. Chapter 2 suggested some reasons for why games are becoming more popular (including the emergence of casual games; Juul, 2010) so it was important to try and recruit a variety of games players in order to allow for a consideration of as wide a range of experiences as possible.

3.2.3 Procedure and participants

Participants were recruited via posters and university mailing lists. Posters were put up in social locations around the Open University campus including two cafes and the Digilab (this is a creative space within the library which supports innovation in the development of learning materials, by providing a space for people to use different forms of technology including game consoles and games). Recruitment emails were sent via departmental, library and postgraduate student mailing lists. When preparing the recruitment poster and email invite, an effort was made to try and appeal to as broad a range of game players as possible, by including pictures and a tagline that would appeal to both casual and hardcore audiences (see **Appendix 1**).

After a prospective participant responded to the initial email, they were sent a consent email informing them of the purposes of the study, that their responses would be anonymised and that they could withdraw at any time. They were asked to confirm their consent and provide the researcher with the following information for demographic purposes: age, gender, occupation and highest level of education completed. After the participant had confirmed their consent to take part, they received the first set of interview questions. If the responses received were too short, further prompts were sent by the researcher to elicit more detail. Once a full set of answers had been received, the second set of questions was sent out. After the second set of responses, each interview was examined in its entirety and follow-up questions were asked that related to individual responses. During the interview process, reminders were sent if the participant took more than a week to respond. Ethical considerations are addressed in Section 3.5.

Thirty adult participants (mean age: 32.5yrs; age range: 22-58yrs; 20 male, 10 female) took part in the study between October 2009 and January 2010. Thirty-three participants started the interview process but two people failed to complete the interview process (despite being sent prompts they stopped responding) and one person was excluded as she was from outside the UK and did not speak fluent English. Participants consisted of staff or full-time postgraduates based on the Open University (OU) campus and family and friends of OU staff and students who were forwarded the initial recruitment email, similar to the snowball sampling method described by Consalvo (2007). The recruitment posters and emails were effective in reaching a wide variety of different players (see **Appendix 2** for a sample of player profiles). However, it should be noted that while the educational level ranged from GSCE to Doctoral level, this was a generally well educated sample, with 8/30 participants having PhDs, only 3/30 having been educated only up to secondary level and the rest all had bachelor or masters degrees. This means the results may not be generalisable to the wider population.

The analyses and results of the study are described in Chapters 4 and 5. Chapter 4 discusses the conceptual analyses that took place prior to data analysis, and the application of the DGEM to the interview data in order to consider motivation and engagement. Chapter 5 then introduces a set of learning categories developed from the data and the results of a thematic analysis which was carried out in order to consider the potential links between involvement and learning. Both Chapters 4 and 5 develop some initial claims to be further investigated in Phase 2.

3.3 Phase 2: A series of case studies

3.3.1 Research questions

After considering what players say about their involvement and learning within the context of games and developing a set of learning categories and themes related to this, the next phase examined gameplay and the activities around it which occur in practice. This meant exploring both macro and micro-level activities as a way of furthering our understanding of

gameplay and the activities that surround it. The following research questions were addressed:

5. *How can we identify breakdowns that occur during play?*
    a. *How do players attempt to resolve these breakdowns?*
    b. *What role do breakthroughs play in this process?*
6. *What does examining breakdowns and breakthroughs tell us about how involvement and learning come together in practice?*
7. *What evidence is there that players are learning anything in addition to learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

The following sub-sections describe how the second study was designed and carried out. Regarding questions 5 and 6, the analysis during Phase 1 led to the development to a number of theoretical conjectures relating to micro and macro-involvement, which were further assessed as part of Phase 2. The analysis of Phase 2 is reported in Chapter 6. This also includes the application of the previously developed learning categories and gaming themes, in order to address questions 7 and 8.

3.3.2 Design and piloting

In order to address the research questions, a multiple case study approach (Yin 2009) was adopted to allow for an in-depth consideration of how involvement and learning come together in practice. This is similar to what Stake (1998) calls a collective case study approach, where several cases are "examined in order to provide insight into an issue or refinement of theory" (p. 88). The approach was developed from previous work carried out by Iacovides (2009) who examined learning with respect to micro-level involvement by adopting a case study approach. Five participants were observed playing in the lab on one occasion and interviewed post-play, where a recording of their gameplay was used as cue to improve recall during a post-play interview. Regarding the current study, the design

was extended to include the collection of physiological data (to gain further insight in the player's micro-involvement) and the completion of diaries (to keep track of learning and micro and macro-involvement over time). Participants were also asked to come into the lab on three different occasions. Yin (2009) argues that collecting multiple sources of data helps to increase validity when using a case study approach, while reliability can be ensured by following a case study protocol. Following a protocol ensures that the researcher follows a similar procedure in each case, so a protocol was developed for the researcher to follow during each lab session and interview (see **Appendix 3**).

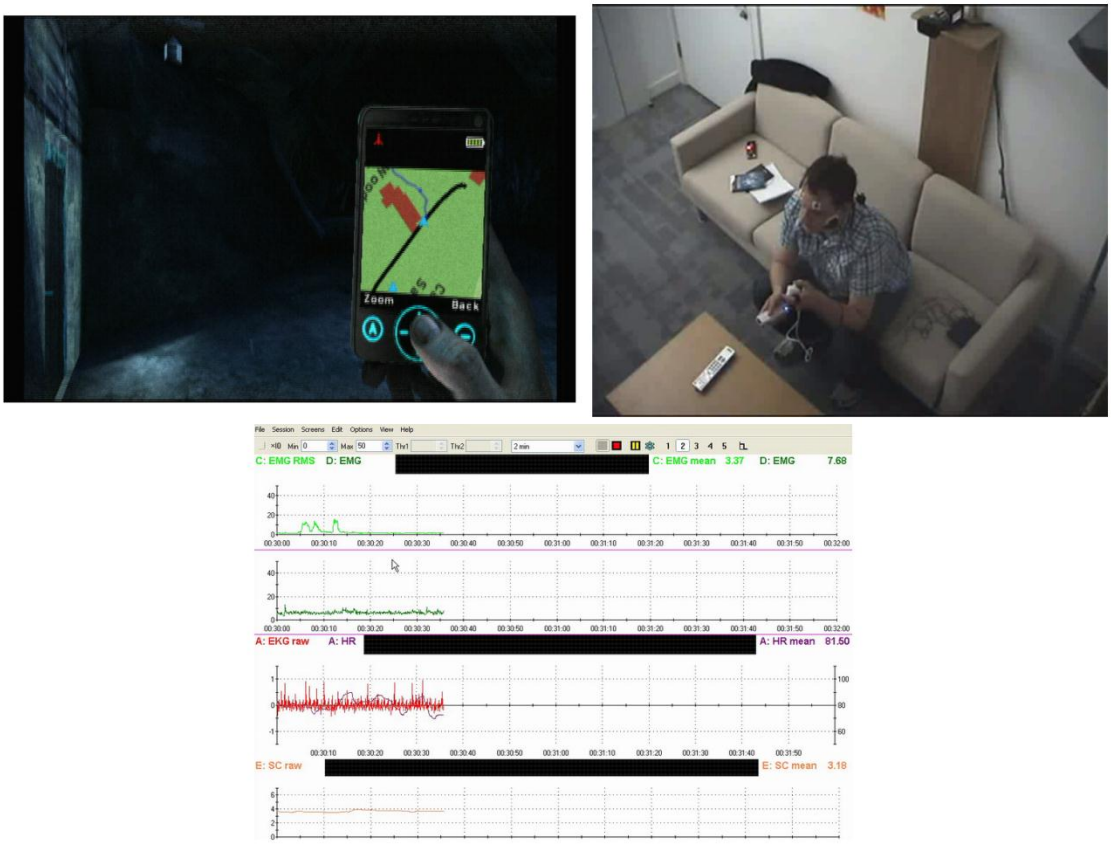


Figure 3.1: Video recordings of the gameplay, the player and the physiological readings

Physiological data was included as an additional measure to collect during observation to provide a further source of information about a player's micro-level involvement. Initially it was thought that the data could be used to signify when distinct reactions and events occurred, which the researcher could note and then ask the participant about (as suggested by Hazlett, 2008). However, in addition to this data, the researcher was also observing camera feeds of the player and of the gameplay itself (Figure 3.1 shows Matt

playing *Silent Hill: Shattered Memories*) and it was soon clear that it would not be possible to pay attention to all the screens and signals at the same time. Therefore, it was decided that the data would be used post-play instead, as it could also be useful for considering when a change in emotion has occurred (Mandryk & Atkins, 2007). Given research such as Nardi, Ly and Harris (2007) which suggests the importance of emotion in relation to learning MMOG practices, a secondary study aim was to establish whether the collection of physiological data would be useful within the context of exploring learning during gameplay.

As part of the process of familiarisation with the physiological equipment and signals, the researcher took part in three online mini-courses provided by Thought Technologies Ltd. These one-to-one sessions were tailored to the research requirements and were useful for introducing the hardware and software required to collect and measure physiological reactions. Following these sessions an extensive period of piloting took place in order to test out the different sensors and sensor placements (to ensure the participant was comfortable), the use of different games (to ensure that players showed a reaction to different types of games) and to make sure that the lab was set up appropriately in order to collect physiological data during observation. It was also decided that the researcher would observe from a separate room during the gameplay session, so the participant would feel less like they were being watched. Five people (colleagues and friends of the researcher) took part in seven different sessions as part of the piloting process (Age range: 24-33; 4 male, 1 female). Two of the pilot participants also gave feedback on the interview questions and questionnaire that were part of the introductory session and on the prompts which were included in the diaries. This helped to clarify the questions and to structure the diary format.

The set of measures included in the final design galvanic skin response (GSR), electromyography (EMG), electrocardiography (EKG) and heart rate (HR) – were chosen on the basis of the piloting and the work carried out by Mandryk and colleagues (e.g.

Mandryk & Inkpen, 2004; Mandryk & Atkins, 2007) in order to try to capture reactions in terms of both arousal and valence. In line with this work (discussed in Section 2.3.4.1), surface EMG electrodes were used on the jaw (indicative of tension), cheek (indicative of smiling) and on the forehead (indicative of frowning). Three electrodes preconfigured in a triangular arrangement were used on the jaw and cheek, while separate extender cables were used for the forehead. For EKG, three pre-gelled surface electrodes were attached in the standard configuration of two electrodes on the chest and one electrode on the abdomen. Heart rate is calculated from this EKG signal. GSR was collected using surface electrodes that snap onto Velcro straps worn around the index and ring fingers. Facial and body hair can interfere with the EKG and EMG signals so participants were screened on the basis that this would not be an issue (i.e. they were informed of the potential interference and asked whether they thought this would problem). The data was collected using the ProComp Infiniti system and sensors, and BioGraph Software from Thought Technologies.

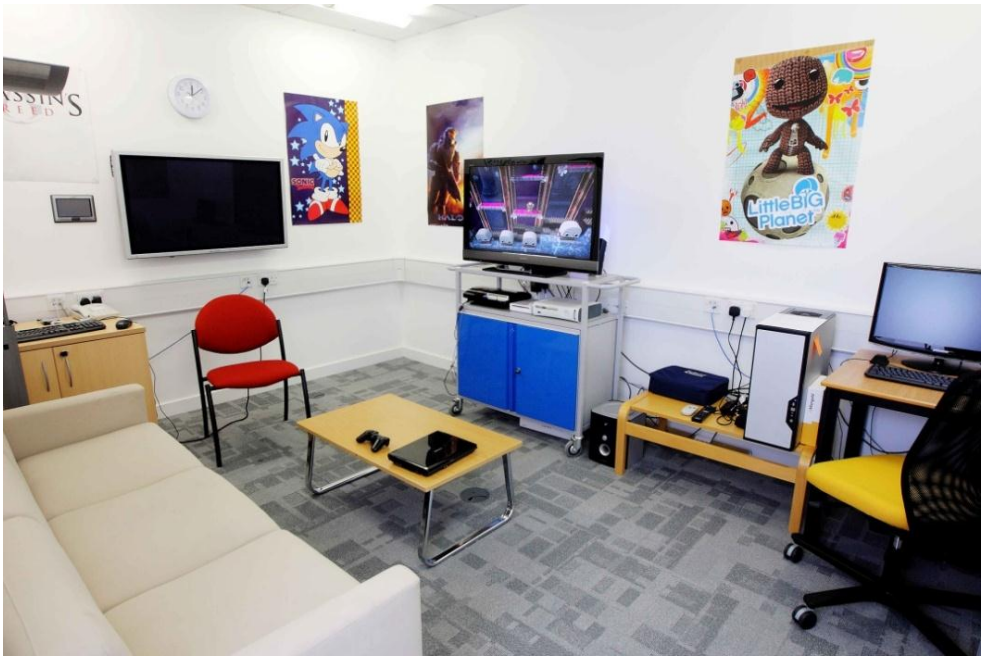


Figure 3.2: Gaming lab

The lab was set up as a relaxed living room environment, with adjustable lighting, a couch, wide screen TV and game consoles for participants to play (Figure 3.2). As stated earlier, the researcher observed the sessions from a separate room. In order to make the

participants as comfortable as possible, an introductory session was included where they were introduced to the equipment and procedure for subsequent sessions (as suggested by Mandryk, 2005). During the first main session, participants were asked to bring in a game of their choice (in order to examine a genuinely motivating experience) and in the second session they were asked to play something they had not played before (in order to examine a less familiar experience that could potentially involve more opportunities for learning). The next section introduces the participants who took part in the main study and outlines the procedure carried out.

3.3.3 Participants and procedure

Eight case studies were completed between April–Sept 2010, with nine participants taking part (mean age: 33.2yrs; age range: 23-59; 5 male, 4 female). Each case study consisted of a single participant who was asked to come into the lab on three occasions and to keep a gaming diary over a three week period, except for one case study which consisted of two participants (a married couple). The couple were included in order to test the efficacy of the method in dealing with more than one player and to consider some of the social influences that might affect involvement and learning. Players were recruited from a previous email interview study, and differed in terms of age, gender, how they identified as gamers, with the aim of trying to maximise the differences between cases as far as possible (Stake, 2003). Barr (2007) suggests that this sort of approach allows for "multiple cases to shed light on one another and to contribute to a more generalisable resulting theory." (p. 44). Further, asking participants to play both a familiar and unfamiliar game helps to extend the variety of experiences included in the analysis.

As stated earlier, a number of methods were used, including observation, post-play interview, the collection of physiological data and asking participants to keep gaming diaries over a three week period. Participants were observed playing in the lab on three separate occasions. The first session was mainly introductory, during which time a preliminary interview was carried out and the physiological equipment was explained. This

session also involved signing a consent form (**Appendix 4**) and filling in a short questionnaire about their gaming habits and preferences (**Appendix 5**). The consent form also asked participants to state if there were any games they did not want to play. Within this introductory session, participants were asked to bring in a game of their choice to play in the lab for 15 minutes. The purpose of this was to familiarise them with the physiological equipment and the procedure they would follow during the next two sessions, during which they would be asked to play for up to an hour. A three minute baseline measure for the physiological recordings was taken before and after the gameplay sessions, for comparative purposes.

Figure 3.3: Researcher in the observation room

While the participant was playing, the researcher observed the session from a separate room which displayed camera feeds of the player and the gameplay, as well as the player's physiological reactions on a laptop (Figure 3.3). During this time, the gameplay was recorded onto PC so that after the session, the recording was reviewed with the participant in order to discuss what the participant was thinking and feeling during play. Tea or coffee and biscuits were provided during the post-play interview, to ensure the experience was a relaxed one.

The second session took place a week later where again the participant was asked to bring in what they were currently playing. This meant ensuring the player could continue their progress from the last time they played through either transferring a saved game file to their console of choice in the lab, or asking them to bring in their own console to play on. For the third session, the player was asked to play a game they had not played before, that was not sort of game they were likely to pick themselves (selected on the basis of the preliminary interview). The purpose of this was to examine what happened when they played something unfamiliar, although care was taken to make sure they had no objections to the researcher's choice.

Finally, participants were required to keep a paper based gaming diary (the paper format was decided on during piloting as it was seen as more convenient than asking them to complete entries via a computer). The purpose of the diaries was to keep track of gameplay which occurred outside the lab and to gain insight into their macro-level involvement, i.e. their wider gaming related activities. Elliot (1997) outlines the "diary interview" method as a way of observing behaviour that would otherwise be inaccessible. While the observation sessions allow for an examination of gameplay in a relaxed environment, the activity still occurs within an artificial setting and so the diaries were used to gain further insight into the real-world contexts of gaming. Elliot (1997) also visited participants to introduce and pick-up the diaries, while her study concluded with a final interview based on the entries; this interview allowed participants to both record and reflect on their behaviour. Similarly, regarding the case studies, the diaries were introduced within the introductory setting and participants were asked to bring in completed entries to the next observation session. The diary included questions to prompt the participants, so in addition to asking them to take note of what they played every day and for how long, they were asked questions about what they did when they got stuck, who they talked to about games, whether they visited or contributed to forums, and whether they thought they learnt anything from their activities (see **Appendix 6**). Participants were asked to fill in the diary daily, even if nothing game-related occurred, in

order to get them into the habit of filling it in. Though still retrospective, Mackrill (2008) suggests that “diary data are generally recorded closer to the event than retrospective interviews or questionnaires. This is presumed to improve the accuracy of the data” (p. 12) and checking them allowed for the researcher to note any potential issues early on. The case studies concluded with a final ½-1 hour semi-structured interview with the participant, based on their diary entries. Participants were given a £15 Amazon voucher to thank them for their participation in the study.

Egenfeldt-Nielsen et al. (2008) suggest that the area of game studies is “unified in the belief that in order to understand most aspects of video games you need to play them” (p. 11). Having at least some knowledge and experience of playing games not only contributes to the understanding of participant experiences also allows the participants to see the researcher as someone who was genuinely interested in games and their experiences. This was especially important during the case studies as meeting participants on multiple occasions and being able to talk naturally about games meant a rapport could be established. However, care was also taken not to come across as an expert, which might have intimidated more casual gamers. Arguably, this helped participants feel comfortable during the study and it may have also led to them being more forthcoming during the interviews.

The findings from Phase 2 are reported in Chapters 6. This includes the assessment and refinement of theoretical conjectures in relation to the breakdowns and breakthroughs identified during the observation sessions and within the diary entries. Further, Chapter 6 reports on the application of the previously developed learning categories and themes which were applied to the diary entries and interview data. Certain claims are also put forward for further consideration in Phase 3.

3.4 Phase 3: Wider survey

3.4.1 Research questions

During the case studies, it became clear that players differed widely with respect to the gaming activities they were engaged in but the sample size was too small to generalise from. In order to explore these findings from Phase 2 in more detail and to contextualise the research, Phase 3 involved a final survey study. A questionnaire was designed, based on the findings of the previous studies, to further address questions 7 and 8, while a further sub-question was added to explore the influence of player identity:

7. *What evidence is there that players are learning anything in addition to learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*
9. *Does player engagement with these communities and resources relate to how they identify themselves as gamers? If so, how?*

The following section outlines the design of the questionnaire and how it was carried out. The results regarding how the findings expand upon the previous phase and address questions 7, 8, and 9 are reported in Chapter 7.

3.4.2 Design and piloting

Within the literature, questionnaires have been used to look at gaming activity in relation to a specific game, e.g. Griffiths et al. (2004) comparing adult and adolescent players of the massively multiplayer online game *Everquest*. Whitton (2007) also carried out a questionnaire study where she found there was no evidence of a relationship between being motivated to play games for leisure and being motivated to use them for educational purpose. This provides insight into the use of games within formal contexts but not into what players think they learn from leisure time play. Several large consumer surveys have also been conducted, e.g. by the Interactive Software Federation of Europe (ISFE; 2010) looking at adult gamers and non-gaming parents in Europe. However, while these reports

often consider motivations and gaming behaviour, they do so from a marketing perspective and have less to say about the sorts of learning and the wider activities and communities that players might be engaged in.

In Phase 3, a number of questionnaire items were developed, based on the responses from the email interview (Phase 1) as well as the case study interviews and the diary entries filled in by participants (Phase 2). The online questionnaire was designed and hosted on Survey Monkey. The initial items were discussed with two faculty members of the Institute of Educational Technology at the OU who have had several years of experience designing questionnaires. A pilot study was carried out with 11 people (age 18-45; 7 male, 4 female). Wording and order changes were made based on feedback from the pilot participants.

The final questionnaire consisted of 18 questions, two of which were open ended. The first four items asked respondents for demographic information including age, gender, highest educational qualification completed so far, and the age they started playing digital games (screen shots of the questionnaire can be found in **Appendix 7**). Question 5 was taken from the ISFE survey (Q37; ISFE, 2010, p. 44) for comparative purposes. This question asked people how many hours per week they spent playing games, in addition to other leisure activities such as listening to music and watching DVDs. Respondents were then asked to complete items of different Likert-type response scales concerning what genres of game they were likely to play, the frequency and duration of play on different platforms as well as single-player and multiplayer play, how often they used and contributed to different gaming related resources, what they were likely to do when they got stuck and how far they agreed with statements relating to learning from games and macro-level involvement. With respect to sets of questions that included more than 10 sub-items (questions 6, 16 & 17), the order of the items were counter-balanced for each participant in order to compensate for possible order effects. Some reverse items were included within the agree/disagree statements contained in questions 16 and 17 to protect against

possible acquiescence bias. Participants were also asked to choose whether they would consider themselves a “casual”, “moderate”, or “hardcore” gamer (or whether they did not consider themselves to be any kind of gamer). These categories were chosen on the basis of the findings in Phase 1 and Phase 2 where it was clear that not everyone who plays games considers themselves to be a gamer and of those that did, very few referred to themselves as “hardcore”. The survey contained two open ended items to provide participants with the opportunity to explain their choice of gamer category and to say more about what they thought they had learnt from their involvement with games.

3.4.3 Participants and procedure

Participants were recruited via a number of different university email lists (at the OU and University of East London, in the UK) and online platforms such as Twitter and OU’s Platform. Again, participants were asked to pass on the email to friends and family (similar to the snowball sampling method described by Consalvo, 2007). Particular care was taken within the invite to emphasise that the questionnaire could be filled in by both dedicated and more casual players (**Appendix 8** contains the invite that appeared on the Open University Platform site). The study was carried out from April – May 2011.

Table 3.3: Age bands

Age	Percentage	Response count
18-25	29.7	69
26-35	42.2	98
36-45	19.8	46
46-55	6.0	14
56-65	1.7	4
over 65	0.4	1

In total, 232 people completed the questionnaire, 53.9% of who were male and 45.7% female (0.4% who identified as other). Table 3.3 provides an overview of the age categories, indicating 26-35 year old group contained the largest number of respondents.

While the educational qualifications reported ranged from GCSE to Doctoral level, the majority of participants were university educated, suggesting this was a particularly well educated sample (Table 3.4). The majority of respondents reported they started playing

digital games under the age of 12 (69.0%), though some started between the ages of 12-18 (15.9%) and after the age of 18 (15.1%).

Table 3.4: Highest educational qualification completed

Qualification	Percentage	Response count
O-levels/GCSE	5.6	13
A/AS-levels	13.8	32
FE qualifications	9.9	23
Undergraduate	32.3	75
Postgraduate	27.6	64
Doctorate	10.8	25

Participants were also asked about a range of leisure time activities and how much time they spent on them. The questionnaire included an item about such activities, taken from the International Software Federation in Europe survey (ISFE, 2010) for comparative purposes. The results of the original ISFE survey are presented in Table 3.5.

Table 3.5: Time spent on leisure activities - ISFE (2010) survey responses

Activities	None	5 hours or less	6-14 hours	15 hours or more
Going to the cinema	38	57	4	1
Reading newspapers and magazines	15	68	15	2
Playing sports/exercising	22	52	20	5
Reading books	21	54	20	5
Watching DVDs	22	61	14	3
Playing digital games	18	56	18	8
Listening to the radio	14	48	24	14
Listening to music on CD/iPod/other player	13	51	23	12
Watching TV	4	28	40	28
Socialising with friends/family	3	31	35	32
Surfing the internet	1	17	36	45

Note: The ISFE survey reports percentages to the nearest whole number.

The results of the same question for the Phase 3 survey are presented in Table 3.6. This data is presented in a descriptive format to provide an indication of the people who responded to the survey in Phase 3 and how the respondents compare to those surveyed by the ISFE. The main item of interest is the number of hours spent playing digital games per week, though all these items are analysed further in Section 7.2.1.

Table 3.6: Time spent on leisure activities - Phase 3 survey responses

Activities	None	5 hours or less	6-14 hours	15 hours or more
Going to the cinema	67	33	<1	0
Reading newspapers and magazines	22	63	13	1
Playing sports/exercising	19	61	19	2
Reading books	9	42	36	1
Watching DVDs	19	60	18	3
Playing digital games	4	33	37	26
Listening to the radio	34	38	19	9
Listening to music on CD/iPod/other player	9	38	24	29
Watching TV	13	46	30	11
Socialising with friends/family	1	25	50	23
Surfing the internet	1	16	31	52

Note: percentages reported to the nearest whole number for comparative purposes

Those that responded to the ISFE survey spent less time playing per week, on average, than the participants of the current study. However, the ISFE survey is based on the response of 6629 people across several different European nations, including the UK. While a specific breakdown of the UK figures are not available, the ISFE survey mentions 24% of UK respondents play digital games for more than 6 hours a week. In comparison, 37% of Phase 3 respondents report spending between 6-14 hours per week on games and 26% report spending 15 hours a week or more on them (i.e. 63% spend more than 6 hours a week playing games). Thus, the Phase 3 survey included a higher proportion of people who spend more of time playing games than those within the UK sample of the ISFE survey.

The ISFE survey categorises gamers with respect to how many hours a week they reported playing and in terms of how many games they had bought in the last three months, leading to six different categories. For instance, an intermittent gamer is defined as someone who reports playing no hours per week, and who has bought between 0-1 games in the last three months, while a committed gamer is someone who reports playing an hour or more a day and who has bought 3 or more games in the last three months. Due to the fact that this was a market survey, these classifications make sense but it does mean that effectively anyone who has bought or played games within this time period is defined as a gamer. As such, it tells us very little about how players actually identify

themselves. In the Phase 3 survey, players were asked to choose how they would describe themselves and asked to explain their choice in a subsequent open-ended question. Statistical analyses, including a factor analysis, were conducted in order to investigate the responses to the questionnaire items in terms of how the groups differed. The open-ended comments were also analysed by applying the categories and themes that were developed previously. The quantitative and qualitative analyses are reported in Chapter 7.

3.5 Ethical considerations

In all three studies the Economic and Social Sciences Research Council code of ethics was followedm which is informed by the six core principles of integrity, honesty, confidentiality, voluntary participation, the avoidance of harm and impartiality (ESRC Research Ethics Framework, 2010, p. 3). In each case, participants were informed of the nature of the study and its goal, that all the data was to be anonymised, treated as confidential and only to be seen by the researcher and her supervisory team, and of their right to withdraw from the study at any time. They were provided with the researchers' contact details in case they had any further questions or concerns. Participants were also asked to give separate consent for the use of extracts for the purposes presentation or training purposes.

With respect to Phase 2, ethical approval from the Open University was sought in order to ensure that the correct procedures were followed and that no unintended harm came to participants. The completed and approved proforma set out a protocol for dealing with applying the physiological sensors (see **Appendix 3**), where the researcher was to ensure the participant was comfortable applying the sensors in her presence (with the option of applying them in private or asking someone else to be present) and would only assist with their application if asked. It should be noted that the participant did not need to undress in order to apply the sensors, although they did have to place the EKG sensors underneath their shirt or blouse. Further, there was some concern that players might chose to play

games with particularly violent content but it was important to ensure that participants were allowed to bring in games that were representative of what they actually play, especially given the fact that participants were all over 18. The researcher did make sure however that no games were included in the study which had not been rated by an external body such as ESRB (Entertainment Software Rating Board) or BBFC (British Board of Film Classification).

3.6 Reporting of Analysis and Findings

The field of games studies is an emerging, multi-disciplinary field in which numerous methodological approaches have been adopted. In order to explore different aspects of how motivation, engagement and learning relate to each other within the context of digital games it was clear that several different methods would need to be adopted. A developmental approach to the research was adopted, influenced by Popperian philosophy, where each phase of the research developed the findings for consideration within the next. This chapter introduced the studies that were carried out, with reference to each of the research sub-questions addressed within each phase. The phases included a conceptual analysis of different models of engagement and motivation, an email interview study which aimed to set the scene by considering how players describe the concepts of motivation, engagement and learning (Phase 1), a series of case studies which explored how learning and involvement come together in practice (Phase 2), and a questionnaire study which aimed to contextualise the research within a wider context (Phase 3). The analysis and results of each study are presented in the subsequent chapters; the findings from Phase 1 reported in Chapters 4 and 5, the micro and macro-level analysis of the case studies in Phase 2 reported in Chapter 6, and the results of the Phase 3 questionnaire reported in Chapter 7. The next chapter outlines the conceptual analysis carried out and the findings of the email interview study that relate to engagement and motivation.

4. Conceptualising motivation and engagement as player involvement

The previous chapter introduced each of the different research phases and outlined how the studies were carried out. This chapter addresses the first two research questions:

1. *What motivates people to play games?*
    a. *What factors affect this motivation?*
2. *What factors affect engagement during play?*

In order to answer these questions a conceptual analysis and an email interview study were conducted. Section 4.1 describes the conceptual analysis of the different models and frameworks that have been used to discuss motivation and engagement within the context of games. This involves introducing the relevant literature in more detail before illustrating how the Digital Game Experience Model (DGEM) was used as an overarching framework. The decision to utilise the DGEM in this way and the subsequent re-conceptualisation of motivation and engagement as macro and micro-involvement will be explained. This conceptual work was also important with respect to the analysis of the interview data, which is presented in Section 4.2. Finally, Section 4.3 contains a discussion of the conceptual and empirical findings in terms how they help to answer the research questions.

4.1 Motivation and engagement: a conceptual analysis

4.1.1 Relevant literature

Prior to the main analyses of the data collected for the first study, several frameworks and models were considered for identifying why people play games (motivation) and what factors affect their desire to keep playing (engagement). These included: Malone and colleagues' theory of intrinsic motivation (Malone, 1981; Malone & Lepper, 1987), Deci and Ryan's Self Determination Theory (SDT; Ryan & Deci, 2000; Ryan, Rigby &

Przybylski; 2006), Whitton's (2007) six universal motivational factors and continua of 15 motivational preferences, Bond and Beale's (2009) good game design factors, Juul's (2010) casual and hardcore gameplay dimensions, and Calleja's (2007a; 2007b) Digital Game Experience Model. Some of these were discussed in detail in Section 2.2. Malone and colleagues' work, for instance, focused on the factors which make games "intrinsically motivating". The factors identified were *challenge, control, fantasy, curiosity, competition, cooperation* and *recognition* (Malone, 1982; Malone & Lepper, 1987). Ryan, Deci and Przybylski (2006) were also discussed in terms of how games motivate players, by satisfying their general psychological needs for *competence*, *autonomy* and *relatedness*. They also added "intuitive controls" and "presence" as additional factors that influence the experience of gameplay. In Section 2.2.2, the DGEM (Calleja 2007a; 2007b) was introduced, which describes how the *tactical, performative, tactical, shared, affective* and *spatial* frames come together to influence the gameplay experience on both a macro and micro-level. The rest of this section summarises the main aspects of the frameworks which were not introduced in Chapter 2 and further elaborates on the DGEM frames. The DGEM frames are summarised in Table 4.1, while all of the factors included in the other frameworks mentioned within this chapter are represented in Table 4.2. These tables illustrate how the DGEM was used to organise the other factors included in the conceptual analysis.

While Whitton (2007) was referred to in Chapter 2, the factors she introduced were not mentioned so further elaboration of her work is required. As part of her research, Whitton adopted a phenomenographic approach in order to collect and analyse data from a pilot interview study. The study was described as a mini-phenomenography since it was only carried out with 12 participants as part of the background research into her main topic. This led to highlighting six factors that were considered to be universally motivating or demotivating, and an additional 15 factors that were found to motivate some participants but to demotivate others (these are listed in Table 4.2). She asked participants about their experiences of digital and non-digital games, with the intention of identifying factors that

were relative to both digital and non-digital games, while her participants included both regular and non-regular game players. The universal motivating factors identified were: *being able to see improvement* and *the perception of being good at an activity.* The universal demotivating factors were: *difficulty getting started, getting stuck, lack of trust in the environment (e.g. perceiving it to be unfair),* and *intrinsic boredom with the subject matter*. In terms of the motivational preferences, these included 15 different factors which each existed on its own continuum: such as *active-passive* (how involved the player had to be in the activity) and *solitary-social* (whether the activity could be carried out along or with others). Whitton recognises the limitations of generalising from such a small sample but also suggests that these factors would be a useful starting point for future research, which is why they were included within this conceptual analysis. Her work also indicates the range of different influences that can affect someone's motivation to play a game. It is also worth noting that in terms of the continua factors, these may be static or more fluid depending on specific individual preferences and context. For instance, while a player may generally prefer to play more passive games when alone, they may enjoy more active games when playing with others.

Bond and Beale (2009) also identify a range of factors that relate to gameplay and presumably affect engagement. Using a different approach to Whitton (2007), they carried out a grounded theory analysis of a number of positive and negative game reviews (from GameSpot UK) in order to establish what makes a "good" game, i.e. one that receives favourable reviews. They also looked at sales figures and found a correlation between these and reviews scores ($r = 0.33$), suggesting a reasonable link between positive reviews and game popularity. As a result of their analysis, they found a total of 12 factors to consider, again, most of which occur on a continuum (from positive to negative, e.g. *customisability – lack of customisability*). The only exception to this was *annoyance*, which they state is the result of a combination of negative factors. Bond and Beale conclude that a "good game" is one that reviews consider to be *cohesive*, *varied*, with *good user interaction* and that allows for some form of *social interaction*. Meanwhile, the most

important factor to avoid is a *bad pricing*. They point out that further work is required in order to fully saturate the criteria for each category (as they did not have enough time to do this themselves) and suggest using larger samples of reviews to improve the reliability of the data. Again, the full set can be found in Table 4.2. Bond and Beale do not give definitions for each category but provide a list of key words associated with each instead. These factors were included in the conceptual analyses as they provide a different perspective on what makes a game engaging, based on game paratexts (which in this case consist of game reviews).

A different set of factors is outlined by Juul (2010) who presents five categories that can be used to consider games in terms of whether they can be considered "hardcore" or "casual" experiences. Juul analysed a number of different games, conducted a survey of two hundred casual players and a number of in-depth interviews with different game players and developers. His analysis suggests that players are influenced by: a game's *fiction*, how *usable* it is, how *interruptible* it is, how *difficult* it is, and how *juicy* it is. These characteristics are present during play but also indicate why certain types of games appeal to different players. Juul suggests that, in order to understand how these categories work, it is important to consider how video games are used over time. So first, the player becomes aware of "a game's *fiction"*, when they hear about it initially. Second, they have to "learn how to play the game, depending on its *usability"* (p. 30), where usability refers to how easy it is to learn the game controls and interface*.* Next, the player will consider how much time they have available to play, which relates to the game's "required time investment and its *interruptibility*" (p.30), i.e. whether a game can played in short bursts or requires longer sessions. In order for play to continue, the game has to have "the right level of *difficulty"* (p. 30). Finally, "the general *juiciness* (positive feedback) of the game" (p. 30) through the graphics, also helps the player to continue with the game. The *Guitar Hero* series provides particularly good examples of "juiciness", since the player gets both audio and visual feedback not only in terms of establishing whether they are hitting the notes at the right time, but also in the form of a rock meter (which drops if the

player misses notes and rises if they hit them), a score meter (which contributes to the player's final rating) and a multiplier (which multiplies the points the player gets based on their accuracy). The crowd even reacts by cheering at the end of the song (or booing, if the player performs badly).

While a game can differ in terms of any of these characteristics, Juul argues that casual games are particularly good at providing more flexible game play experiences that appeal to a range of players. He does point out however, that while casual games do not require previous knowledge of gaming conventions, this does not necessarily entail that they are easy to master. Because they are more usable they are easier to pick up since the barriers of access are lower. Casual games are also easily interruptible, tend not to punish players for mistakes by forcing them to replay large parts of the game and provide lots of juicy feedback. Finally, Juul suggests the fact that these games tend to be set in pleasant environments that support emotionally positive fictions has contributed to their appeal (as opposed to hardcore games set during a zombie apocalypse, for instance). Juul's analysis is useful because it suggests that while hardcore games may only appeal to hardcore players (due to the greater time investment and knowledge required), casual games are more likely to appeal to players of all kinds. This claim is something which will be further considered in relation to player identity within Section 7.2. The five categories were included in the conceptual analysis in order to take into account both casual and hardcore gameplay experiences. Given the growing mainstream appeal of games, it was prudent to consider as wide a variety of experiences as possible when investigating why people play games and what sustains their engagement.

Another model that which accounts for motivation and engagement is the DGEM presented by Calleja (2007a; 2007b). Since the DGEM was used as an overarching framework in the subsequent conceptual analysis, it is important to elaborate on it further. As stated earlier, the DGEM can be used to describe the player experience with reference to how the *tactical, performative, affective, shared, narrative* and *spatial* frames come

together in different ways. Once the player has successfully internalised each of the relevant frames they may experience *incorporation*: “The subjective experience of inhabiting a virtual environment facilitated by the potential to act meaningfully within it while being present to others” (Calleja, 2007a, p. 257). Calleja also discusses how we can experience involvement with games on a micro-level, in terms of engagement during play, and on a macro-level, in terms of involvement outside of play and the reasons for wanting to play in the first place. A summarised description of each frame presented by Calleja (2007a) is provided below:

1. *Performative involvement:* On the micro-level, this form of involvement is dependent on how the player is able to exert agency within the game world. Within the Performative frame, the player is able to actualise the strategies they have formed during tactical involvement. This frame also relates to game piece control and movement within the game world, the player’s perspective (first or third person) and is highly dependent on mastering the controls of the game. On the macro-level, the appeal stems from a desire to exert agency within a virtual environment, although the ability to do so does not guarantee satisfaction in itself, as player actions do not always lead to the intended consequences. However, the unpredictability of outcomes can contribute to what makes games meaningful and compelling. The importance of agency and the impact of unpredictable outcomes will be further considered in relation to the analysis of breakdowns and breakthroughs in Section 6.2.

2. *Tactical involvement:* On a micro-level, this refers to any form of decision making and strategy formation within the game and includes interaction with the rules, the game environment and other players. In most games this frame is usually closely aligned to the performative frame. In the longer term, this relates to the satisfaction that players get from aiming for and achieving goals (whether these are goals set by the game, or that players choose for themselves).

3. *Shared involvement:* Games can be distinguished from other media by the fact that they allow players to control agents in a represented environment in which other agents react during gameplay. These agents can be controlled by Artificial Intelligence (A.I.) or human players. With respect to longer term motivations, Calleja points out that the earliest digital games were designed to be social affairs, and this is especially true of home console systems. While PC games were originally less able to support shared involvement, the internet and the rise of MMOGs has changed this, and now sharing an experience with others is one of the main motivators for taking part in such games.

4. *Affective involvement*: This refers to the way the game affects players' moods and emotional states through a cognitive, emotional and kinaesthetic feedback loop. On a micro-level, the mode of representation is often important, e.g. audio, visual. Other factors that can affect this frame are lack of interest in the genre and interruptions to the game. With respect to longer term motivations, players choose to interact with games in order to be engaged by them and because they want to experience a change in mood.

5. *Spatial involvement*: This relates to players locating themselves within the game world, both on and off the screen. A growing sense of familiarity with the game world leads to feelings of comfort and belonging which can make players feel more involved during specific instances of play. On a macro-level, the spatial frame refers to players' desires to inhabit and explore new worlds.

6. *Narrative involvement*: This frame concerns the role of both designed and personal narrative, where the former refers to the narrative which forms part of the game itself and the latter to a player's interpretation of their gameplay experience. Growing personal narrative during gameplay can still heighten affective aspects of the game even if there is a lack of engagement with the designed narrative, since this is what makes the game personally meaningful to the player. Part of the longer term appeal of some games is that they allow players to feel they are contributing to the unfolding of

the game's narrative. Narrative also helps to provide the other frames with a sense of context.

Table 4.1 provides an overview of each of the DGEM frames, in relation to micro and macro involvement.

Table 4.1: DGEM frames

DGEM frame	Macro level involvement	Micro level involvement
Performative	A desire to exert agency and to carry out meaningful actions with relevant consequences.	Affected by how agency is exerted in the instance of gameplay, how game pieces and avatars are controlled, a sense of player movement, the game perspective and how successfully strategies developed in the tactical frame are actualised.
Tactical	Wanting to experience the satisfaction of working toward and reaching goals, whether set by the game or the players themselves.	Relates to engagement with all forms of decision making in the game, as well as the formal rules of the game.
Shared	A crucial motivator for trying out and extending player's involvement of MMOGs, the desire for a shared experience.	Where the player can interact with others (human or AI controlled), build a reputation, perform in front of an audience, collaborate and communicate, and compete. Further, human players can increase the challenge of the game as they will be less predictable than the AI.
Affective	Where people play to affect their mood and emotional states.	Relates to how the visual graphics, audio effects and game physics, provide feedback to the player and lead to them having specific emotional experiences.
Spatial	The attraction of exploring and discovering new worlds.	Depends on the spatial features of game environments and how the player is kept aware of their surroundings (through game world or map).
Narrative	Yearning for future participation in designed and personal narratives.	Where the player creates a meaningful narrative based on their in-game experiences
Incorporation	Where the frames come together as a consequence of micro and macro involvement, resulting in the player having the subjective experience of inhabiting a virtual environment facilitated by the potential to act meaningfully within it while being present to others.	

The DGEM is a descriptive framework that can be used to consider a wide variety of factors that relate to both micro and macro-level involvement but it also suggests that a certain amount of learning (which occurs through internalisation of the relevant frames) is required before deeper involvement can take place. In addition, the model was originally based on player involvement with Massively Multiplayer Online Role Playing Games (MMORPGs). Thus it would be worth considering how well it can account for involvement with a range of different games (Iacovides, 2009).

4.1.2 The DGEM as an overarching framework

It is clear from reviewing the frameworks above that most of them do not make a clear distinction with respect to the concepts of motivation and engagement. For instance, Malone and Lepper (1987) state that they "use the words *fun, interesting, captivating, enjoyable* and *intrinsically motivating* all more or less interchangeably" to describe an activity that "people engage in *for its own sake,* rather than in order to receive an external reward or avoid some external punishment" (p. 229). While this suggests that our reasons for playing games are closely linked to what we actually experience during play, there is little research that explicitly addresses how our reasons and experiences relate to each other. In addition, many of the frameworks refer to similar factors. For instance, Whitton (2007) and Bond and Beale (2009) both have social continua factors that refer to whether a game is played alone or with others, while almost all the frameworks examined suggest the importance of being able to overcome challenges within the game.

It appears there is a large degree of potential overlap between these frameworks though the DGEM looked like it would be able to account for majority of the different factors presented. This is partly due to the broadness of the six frames, but also because of the way the model can be used to consider aspects of motivation and engagement in terms of macro and micro-involvement across the *tactical, performative, tactical, shared, affective* and *spatial* frames. Table 4.2 shows how the DGEM was used as an overarching framework to organise the factors from each of the frameworks mentioned in Section 4.1.1. This was a useful exercise that helped to assess some of the literature in the area. More significantly however, it influenced the development of the thesis since using the DGEM in this way led to the re-conceptualisation of motivation and engagement as forms of macro and micro-involvement respectively. This reconceptualisation had an impact on the wording of subsequent research questions (as discussed in Chapter 3) and is reflected in the analysis reported in Section 4.2.

Table 4.2: DGEM as overarching framework

DGEM	Factors	Description
Performative	Autonomy Intuitive controls (Ryan et al., 2006)	A sense of volition or willingness when doing a task. How far the controls of can be considered intuitive and do not interfere with one's sense of being in the game.
	Active – passive Physical – sedentary Speed-dependent – non-speed-dependent (Whitton, 2007)	The level of involvement in the activity. The amount of physical exertion required. The degree to which speed of action is important to the activity.
	Technical soundness Maintenance Gameplay Customisability Variety User interaction (Bond & Beale, 2009)	Well designed camera, unobtrusive adverts, smooth frame rate, uniformity, freedom to behave as expected. Low hardware requirements, easy to maintain, and independent of external software. Engaging, fair, balanced, progressive, fun, innovative, easy to play, hard to master, objective based, freedom, compelling, dynamic, various solutions. Powerful easy personalisation, character modification. Non linearity, choice, differences, dynamic combat, varied AI, emergent tactics, varied delivery media. Fast feedback, customisable, invisible controls, realistic, functional.
	Usability (Juul, 2010)	Relates to how easy the controls and interface of the game are to use, where casual games presuppose little knowledge of video game conventions and are generally very usable
	Curiosity (Malone, 1981) Control (Malone & Lepper, 1987)	The way players continue to play a game in order to find out what will occur after certain actions are taken. The way in which games can give players a powerful sense of control.
Tactical	Competence	A need for challenge and feelings of effectance, (Ryan et al., 2006).
	Being good Improvement Lack of trust in environment Difficulties getting started Getting stuck Definite – open-ended Cerebral – non-cerebral Chance – skill Easy – difficult Quick – lengthy Simple – complex (Whitton, 2007)	Motivating factor – perception of being good. Motivating factor – seeing swift and steady improvement. Demotivating factor – seeing the game as unfair or incorrect. Demotivating factor – when an activity is too difficult to get into. Demotivating factor – especially for long periods of time. Whether the activity has a fixed end point. The extent to which an activity is intellectually challenging. The degree of random input into the activity. The preferred level of challenge. The amount of time an activity takes to complete. The complexity of the rules of engagement in the activity.
	Gameplay Variety (Bond & Beale, 2009)	Engaging, fair, balanced, progressive, fun, innovative, easy to play, hard to master, objective based, freedom, compelling, dynamic, various solutions. Non linearity, choice, differences, dynamic combat, varied AI, emergent tactics, varied delivery media.
	Difficulty punishment Interruptibility/time investment (Juul, 2010)	A game challenges and punishes the player for failing, where casual games often become difficult but do require replaying large parts of the game. Games demand a time commitment from players, casual allow the player to play in short burst, and so are more interruptible.
	Challenge (Malone, 1981)	The degree of difficulty and level of uncertainty to drive players.

Shared	Relatedness (Ryan et al., 2006)	Experienced when a person feels connected with others.
	Solitary – social Competitive – noncompetitive Team – individual (Whitton, 2007)	Whether the activity is undertaken alone or in a group. The degree of competition / importance of winning. Whether the activity is undertaken collaboratively or as an individual.
	Social – lack of social (Bond & Beale, 2009)	Multiplayer co-op, multiplayer, competition, communication, sharing.
	Online – co-located Stranger - friend (Iacovides)	Whether other players are co-present or not. Whether you know who you are playing with or not.
	Recognition Competition Cooperation (Malone & Lepper, 1987)	Having efforts recognised by others. Playing against others. Playing with others.
Affective	Relaxing – stimulating Frivolous – serious Realistic – fantastic Intrinsic boredom (Whitton, 2007)	The level of excitement engendered. The preferred level of playfulness within the activity. The amount of realism in an activity. Demotivating factor – boredom with the subject matter or game itself.
	Environment Annoyance (Bond & Beale, 2009)	Impressiveness, eye catching, good lighting, lifelike effects, good soundtrack, good sound effects, good music. Combinations of bad factors.
	Juiciness (Juul, 2010)	The form and quantity of feedback provided, where casual game design tends to feature excessive positive feedback and so is very juicy.
	Fantasy (Malone, 1981)	The way players can imagine themselves in specific contexts using vivid realistic images provided by the game.
Spatial	Presence	Sense of being within the game, (Ryan et al., 2006).
	Environment (Bond & Beale, 2009)	Impressiveness, eye catching, good lighting, lifelike effects, good soundtrack, good sound effects, good music.
Narrative	Realistic – fantastic (Whitton, 2007)	The amount of realism in an activity.
	Variety Cohesive Storytelling (Bond & Beale, 2009)	Non linearity, choice, differences, dynamic combat, varied AI, emergent tactics, varied delivery media. Seamless integration, story related to gameplay, cohesive story, consistent style. Mature, progressive, tense, engrossing, embedded in gameplay.
	Fiction (Juul, 2010)	What the game is about, where casual game design contains emotionally positive fictions (depicting pleasant environments like restaurants) as opposed to the mostly negative “vampires and war” settings of traditional video games.
	Fantasy (Malone, 1981)	The way players can imagine themselves in specific contexts using vivid realistic images provided by the game.

Table 4.2 suggests that questions about what motivates players, what factors affect their motivation and what factors keep them engaged really depend on what level the questions are being asked at. For instance, Self Determination Theory (e.g. Ryan, Rigby & Przybylski, 2006) can be used to discuss the high level psychological needs that gameplay satisfies, where people play games in order to satisfy these needs and keep

playing them until their needs are met. With respect to the DGEM, the need for *competence* is experienced within the *tactical* frame (as this relates to the challenges games provide), the need for *autonomy* within the *performative* frame (as this relates to the experience of agency within games) and the need for *relatedness* to the shared frame (as this relates to interactions with other characters within different game worlds and to other people playing the same game). Similarly, Whitton's (2007) suggestion of *intrinsic boredom* as a universal de-motivator (there are some games people are just not interested in) comes under macro-level *affective* involvement since it relates to a person's interest in a game, before even having played it. Or, questions can get more specific and discuss aspects of game design that affect the micro-level (i.e. factors that can affect engagement during a gameplay). For instance, Whitton's (2007) 15 factors include examples such as *relaxing-stimulating*, *frivolous-serious* and *realistic-fantastic*, all of which can be placed under the *affective* frame of the DGEM. These all concern what experience the player is in the mood for, but *realistic-fantastic* can also refer to the graphical realism of the game. Additionally, this last factor relates to *narrative* involvement as it can also relate to whether the player wants a more realistic or fantastic story-line to engage in. This is similar to some of Bond and Beale's (2009) factors, e.g. *variety* which can occur in the *narrative*, *performative* and *tactical* frames by providing players with a non-linear story and meaningful choices that they have to decide between during gameplay.

Many of the frameworks presented focus more on factors that relate to micro-level involvement. It could be argued that this is because different motivations lead to different expectations concerning gameplay experiences and so continued engagement depends on whether or not these expectations are met. However, frameworks which focus purely on game design factors and whether these lead to desired experiences may miss out some of the important contextual dimensions of play. As noted earlier, Egenfeldt-Nielsen et al. (2008) argue that the work of Malone and colleagues (despite the inclusion of interpersonal motivators such as competition) does not help to explain the social networks that exist around games and how the context where play occurs might affect involvement.

While some of the frameworks in Table 4.2 do take social factors into account, the DGEM is the only one which considers social interactions during play and outside of it. Further, few of the frameworks emphasise the spatial frame on either a micro or macro-level. Perhaps this is less surprising given that Malone and colleagues work was carried out in the 1980s (before the increasingly realistic 3D graphics we have today), while Whitton (2007) was looking at factors common to both digital and non-digital games. Nevertheless, the lack of factors associated with the spatial frame indicates that less attention has paid to it beyond the consideration of "presence".

The majority of factors fit quite neatly under the different DGEM categories but one that was less easy to categorise was the price of the game. As Bond and Beale (2009) note, this is an important factor that players consider when choosing a game thus it can be argued that price affects player motivation to try something out in the first place. However, price does not necessarily relate to the quality of a game (though sometimes it can indicate length) or how it was designed so it is quite difficult to place it under one of the DGEM frames. It could relate to the macro-level in the sense that it affects people's desire to try a game in the first place but it does seem a little tenuous to suggest that (since the price is set by someone other than the player) price relates to shared involvement. Regardless, price could influence whether a player is motivated to try out a game or not.

In general, using the DGEM as an overarching framework helps to illustrate what these different frameworks have in common and provides us with a common language for discussing how different factors can affect player involvement across a micro or macro-level. The DGEM makes the relationship between motivation (macro-involvement) and engagement (micro-involvement) clearer as it suggests that different motivations lead to different expectations of gameplay experiences and that continued engagement depends on whether or not these expectations are met. The relationship between motivation and engagement will be further explored in Section 5.2 and later in Section 6.2.3. The conceptual analysis suggests that questions like why do people play games and what

keeps them involved in the process are quite complex and the answers are likely to be dependent on a combination of a variety of different factors. As a result of this analysis, motivation and engagement were reconceptualised as macro and micro-level player involvement, since it provide a useful way of distinguishing between different types of player experiences when coding the data collected from the first study.

4.2 What do players say about their involvement with games?

4.2.1 Email interview analysis

In order to examine the extent to which the conceptual analysis above is able to effectively illuminate players' experiences of involvement, the rest of this chapter focuses on the analyses and findings of study 1. Players were asked via email interviews about their different gameplay habits and preferences, as described in Section 3.2. The email conversations were collated into a single document for each participant. Nvivo was used to organise the data and apply the DGEM categories to the data. Extracts were coded in terms of micro-involvement (which concerned any references to experiences of play and factors that would influence these experiences) and macro-involvement (which concerned references that were made about long term motivations for play and to activities that occurred outside of gameplay). Further, items were coded according to the frames to which they referred where Table 4.2 was used as a guideline for coding each category. It should also be noted that while Calleja's (2007a) definition of macro-level shared involvement mainly relates to a desire to share experiences with others within a virtual world, he does also mention activities that extend beyond the experience of play (e.g. people meeting up outside of the game world). As such, any references made to interacting with a wider community, usually via the use of paratexts (e.g. contributing on game forums or consulting game guides) were coded under macro-level shared involvement. Participants would often refer to more than one form of involvement at once, so the coding was less about trying to pigeon hole people into different categories of game player (e.g. someone who prefers narrative involvement over spatial) and more

about establishing how useful the DGEM was for describing different examples of macro and micro-involvement.

For instance, when discussing the types of games he likes to play Ben (M, 23) stated he likes survival horror because “I seem to enjoy scaring myself, they also tend to be quite challenging” which was coded as macro-level affective and tactical involvement since it referred to longer term motivations for play and indicated his preferences for games with mood-affecting and challenging elements. Meanwhile Sam (F, 46) talks about sharing her gameplay activities with her 19-year old son: “I play action games with my son - I mean one of us plays and the other watches, and we discuss strategies and the puzzles in the game - it is very much a sort of partnership and also because we can discuss the plots”. This quote was categorised under micro-involvement since it refers to instances of play, and was classed under shared, narrative, tactical, and performative involvement since Sam was discussing plots and strategies with her son while they took turns playing.

Initially, an attempt was also made to code for any instances of incorporation. Calleja (2007a) defines incorporation as “the subjective experience of inhabiting a virtual environment facilitated by the potential to act meaningfully within it while being present to others” (p257). Essentially it is a form of “flow” (Csikszentmihalyi, 1988) but with spatial characteristics, i.e. a combination of intense absorption and presence. However, none of the interview questions asked participants to recount a particularly involving gaming experience so there were few references that could be classified as incorporation. In fact, some of the questions were actually about getting stuck and needing help, which are essentially situations a sense of incorporation would break down. As a result, although some quotes did emphasise different aspects of the phenomenon, there were very few statements which were seen to satisfy the simultaneous criteria of “inhabiting” a virtual world, having the “potential to act meaningfully” while also “being present to others”.

4.2.2 Findings

The DGEM was applied for qualitative purposes, although some of the frames were mentioned by more participants than others. For instance, as Table 4.3 indicates, almost all the participants made reference to the shared, tactical and affective frames during their interviews, and while 18/30 and 18/30 referred to narrative and performative involvement respectively, only 11/30 mentioned the spatial frame.

Table 4.3: Coding frequencies

DGEM frames	Participants	References	References/ participant
Spatial	11	22	2
Narrative	18	57	3.1
Performative	18	67	3.7
Affective	29	163	5.6
Tactical	30	126	4.2
Shared	30	273	9.1
Micro	30	437	14.6
Macro	30	290	9.7
Micro & Macro	26	101	3.9

The table shows the total number of references coded under each frame and gives an idea of how many references participants per frame. The number of references alone is not necessarily a reliable indicator of how often each frame was coded, since one sentence could contain multiple references. The references per participant figure provides an indication of how frequently references were made by participants with respect to each of the different frames. For instance, while the same number people mentioned factors that relate to the shared frame as the tactical, on average, they would make 4.9 references more shared references. Again, these numbers should be interpreted with caution since the goal was not to count and compare categories statistically but to gain insight into various aspects of player involvement. They are provided only to give an indication of the how the participants emphasised the different frames.

Table 4.3 shows that the spatial frame is perhaps less important than the others, but it may be that it is a taken-for-granted part of the gameplay. Many of the references that were coded under the spatial category were made with respect to the enjoyment of

exploring the game-world. Simon (M, 36) for instance, likes playing *Spyro the Dragon* "just for the fun of exploring and finding new levels". This quote was also coded under affective involvement as it referred to the player enjoying the experience. In terms of the affective frame, apart from referring to specific emotional states (e.g. playing games of fun, or liking horror games for being scary), players would often talk about games as a form of escapism. For example, Katy (F, 22) suggests that "when it comes to gaming, it's often that sense of being in another world that I enjoy or at least of being involved in something else other than my own everyday life". While the affective frame was mentioned by almost all participants, extracts coded in this category occasionally included negative comments. These usually concerning a lack of interest in a game or genre, e.g. "The only two types of games I don't play are Sports and Racing. I understand the challenge and skill involved but I find them very boring." Marco (M, 28). This type of quote reflects Whitton's (2007) universal demotivator – intrinsic boredom – particularly well. While affective involvement was frequently referred to, this was less true of narrative involvement. Still, almost two thirds of the players mentioned the importance of an engaging narrative, sometimes in terms of escaping into a story and often in conjunction with character development. For example, "For single player PC games, I want something with a good story or varied quest structure or deep character development" Adam (M, 23). Adam's quote also illustrates how narrative was often referenced in relation to role-playing games, suggesting this is a potentially important component of the genre.

About two thirds of participants referred to the performative involvement frame, occasionally in terms of describing specific instances of play but more often with respect to learning the controls of the game, e.g. David (M, 24) talking about going through the tutorials for *Mirror's Edge*. However, there were very few explicit references to macro-level performative involvement. Calleja (2007a, 2007b) describes how the performative frame relates to having a meaningful experience where choices have consequences in a game. Henry (M, 38) alludes to this when he discusses looking forward to the release of *Heavy Rain* because of how it "It portrays both negative and positive aspects of the world, and

social consequences of actions, in a way which seems responsible, and is also dramatised to provide a believable world and elicit a strong *emotional* reaction from the game-playing audience." While this quote contains references to affective, narrative and shared involvement, it's Henry's mention of consequences that relate to the performative frame. The majority of extracts coded in the performative frame related to the micro-level, e.g. in terms of the how the controls affected gameplay, but there were very few explicit references to the experience of making meaningful choices within a game (which is an important component of incorporation). Henry's quote illustrates how meaningful consequences are dependent on how some of the other frames come together, and so perhaps it is not surprising that participants were more likely to mention enjoying a good story, rather than to point out that it is their involvement in the story which makes playing a game a meaningful experience.

Apart from affective involvement, the other two most common frames were tactical and shared. Many of the references to tactical involvement related to the challenge level of the game. For instance, John (M, 43) said that one of the reasons he would stop playing was if he found the game "too easy/too hard". Several players pointed out that part of what they enjoy about games is that they are "interesting/provide an intellectual challenge - such as Empire Total War, or Civilisation" (Nick, M, 28). This frame was often highlighted in reference to puzzle games. For example Natasha (F, 30) suggested that "with puzzle games an interesting challenge is important and the difficulty has to increase as you progress to higher levels to avoid boredom". References to strategies were included under this category, e.g. William (M, 31) discussing how "on some kinds of online games, it's possible to play a fairly passive role and watch what strategies other people use to get your head around what to do". This quote was also coded as an example of shared involvement since William was referring to learning from watching others play.

The most popular frame was the shared frame, where participants referred to instances in which sharing a gameplay experience with others increased their affective involvement

with a game. For instance, Steph (F, 30) talked about how she likes playing with others because “It can be exciting to complete with each other, and even when you are not playing, you can watch others play which is also fun.” While the shared frame included references to other people that the participants played with and talked to about games, it was also used to record instances of macro-level involvement with the wider gaming community. This was usually in the form of accessing paratexts. Sometimes, the references concerned activities such as looking at game reviews to keep up to date, although it also involved instances of consulting different resources for advice when stuck. For example, when Diana (F, 33) gets stuck she tries numerous options including “I ask friends of mine that play the game, refer to the manual (not my favourite option) or check out responses in forums.” This quote illustrates how shared involvement can manifest in different ways, from asking people you know for advice, to consulting printed and online paratexts. Further, it is an example of macro-level tactical involvement, since Diana is asking for advice of how to get further in the game. Presumably this will manifest within the micro-level performative frame, if she can implement the advice successfully. The numerous references to macro-level activity (usually in the form of consulting paratexts or talking to other players) made the social frame the most frequently referred to category.

There were also occasions when extracts were coded as both micro and macro. This was because participants often made several references within a single response, e.g. William (M, 31) listing what he would do if he got stuck “keep trying...try different strategies...ask someone...google hint”; the first two references relate to micro-level experiences and the last two to the macro-level. However, while the categories initially seemed mutually exclusive, some of the quotes coded as both help to indicate how the micro and macro frames influence each other. For instance, Henry (M, 38) answers the question about getting stuck: “Experiment as far as possible, until my patience wanes, then go look at GameFAQs.com for tips on that specific issue. Unless I have no other choice I prefer not to use cheats or tips, since it’s playing the game that’s (intended to be) fun, and if you cheat, you don’t get that experience”. This quote provides a good example of how Henry’s

experiences during play (micro, tactical and performative involvement) lead to him looking at resources outside of the game for help (macro, share and tactical involvement). However, he also notes that using these resources can ruin subsequent gameplay since they may end up reducing his micro-level affective involvement. Another example comes from Simon (M, 36) answering the question about whether he plays games with other people: “Sometimes I do, sometimes I don’t. I think it begins with sharing an interest with people, and then I move forwards and spend time playing some of the games on my own, to perhaps explore the features and options that were exposed when playing games with someone else. Often other people are catalysts for what I think of a ‘game playing’ episode”. Here, he is discussing shared involvement on both a macro and micro-level in terms of sharing an interest with other people but also in terms of his experiences with others prompting further single-player episodes of play. Finally, some of the quotes concerned how different games are chosen depending on the situation. For example, while Tony plays a range of different games he tends to use the Wii “to unite family and friends when visiting”. In other occasions, the choice depends on mood, e.g. Steve (M, 51) said he tends to be in a “quiet mood for puzzle solving or frustrated mood for energetic competitive games with action.” These were coded as both macro and micro-involvement because they indicate how the decision to engage in micro-level play depends on prior macro-level factors such as social context and emotional state. The relationship between micro and macro-level involvement is considered further in Section 5.2.

While most of the factors that affect micro and macro-involvement can be found in Table 4.2 there were a couple that were less easy to code for when using the DGEM as an overarching framework. The first of these was using games for exercise purposes. This is a relatively new phenomenon in terms of gaming practice, but at least three participants mentioned using games for this reason. It is not clear which frame could most accurately capture this long term motivator. Potentially though, it could be a form of performative involvement in the sense that players are choosing to play games that require more active interaction techniques that translate to results both within the game (in terms of score and

progress) and in the real world (in terms of increased fitness). The second concerned the issue of interruptions to gameplay, such as a partner growing annoyed with the activity or having other priorities to deal with such as work, looking after children, or even "when something more interesting is happening like food being served" Rosie (F, 29). Ian (M, 25) also mentions about how "buying something newer that is more exciting" can get in the way of continuing with a game. The amount of time available was often highlighted as an important consideration, where some players would point out how gaming had to fit in to a limited amount of "discretionary leisure time" Alex (M, 40). These sorts of issues could be described as relating to the performative frame since they affect the time a game is played for, but Calleja (2007a) mentions this phenomenon in relation to affective involvement. More specifically, he points out that there are a variety of reasons why the intended emotional responses a designer intended to evoke do not occur including "interruptions from other sources demanding attention" (p. 179). As such, these occurrences were coded as factors that influenced affective involvement. Finally, the issue of how much a game costs also came up with respect to at least two participants and it is not clear where this fits under the DGEM. As such, these items were coded under macro-involvement only, as the price of the game can affect the decision to play it or not in the first place.

Additionally, there are two other factors that participants mentioned and that could be added to Whitton's (2007) list, although they are more likely to be relevant to digital games rather than non-digital ones (Whitton was interested in factors that apply to both). These additional factors are: "online – co-located" and "stranger – friend", both of which are relevant to the shared frame of the DGEM and added to Table 4.2. These factors reflect participants' preferences for playing games over the internet or in the same room, and their preference for playing with people they already know or not (usually online). For instance, when Mark (M, 28) plays online, he prefers to play with people he already knows "I haven't bothered to play with strangers for years now as a lot of people are just not very nice." Meanwhile, Kareem (M, 22) says he enjoys playing online "Because you can meet

anyone and everyone online, I've met some of my longest friends online and still game with them now. If a new game comes out we all play them together if we can".

Overall, the DGEM was quite useful for considering the majority of factors that affect both motivation and engagement, and in terms of considering the relationship between the two. The following section discusses how the conceptual and empirical findings, in terms of using the DGEM as an overarching framework, helped to address research questions 1 and 2. This will involve an assessment of the utility of the DGEM for considering motivation and engagement. The next section also considers the findings in relation to the other frameworks on engagement and motivation mentioned in this chapter.

4.3 Discussion

In order to start considering the relationship between motivation, engagement and learning within the context of digital games, this chapter addresses the first two research questions set out in Chapter 3:

1. *What motivates people to play games?*
    a. *What factors affect this motivation?*
2. *What factors affect engagement during play?*

The following sections review the findings presented in this chapter with respect to how they helped address the research questions and relating them to the wider literature.

4.3.1 Why do people play games?

As part of trying to establish why people play games and what sustains their interest, some conceptual work was conducted leading to the use of the DGEM as an overarching framework (Table 4.2). This led to the re-conceptualisation of motivation and engagement as forms of macro and micro-level involvement. The conceptual analysis helped guide the coding of a series of email interviews, which were carried out with a range of different games players in order to examine a broad a range of experience as possible.

It would appear that people have a whole host of reasons for playing games, which is reflected in each of the DGEM frames at a macro-level and the findings of the interview study. These reasons include wanting to experience a change of mood, to engage with a narrative, to overcome a challenge, to share an experience with others, to explore a virtual world and to act in an environment where your choices are meaningful. These motivations were most commonly affected by factors such as mood or context and also time available. However, looking at various other macro-level activities within the shared frame, it can be argued that there are some other factors which may influence which games are played; these include talking to friends and family about games and the use of paratexts such as game reviews. In terms of maintaining the experience of micro-level involvement, there are again numerous factors that relate to each of the DGEM frames which can have an effect, which were also captured by the empirical data. These mainly relate to whether a player's macro-level expectations are being met, e.g. if the challenge is manageable then they will keep playing. There are also external factors which may interrupt a period of gameplay, e.g. competing priorities.

4.3.2 Factors that affect motivation and engagement

In terms of what factors affect motivation and engagement there are a large number of existing frameworks that have looked into these questions. However, the DGEM was useful for providing an overview of how these different frameworks relate to each other and for interpreting the interview findings. As noted earlier the answers to the questions what factors affect motivation and engagement, really depends on the granularity the questions are being asked. Players have a variety of different reasons for playing games and there are a large number of factors that can affect their involvement both before and during play. The frameworks included in the conceptual analysis: Whitton's (2007) six universal motivational factors and continua of 15 motivational preferences, Bond and Beale's (2009) good game design factors, Malone and colleagues theory of intrinsic motivation (Malone, 1981; Malone & Lepper, 1987), Juul's (2010) casual and hardcore

gameplay dimensions and Deci and Ryan's Self Determination Theory (Ryan & Deci, 2000; Ryan, Rigby & Przybylski; 2006) seem almost static in comparison to the DGEM. In contrasts to the other models, the DGEM interprets involvement as occurring on a micro and macro-level scale where a process of internalisation on both levels contributes to even deeper feelings of involvement.

For instance, the factors identified by Whitton (2007) and Bond & Beale (2009) mostly focus on how games are structured. While they do touch upon the importance of social aspects, they are not very helpful for capturing some of the interactions that occur around play, e.g. discussing latest releases or checking a walkthrough online. Further, these factors don not suggest how macro-level activity might contribute to micro-level involvement. While Juul's (2010) dimensions explain why casual gameplay appeals to so many people they do not explain why fewer hardcore players are so willing to invest more time and energy into less accessible games. With respect to the work of Malone and colleagues (Malone, 1981; Malone & Lepper, 1987), aspects of game design are considered (e.g. how fantasy is integrated), as are certain psychological influences (e.g. the importance of feeling in control of the game) while there is some attempt to consider the social context (e.g. wanting our efforts recognised by others). But again, while they discuss intrinsic motivation, the concept relates more to player's micro-level experiences and does not suggest why people play games in the first place. In addition, the application of self-determination theory to games by Ryan et al. (2006) is also interesting from a psychological view point, but there is little consideration of game factors apart from the controls and the sensation of presence. It is still unclear why players like different games, or why people choose to play games over any other activity that might satisfy their psychological needs.

The DGEM however, can capture almost all of the different factors and dimensions identified by these frameworks within the affective, tactical, performative, narrative, spatial and shared frames, which relate to both micro and macro-involvement. Further, it gives

researchers a way to discuss the interactions that occur around episodes of play. It allows for a consideration of a player's shared involvement with paratexts and how these interactions can affect the other frames. However, it is worth noting that there are some factors, such as price, that the DGEM has difficulty accounting for.

4.3.3 Summary

This chapter introduced a conceptualisation of motivation and engagement as macro and micro-level involvement. The conceptual and empirical analysis indicates that there are a wide range of factors influencing why we play games and find them engaging, the majority of which relate to spatial, narrative, performative, tactical, affective and shared involvement. In particular, the DGEM analysis highlighted the importance of the shared frame on a micro-level (with respect to playing games with other people) and on a macro-level (in relation to asking people for advice or using paratexts when stuck). Through being able to distinguish between the involvement that occurs during play and around it, we can start to capture some of the broader activities that relate to the activity and that contribute to the experience of play. The analysis of interview data was the first step in developing our understanding of the factors that influence micro and macro-level game involvement.

However, while the DGEM was able to capture most aspects of micro and macro-level involvement, it is unclear how far it can be used to discuss learning which results from this involvement. The model does describe how a player is required to internalise the relevant frames in order to achieve deeper levels of involvement but this process is mainly about learning how to play the game. For instance, while we can discuss how the player internalises the controls within the performative frame, it is less clear how we could discuss hand-to-eye coordination skills that can be used outside the context of the DGEM. Learning is even harder to consider under this framework when considering activities such as using non-paratexts, such as Wikipedia to read up on information that was introduced during a period of gameplay. While looking up a game-guide can be seen as an example

of shared macro-level involvement where the player consults a paratext, does it still count if the player is consulting something that is not actually a secondary game text (e.g. a Wikipedia article on the historical setting of a game)? The DGEM alone would have difficulty addressing the question of whether players learn anything else through their involvement with games, and if so, what? The next chapter considers the issue of what and how people learn through gaming, before going on to consider the potential relationships between involvement and learning on a micro and macro-level scale. A set of learning categories and themes are presented in Chapter 5 that extend the initial DGEM analysis of the interview data.

5. Identifying learning and potential links with involvement

This chapter addresses the next two research questions through examining learning within the context of gaming. This will include a consideration of how this learning relates to involvement on a micro and macro-level. In order to reflect the reconceptualisation of motivation and engagement as macro and micro-level involvement, the wording of research question 4 was changed. Thus, the following questions were addressed:

3. *How do players describe learning within the context of gaming?*
4. *What links can be identified between involvement and learning from player accounts of their gameplay experiences?*

As part of the analysis of the email interview data, a set of learning categories was developed to describe how and what people learn from games. These categories will be introduced in Section 5.1 before going on to discuss the findings of a thematic analysis carried out to examine the potential links between learning and involvement in Section 5.2 Section 5.3 then concludes with a discussion of the learning categories and the themes identified in terms of the research questions and the relevant literature.

5.1 Informal learning through games

5.1.1 Developing categories of learning

The Digital Game Experience Model (DGEM) does have the potential to discuss learning in terms of internalising each of the relevant frames (something that is actually required before deeper levels of involvement can be experienced; Iacovides, 2009), but the process is very specific to learning how to play the game and about the game itself. This leaves little room to discuss learning that might transfer beyond playing the game, e.g. general problem solving skills. Further, the literature suggests that we still do not know enough about how and what people learn from games (Pelletier & Oliver, 2006; Squire, 2008; Oliver & Carr, 2009). Based on the responses in the interview study, a set of categories that capture different forms of learning were established (Table 5.1). In Section

5.3, these learning categories are compared to DGEM to illustrate the shortcomings when DGEM is applied to learning beyond a game level (Table 5.2).

Initially a phenomenographic approach, similar to Whitton (2007), was to be adopted in order to focus on people's conceptions of learning, with the interview question "Do you think you learn anything from playing games and if so what?" being the main item of interest. Phenomenography is a research methodology that attempts to uncover the different ways in which people perceive aspects of reality (Richardson, 1999). The aim of this approach is not to make statements about the world but about people's conceptions of it. However, during the preliminary analyses, it became apparent that participants would often refer to instances which they did not explicitly view as learning. For instance, when answering questions such as what do you do when you get stuck, or how do you get better at playing a game, participants would respond by discussing episodes where they had asked for help or looked online for advice. However, they did not always refer to this sort of activity when answering the question about what they thought they learnt within this context. For example, while Natasha (F, 30) mentioned sometimes using walkthroughs or asking a friend for help when she was stuck she answered the question about whether she thought she learnt anything from games with "Not really! Playing games for me is just a way of relaxing". A decision was made to include this implicit data within the analyses so that a more comprehensive set of learning categories could be developed.

Before going on to examine the categories presented in Table 5.1, it is worth noting that their development was influenced by different perspectives on what constitutes learning and how it occurs. These perspectives include general theories about how we learn, such as constructivist viewpoints (e.g. Bransford, Brown & Cocking, 2000) and ideas about situated learning (e.g. Lave & Wenger, 1991; Wenger, 1998), and literature on different conceptions of learning (e.g. Richardson, 1999). With respect to games, this includes considering aspects of *unintentional informal learning* (Vavoula et al., 2005) in terms of the sorts of activities Gee (2004) discusses, such as participating in different affinity

groups and the concept of “tangential learning”. This concept which was presented in a YouTube video produced by Daniel Floyd (a student animator) and James Portnow (games designer and journalist) as part of a series on video games (Floyd & Portnow, 2008). Tangential learning refers to what happens when you have an experience, e.g. playing a game set in World War II, which results in you wanting to find out more about it, e.g. by reading a book about the war. It can be argued that there are some parallels between this idea and those about self-directed learning (Knowles, 1975) and the emphasis on taking responsibility of one’s own learning in experiential learning accounts (e.g. Rogers, 1969). However, tangential learning is distinguishable from these ideas because it refers to situations where a catalyst for further learning occurs, but where the catalyst was not specifically intended, i.e. it is unlikely that the player decided they wanted to learn more about a subject prior to playing the game. These categories are later discussed in relation to the framework of learning presented by Vavoula et al., (2005) within Section 5.3.1.

Table 5.1: Initial informal learning categories

How people learn from games	What people learn from games
1. Through play	1. On a game level – Controls/interface
2. Through other players	– Content – Strategies
3. Through external resources – Via game paratexts – Via tangential sources	– Behaviour of others 2. On a skill level – Psycho-motor – Cognitive – Collaborative 3. On a personal level – General knowledge – Changing as a person

Data extracts were first categorised under “learning” if the extract referred to views of learning within the context of gaming and to any examples of learning that the players engaged in or experienced. Attention was given to both learning that occurred during gameplay but also to activities which supported learning outside of gameplay, such as consulting a walkthrough, e.g. “Sometimes consult a walkthrough, normally from

Gamefaqs, or perhaps UHS [Universal Hint System] if an adventure-type title as it gives finer grained hints", Alex (M, 40)." After iteration and comparison between the categories and the data set, the extracts were organised into two sets of categories that distinguish between how people learn and what people learn from their gaming involvement. The final set is displayed in Table 5.1.

Regarding how people learn from games, there were three distinct ways of doing so. The first, *learning through play*, was coded for whenever a player referred to how they approached playing a new game in terms of "just playing it" and/or starting out with in-built tutorials. This also included references to how they attempted to solve a problem by "trying again and again" or by "experimenting". For instance, in response to the question about how they would approach playing a new game, Patrick (M, 30) responded: "By exploring or trying different combinations of things. Sometimes it's just a thing of practice, you have to keep at it". The second category, *learning through others* relates to learning through interacting with other players. This could occur with respect to asking advice or discussing strategy, e.g. Nick (M, 29) "I'll ask a friend for who also has the game, for some advice maybe" and also in terms of observing others, e.g. Steph (F, 30) "If I am with friends, I usually watch them play for a while, and then try playing myself with someone guiding me through the process." Steph's quote also illustrates how people would occasionally refer to learning through others during instances of play, so these categories are not mutually exclusive.

The third category, *learning through external resources*, is further subdivided into two: *via paratexts* and *via tangential sources*. Learning via *game paratexts* was coded whenever a player mentioned consulting a gaming resource such as the manual or an internet walkthrough. Paratexts such as walkthroughs were often seen as a last resort when stuck since "It can take all of the decision making out of the process of playing the game and that sort of ruins the point" Henry (M, 38). The second sub-category is learning via *tangential sources*, which referred to instances where a playing a game had got the player

so interested in a subject they encountered during play that they decide to consult an external resource, such as a Wikipedia article or a book, to find out more. For instance, Sam (F, 46) talked about how "some games have a very rich story line with full of mythology and cultural references - we usually check this stuff online. Many times we stop to check references at the internet - there is a lot of intertextuality in games. For example, playing Assassins Creed I, I learnt a lot about the Crusades and the Templars. Bladestorm is nice to get to know more about the A Hundred Years War and so on". Although they are both external resources, tangential resources are different to paratexts in the sense that they were not produced in relation to a specific game or genre. If the game is to be considered the main "text", paratexts are supplementary to it, while tangential resources are more incidental. So in the example provided by Sam, she refers to using the internet to find out more information on the Crusades and 100 Years War, and not to using a paratext produced in relation to *Assassin's Creed* to do so.

With respect to what people learn from games, again, there were three main categories that participant interview responses could be separated into. The first concerns learning on a *game level.* The first sub-category of the g*ame level* concerns learning how to use the game *Controls,* e.g. Steve (M, 51) approaches a new game by "Quickly check the main controls and go for it". The second sub-category relates to game *Content.* This includes things like following the narrative of the game, understanding the spatial layout (e.g. tracks in a racing game) and working out the game mechanics. For instance, Diana (F, 33) discussed how she would "try to figure out what the game is trying to achieve at that level and try and detect the pattern behind it" while Amy (F, 27) suggests that what she has learnt from gaming is the "ability to work out what the game is looking for so how to 'cheat'". References to game *Strategies* were also coded under the *game level* category as they indicated how players learnt how to be successful within certain games, e.g. "game tactics - keep your back to the wall, use the element of surprise, face groups of enemies in narrow spaces where possible so that they can only come at one or two at a time" Peter (M, 27). A further sub-category relates to learning about the *Behaviour of*

others within the game world. This related to developing an understanding of the strategies other characters within the game adopted, whether these characters were controlled by the AI (Artificial Intelligence) of the game or by other players.

The second set of categories relates to learning on a s*kill level*, where people referred to developing *psycho-motor*, *cognitive*, and *collaborative* skills. The *psycho-motor* sub-category included references to how people learn the game controls. There is some overlap here with the *game level c*ategory but the distinction is that participants were referring to general psycho-motor skills in terms of improving their hand-to-eye coordination and manual reflexes, e.g. “I'm certainly more dexterous, although PES [*Pro Evolution Soccer*] probably leads to arthritis. They say it helps hand-eye co-ordination and night vision”, Ian (M, 25). The *cognitive* sub-category mainly contained references to problem solving and how games can be seen as a way to keep the brain active, e.g. “I think they are great for problem-solving, and keeping the brain tuned – they help my mental dexterity”, Linda (F, 58). One common general strategy players chose when stuck was simply to take a break: “If that fails I'll take a break and come back later to try again” Ben (M, 23). Extracts were also coded under the *cognitive* label when a participant discussed how they would reflect on the game and their progress, e.g. “when I get stuck I generally reflect on what I've done and try to analyse why I'm stuck. Unless it's a glitch in the game, rare but happens, there is always a reason for why I am stuck. So if playing platform games or FPS I need to assess what the objective was, what are my limitations, what may I have missed, are any other characters involved, what do I actually want to achieve”; Tony (M, 29). Finally, the *collaborative* sub-category contained examples of collaborative activity participants had engaged in during game play and the skills they felt they had picked up as a result, e.g. “I think the Lego games, particularly Indiana Jones teaches my son an important message about collaboration as these games require the skills of more than one character to proceed” Tim (M, 53).

The third main category concerns learning on a *personal level*. Any data extracts that discussed learning on that occurred on an individual level and could be applied outside of the game were coded under this category. The *general knowledge* sub-category related to any knowledge which referred to general facts and procedures in the real world, e.g. “For example, Civilization or the Total War series have taught me some interesting stuff I didn't know beforehand (such as different government types, use of religion for border expansion etc.)” Nick (M, 28). The sub-category *changing as a person* is mainly reflected by extracts such as, “You could take an RPG (say final fantasy 7) [where] the main character starts as a bit of a loner and as he opens up more you gain more friends and the plot gets richer. Now from this, you could gather that if you want to experience more of your own life and make it richer then you have to open up more and be ready to embrace change”, Marco (M, 28). Additionally, there were also several references to how games were able to help to people develop persistence within and outside of the game world. Katy (F, 22) mentions this and how a specific game has provided her with a role model: “So, from a gaming perspective, Sonic Adventure taught me that I should believe in myself and in my dreams, and always keep on trying. Skies of Arcadia more than anything else furthered that, and many other things besides. The main character, Vyse, is someone I would very much like to be like. Over the years I've probably modelled a lot of my outlook on his - he's very much my role model, and has been for a long time now”. The only negative reference made within this category came from Tim (M, 53) when he was talking about his five-year old son displaying aggressive behaviour after playing a certain game: “Kung Fu Panda he likes, but it consists of hitting other characters throughout the game and I decided to withdraw it when my son and the neighbours' daughter started banging each other for fun.”

The categories presented in Table 5.1 contribute to an initial understanding of how and what people learn from their involvement with gaming activities, although they are based on retrospective accounts. Chapter 6 considers whether the categories can help identify

learning which occurs in practice (Section 6.3), while Chapter 7 presents a refined version of the categories based on the results of a wider survey (Section 7.3.1).

5.1.2 Themes that relate to learning

In order to further investigate learning within the context of gaming, a thematic analysis was carried out to examine the theme which cut across the different learning categories through searching "*across* a data set... to find repeated patterns of meaning" (Braun & Clarke, 2006, p. 86). Of particular interest were any references, explicit and implicit, which related to how participants viewed learning within the context of gaming. The analysis consisted of iterating between the six-phases outlined by Braun and Clarke:

I. Familiarising yourself with the data
II. Generating initial codes
III. Searching for themes
IV. Reviewing themes
V. Defining and naming themes
VI. Producing the report

Regarding how the participants discussed learning within this context, a recurring theme concerned how much *value* players placed on their gaming experiences. For instance, Simon (M, 36) says "More often than not, I learn about the game and its characters. I learn the structure of game worlds and, if it's a car racing game, I might (roughly) learn the layout of the tracks. Nothing that comes to mind as being immediately useful!". This quote indicates that while Simon recognises he has learnt something, he does not consider it to be particularly worthwhile. Similarly, a couple of participants wondered whether game-playing was a waste of time, e.g. "Sometimes I get philosophical about the meaning of life and whether it's more or less a waste of time playing games than doing anything else ;-)" John (M, 43), while others also wanted to point out that while they did enjoy games they also engaged in other activities, e.g. "I do other activities :) I read English literature a lot in my free time, before sleeping, on the train and at the weekends" Sam (F, 46). Amongst

some of the more dedicated players there was also a desire for games to be taken more seriously. For instance, Henry (M, 38) states “my only real objection is the use of the word “play”, which implies triviality. Games *can* be trivial, as can books. But “reading” is a respected cultural pastime. I wonder how long it’ll be before the word “play” achieves the same status? Not in my lifetime, I daresay”.

A related theme concerned the notion of *transfer.* Though not often explicitly stated, there is an indication from some participants at least, that learning was only seen valuable if it could transfer outside the game world. The *skills* category was the one most likely to contain references to learning that might transfer beyond the game, especially in terms of hand-to-eye coordination and problem solving. The *personal level* also concerned learning beyond the game as it related to acquiring general knowledge and developing as a person. Additionally, with respect to learning on a *game level*, a form of near transfer was often mentioned in terms of player familiarity with different types of games and genres. For example, “Generic game types (e.g. FPS) really don't take much climatisation” Justin (M, 31). This indicates players not just learning about individual games but about wider genres and what to expect from them.

5.2 Potential links between macro-involvement, micro-involvement and learning

5.2.1 Themes that relate to micro and macro-level involvement

Other themes highlighted during the analysis related to identifying potential links between learning and involvement. The prior reconceptualisation of motivation and engagement was useful for focusing attention on game-play (the micro-level) and the motivations and activities that surround it (macro-level). Two inter-related themes were identified which concerned learning and micro involvement: *Progress* and *Rewards* (Section 5.2.1.1) and two themes relating to learning and macro involvement: *Expectations* and *Resources* (Section 5.2.1.2).

5.2.1.1 Progress and Rewards

The importance of *progress* was a recurring theme, with regards to players overcoming the challenges provided by the game. Challenge involves a delicate balance where, if the tasks in the game are too hard then the player will get frustrated but if they are too easy they will get bored. In both cases, the result is likely to be the same, with the player quitting. However, learning can lead to progress, e.g. “Thinking about the way I play games, I think there is a learning curve which can either keep me playing or just drop the game. If the learning process is successful, or in other words, I keep on getting good results while learning new things, then I keep on playing. If my results are good but there are still new levels of difficulty I haven’t yet mastered, that’s another challenge for me to overcome, and hence I keep on practising to get there.” Patrick (M, 31). Learning the controls is part of this process, e.g. “Usually I avoid to play games that you cannot play without reading the instructions (for example I have a home the following Wii games that I tried to play once but because in order to play them you need to learn several combinations of buttons I didn't even bother to play them again - Tom Clancy's Splinter Cells Double Agent, Pirates of the Caribbean, Trauma Centre)” Sophie (F, 27). It is important then for there to be a seamless integration with learning how to play and progression within the game itself. For instance, David (M, 24) is impressed with the tutorial in Mirror’s Edge “which is based around the art/sport of parkour. The beginning stage of the game finds your character coming back after an injury, and being reacquainted with the various athletic skills that she needs to function in that world. While she's being reminded how to wall-run or roll safely after a jump, the player is being told what buttons to press in order to do just that. It's actually one of the most immersive tutorials I have ever encountered”.

Rewards such as “getting a bigger score, unlocking another game in say Wii Fit” Marian (F, 39) tend to occur after progress has been made (and provide an indication of progress), e.g. “It's also good to have a sense of reward, a feeling that I'm getting somewhere and achieving something, whether by completing a level or finding out a new

piece of information in-game that sheds light on things, or doing steadily more difficult things, or so forth" Katy (F, 22). Narrative can also encourage the player to put in more effort, as David (M, 24) suggests: "A story or atmosphere-driven game like Ico on the other hand evokes an empathy with characters and place, and demands a longer investment in terms of play time and attention; in return providing a richer and more rewarding gameplay experience". It could be argued that *rewards*, which can manifest as higher scores or a more enjoyable gameplay experience, are experienced as *progress,* which encourages the player to keep playing. Narrative also had a role in keeping the player engrossed. For instance, Mark (M, 28) said he chooses to make progress more difficult so he can spend more time enjoying the story: "I tend to play through on the hardest mode for the first time so that the story takes as long as possible to get through". The influence of progress and rewards are further considered within Section 6.2.3.

5.2.1.2 Expectations and Resources

In terms of macro-level involvement, there were fewer references made by participants to how this might relate to learning but two main themes were identified. With respect to *expectations*, some players discussed how they did not want to play Massively Multiplayer Online Role-Playing Games (MMORPGs) in particular because of the perceived amount of effort and time it would take (without enough of a reward), e.g. "MMORPGs seem to require too much time to be involved and I am not sure about the quality of them or the quality of the interaction with other folks" John (M, 43). For these players, the perceived pay-off for learning how to play the game and succeed was seen as too high, especially when they had other priorities to consider, e.g. Simon (M, 36) was intrigued by the "enthusiasm" MMPORG players display but: "whilst I can imagine myself enjoying some of these games, I can also imagine the pull of real world activities and challenges. If you're sucked into these games, you'll still have the hoovering to do". For other players, they were often motivated to play certain games on the basis of what they perceived the game to be about. For instance, Patrick (M, 31) discussed his desire to try and replicate his home team tactics within FiFa 10 and to try and get his team to top of the league. Sometimes though, previous experiences with similar games have a negative effect. For

instance, “I don't generally like playing games that involve manual dexterity or adrenaline-fuelled games like FPS games, racing games and some platform games…I usually find them pretty frustrating as I die too often and don't tend to get very far in these games”, Natasha (F, 30). Here frustration with lack of progress in the past has led to not wanting to play this type of game in the future. Expectations can also be based on people’s exposure to paratexts, e.g. Tony (M, 29) discusses how he chooses what game to buy “To decide it's generally a mix of reading reviews, having played previous versions, being the genre I enjoy - sometimes the hype makes a difference to whether I look into it.”

This brings us to the issue of the *resources*, in the form of paratexts or other people. Here, the shared aspects of macro-involvement were can relate to learning in a positive or negative way. Positive references were often about sharing and discussing tactics with other players outside the experience of gameplay, e.g. “For example when I played quake 3 enough to be in a clan, a lot of tactics discussion was had away from the game to improve each other’s play”, Adam (M, 23). Negative references tended to focus on how the participant did not want to play with other people in the first place, due to differing levels of competence. For instance, when asked if other player’s had ever helped him to learn how to play games, Steve (M, 51) responded “No. They are usually much better and that's demotivating.” When a lack of progress was experienced during play, players would sometimes ask a friend for advice but also mentioned using different paratexts, e.g. Diana (F, 33) said she would first try and figure out the problem on her own but “If that doesn’t work, I ask friends of mine that play the game, refer to the manual (not my favourite option) or check out responses in forums”. A frequent note of caution was attached to relying on these kinds of external resources however, as they were seen as a risk to game enjoyment, e.g. “The internet is black and white and so will give you walkthroughs. It can take all of the decision making out of the process of playing the game and that sort of ruins the point. If you are stuck, a friend is better placed to give you a nudge in the right direction and so you can get past a tricky point without ruining the game” Ian (M, 25).

Some extracts were coded as both macro and micro-involvement (Section 4.2.1). This suggests two ways in which the two relate to each other. The first concerns players who get stuck during play and decide to consult macro-level resources (at the risk of ruining their micro-level enjoyment). The second relates to macro factors such as social context and emotional state and how they lead to and influence the decision to engage in gameplay. However, there was very little in the extracts that explicitly referred to the relationship between macro and micro-involvement, though one participant noted: “Also, on another note, for me, some games are more expected than others either from past experiences or from word of mouth reviews. I guess expectations play an important role when starting playing a new game in terms of willingness to engage. Thus, I will be more likely to spend more time trying to understand and manage a game with high expectations than one with not that great expectations.” Patrick (M, 31). This quote refers to the role of *expectations* and *resources* and raises two important issues. One, it implies that continued micro-involvement depends on expectations being met. Two, it suggests that that people’s macro-level choices are influenced by the opinions of a wider community, as this seems to be where the resources and at least some of the expectations stem from. These two conjectures will be examined further within Section 6.2.3.

5.2.2 Themes that relate to the concept of gaming capital

An additional concept which can help us to consider how the community aspects of gaming relate to involvement and learning is that of *gaming capital*, developed by Consalvo (2007). While gaming capital “suggests a currency that is by necessity dynamic – changing over time and across types of players” (p. 4), the interviews indicated some key themes that relate to this concept. Specifically, the following themes were developed during the analysis of the interview data: *competence, knowledge, community* and *identity*.

5.2.2.1 Competence

Consalvo (ibid) indicates that being good at games is one way to increase a player’s amount of gaming capital. So unlike the *progress* theme, this is less about experiencing

the feeling of competence and more about establishing *competence* amongst others (suggesting it manifests on both a micro and macro-level). For instance, in response to a question about whether other people help him how to play games, Hugh (M, 24) replies “usually I'm the one teaching other people :)" while Mark (M, 28), points out that he is pretty good at games (albeit jokingly) “I always start on the hardest setting, not because I am amazing (well maybe a little) but like to get the maximum amount of achievements from a game”. Several participants also made comments about how they do not feel very competent at playing games, for instance Amy (F, 27) preferred to try games out on her own, before playing with her friends because “I know I'm not really very good at computer games so having a go on my own lets me make little mistakes without looking silly in front of my more skilled friends”. For some people, the issue of competence was a factor in deciding what type of games to play, e.g. “I usually get inundated with things to deal with / panic and die very early so I get no satisfaction from FPS” Steve (M, 51), suggesting he would rather play something he was better at instead. These more negative comments suggest these players have lower amounts of gaming capital but it may also be the case that some people are less interested in accumulating gaming capital than others.

One particular episode that exemplifies this theme comes from Marco (M, 28) who was discussing how he found it satisfying to teach others how to perform well and then watch them beat another player: “This happened recently. My flatmate (another beat-em-up enthusiast) has a very predictable playing style, that once worked out he becomes very easy to beat. So for my own perverse satisfaction I taught his girlfriend the tricks needed in order to watch her beat him time and time again.” This can essentially be seen as a way for him to display his own competence (and expert knowledge) amongst his friends by teaching someone else how to play well and also in terms of making his flatmate look bad without even playing against him.

A variety of opinions also emerged around the use of paratexts. Some, like Diana, would use the manual but only reluctantly, although some would refer to them before playing a new, e.g. Patrick (M, 31) “I usually start by reading the manuals, if there’s any available”

and at least one person refused to use manuals at all: “Never read the manual - that's a bit like cheating and if you do get stuck there will be something in the options menu to help”, Ian (M, 25). While this could be about not wanting to ruin game enjoyment (as indicated in the *progress* theme), it can also be seen as relating to gaming capital; in the sense that not having to use a manual makes someone come across as a more competent player.

5.2.2.2 Knowledge

Knowledge of games and gaming practices is another way to gain gaming capital, with Consalvo arguing for the integral role of paratexts in this. In addition to using paratexts, players can gain knowledge from the friends that they talk to, from playing the game itself and from being a part of a wider gaming community (again stemming from both micro and macro-level involvement). The interviews indicated the wide range of paratexts participants used, including game manuals, walkthrough, cheats and YouTube videos that they consulted for advice when stuck. Players also referred to using gaming websites and forums for recommendations about games. Similar information can be gained from friends, e.g. when stuck “If that doesn’t work, I ask friends of mine that play the game, refer to the manual (not my favourite option) or check out responses in forums”, Diana (F, 33); or keeping up to date by making sure to “check out reviews and what friends say for a game I should look at”, John (M, 43). Certain expectations about new releases resulted from interacting with different paratexts. For example, Henry (M, 38) talks about an upcoming release on the PS3: “…which I’m eagerly awaiting, is the game “Heavy Rain”, due for release early in 2010, which is very much a real world experience. The trailers and write-ups of this game suggest that it’s unusual.” Henry goes on to list all the ways in which he thinks the game is unusual suggesting he has researched the game thoroughly, despite it not being released for a while. Playing a game is also a very obvious way for someone to gain knowledge and that would also feed into future expectations, so for instance you had some people talking about familiarity with a specific genre, e.g. “Generic game types (e.g. FPS) really don't take much climatisation”, Justin (M, 31) or series, e.g. “I enjoy the Lego series” Linda (F, 58).

Some participants also displayed their knowledge of debates within the wider gaming community such as Marco (M, 28), who was concerned about how political correctness was going to affect the games industry referring to *Little Big Planet*, *Modern Warfare 2* and *Resident Evil 5* as examples of games that had been affected by the issue. Similarly, Henry (M, 38) engaged in a different debate when he discussed the value of games as art: "I've played games that have made me laugh and made me cry, I've played games where I've mourned their passing, and where I've been eager to return to the worlds they showed me. I've felt real emotion, be it affection, anger, revulsion or fear — every bit as real as that I'd experience from a novel or a piece of music. That's art."

5.2.2.3 Community

This brings us onto the third theme, *community*, where it can be argued that much of a player's knowledge stems from the community they are involved in. Gaming capital can be gained in terms of interacting with players immediate gaming communities (those they regularly play with and talk to about games) and in terms of interacting with the wider gaming community. Almost all participants reported playing games with friends and family at some point (relating to micro-involvement). At one end of the spectrum players reported only playing with family members, e.g. Tim (M, 51) who only plays with his five-year old son; at the other end, this involved playing with lots of different people including friends and strangers online, e.g. Nick (M, 28), who plays games online to socialise "with existing friends or people I just meet online for that particular session (using the match making service)." In terms of the smaller, more personal community, people also reported talking to friends and family about games in order to get advice or to discuss new games (which could happen on either a micro or macro-level). Steph (F, 30) for example, mentions her sister who "would recommend me games and told me how to sort out the puzzles". Further, some people often played with their children, e.g. Marian (F, 39) said she plays game with other because she spends "time with the children, also fabulous way of getting my son who is dyslexic reading and engaging with learning. Lots of fun together.". For some participants, other people prompted periods of gameplay, e.g. when Amy (F, 27) was asked what motivated her to play games, she responded "For me, getting fit and

exercising so I use the trainer programme, for the more games based things it's my friends." While some of the participants reported they did not normally play certain games, they said they would do so if in a social context, i.e. if they members of their community enjoyed playing them. For instance, David (M, 24) pointed out that while he does not normally like shooters on rails and sports games he will play them "if and only if I'm at a friend's and other people are involved in them".

Paratexts are related to the wider gaming community (and macro-level involvement), although despite referring to many different forms, none of the participants in this study reported producing a paratext themselves or knowing someone who had (though they were not asked about this explicitly). The majority of participants mentioned having used some form of paratext either when trying to decide what game to buy, e.g. Hugh (M, 24) "a lot of the new games I've read a lot of the game previews on the net and watch the new trailers, and there always seems to be something new coming out" or when needing help, e.g. Justin (M, 31) "if I get really stuck then I look online (e.g. gamefaqs.com) for tips". It's worth noting that not all paratexts are necessarily online. At least one participant, Linda (F, 58) mentioned having bought a game guide in order to complete a game, while others mentioned looking at the game manual prior to playing a game or when stuck. Online or not, these sorts of paratexts have been produced by the games industry and as such are still part of the wider gaming community that players can consult.

5.2.2.4 Identity

The final theme that relates to gaming capital is that of *identity*. This theme was closely aligned to *community* in the sense that some participants were quite clear about whether they saw themselves as being part of a wider gaming community or not. For instance, Henry (M, 38) stated "Me? I'm a gamer" while Kareem (M, 22) refused anonymity because "I'm a gamer and proud of it so I would like you to include my name if you have to". In contrast, William (M, 31) stated "I'm not really much of a gamer tbh" and Mark (M, 43) called himself "a very casual gamer". Alex (M, 40) also indicated his status as a gamer when he later joked that "1337 players don't get stuck". 1337 is leetspeak (where various

combinations of ASCII characters are used to replace Latinate letters) for leet, which is derived from the word elite, and used to indicate prowess and accomplishment within the gaming community. One could argue that using the phrase 1337 conveys gaming capital by establishing competence (as he was referring to himself as an elite player, albeit jokingly) and indicates membership of a wider gaming community through displaying knowledge of specific conventions. Similarly, Kareem highlights the link between identity and community further, when he went on to say "It's great to have a conversation and link in game related jokes that only you and your gamer pals know and just chuckling amongst yourselves and seeing who laughs at your joke outside your friend group, Because once that happens you know why they're laughing, they're laughing with you because they are a gamer as well". Another aspect of identity concerned brand loyalty, e.g. when Sam (F, 46) talked about choosing to buy Playstation consoles only, as "Xbox caters for personal shooters and sport fans. Wii is devoted to occasional gamers. PS is for serious gaming and the ones who can appreciate the development of the genre." This suggests that there are different ways in which being a gamer can be defined and that this is related to what community a player identifies (or doesn't identify) with.

Participants would sometimes refer to their own history of playing games, as a way of indicating how important gaming was at different stages in their lives. For instance, Rosie (F, 29) talked about how often she used to play games as a child but that now "it's very different" because of "priorities changing and energy". Similarly, Ben (M, 23), in response to the question about what games he plays, provided a timeline of his changing game preferences from 10 years old until the present day. He also noted that since going to university, the amount of time he spends on much less time on games as "I believe this was due to my mates living 10 metres down a corridor as opposed to 10 miles away in the next village". Meanwhile, Alex (M, 40), indicated he has been gaming for many years when he says "I have always enjoyed the activity and inherent challenge from first interactions with a Commodore PET through various computers and consoles at home. Also, a period in my teens in the UK and in Japan with arcade machines." In terms of

whether someone views themselves as a gamer, it depended less on when they were first introduced to games and more on whether they still made time for the activity (even if they no longer have the time spend to spend on the activity as they did when they were younger).

The themes presented above are useful for considering how involvement and learning relate to each other in different ways. The following section discusses the categories and themes in terms of addressing the research questions and how they related to the wider literature, including a comparison with the DGEM.

5.3 Discussion

While the previous chapter illustrated the utility of the DGEM for considering involvement on a micro and macro-level, it was less able to fully capture all the learning that occurs within the context of gaming. In addition, Chapter 2 revealed very little in terms of frameworks which discuss informal learning with respect to gameplay, especially in relation to involvement. The literature would benefit from considering how to identify informal learning within this context and how this learning relates to the experience of player involvement. In order to address this gap, this chapter sought to answer the following research questions:

3. *How do players describe learning within the context of gaming?*
4. *What links can be identified between involvement and learning from player accounts of their gameplay experiences?*

The following sections review the findings presented in this chapter in terms of addressing the research questions and relating them to the wider literature. Section 5.3.1 provides a comparison of the DGEM to the learning categories to illustrate how the DGEM is unable to account for learning at the *skill* and *personal level*s. Section 5.3.2 outlines some theoretical links between learning and involvement which will be further investigated in Section 6.2 6.

5.3.1 Players descriptions of learning

Regarding question 3, a set of categories were established, based on the interview data, which considered *how* learning occurs and *what* is learnt. Table 5.2 compares the DGEM and the learning categories. In particular, the overlap between the *game level* categories and the DGEM frames, suggests that the frames themselves could be used to discuss learning on *game level* in relation to micro and macro-involvement. However, the DGEM is less applicable when discussing learning on a *skill* and *personal level* because this type of learning manifests outside the frame of the game (whether in terms of micro or macro-involvement). While it makes sense to consider learning the controls of the game as part of performative frame, it seems strange to attempt to describe the improvement of general psychomotor skills as performative involvement because these skills are being used outside the context of game involvement. However, just because this sort of learning applies outside of the DGEM, does not mean it cannot contribute to greater involvement during play sessions and to an increased appreciation of a game. For instance, finding out more about the Templar Knights may enhance player enjoyment of *Assassin's Creed I*.

Table 5.2: Learning categories and the DGEM

Learning (what)	**Description**	**DGEM**
Game level	Controls	Performative
	Content	All frames
	Strategies	Tactical
	Behaviour of others	Shared
Skill level	Psycho-motor	Performative?
	Cognitive	Tactical?
	Collaborative	Shared?
Personal level	General knowledge	?
	Developing as a person	?
Learning (how)	**Description**	**DGEM**
Through play	By playing the game, experimenting, practising	Performative
Through others	From watching or asking other players	Shared
Through external resources	Paratexts: developed by others, in relation to games	Shared
	Tangential resources: Developed by others, not in relation to games	Shared?

These categories reflect and support different learning theories and frameworks, including constructivist view points and socio-cultural approaches. Learning is shown to be an active process (which occurs through play in this case) and also results from external

activities (whether through interacting with others or with different resources). While game level learning can adequately be accounted for in terms of the DGEM and the process of internalising each of the frames, the skill and personal categories also reflect the literature on conceptions of learning. This is because the categories contain references to different conceptions including: learning as the increase of knowledge, learning as the acquisition of facts, procedures, etc., which can be applied in practice and learning as changing as a person (Richardson, 1999). However, unlike the conceptions of learning, the learning how and what categories developed do not share a hierarchical relationship.

With respect to the notion of *unintentional informal learning* (Vavoula et al., 2005), it seemed that the learning within the context of gaming would be unintentional. The learning *how* categories suggest this is not always the case however, especially in relation to two specific instances. The first involves instances where the player *intentionally* seeks information about how to overcome a problem or improve their performance (whether through consulting paratexts or asking others). The second involves the use of tangential resources. While the player may not have gone into an episode of play with the intention to learn information that applies outside of the gameplay experience, the decision to look something up suggests a shift towards *intentional* learning. In both cases, the learning is still informal, though in the latter the player has developed specific goals and makes decisions about how to reach them.

These learning categories were based on descriptions by participants of different experiences and their own conceptions of learning within this context. Further, the interviews themselves and the subsequent thematic analyses raised a significant point about how learning is viewed within this context; some players do not believe they learn very much from gaming and even when they did concede that something is learnt, they did not necessarily view this learning as being valuable. The issue of value related to how well learning was seen to transfer to other contexts but it also concerns the fact that

games are seen as less culturally valuable than other leisure activities (such as reading) despite their growing prevalence and popularity amongst mainstream audiences.

5.3.2 Identifying links between learning and involvement

A thematic analysis was conducted in order to address research question 4. This involved exploring the relationship between involvement and informal learning and considering the role of cultural capital. The themes developed address research questions 1 and 2 (about the factors that influence engagement and motivation) since they allowed for a more in depth analysis of micro and macro-level involvement. Table 5.3 illustrates how the themes relate to the DGEM.

Table 5.3: Gaming themes and the DGEM

Themes	Description	DGEM
Progress and rewards	Rewards signify progress, which encourages further gameplay and learning	Performative, tactical
Expectations	Emerging from gameplay, from shared involvement with others and paratexts	Performative, shared
Resources	In the form of paratexts which people consult when stuck and to keep up to date	Shared
Knowledge	Knowing about specific games and keeping up to gaming news and developments	All frames
Competence	Being good at games and others being are aware of this	Performative, shared
Community	Consisting of those you play with and talk to about games, and the wider community which produces paratexts	Shared
Identity	How players identify with the wider community	Shared

At a micro-level, the iterative relationship between *rewards* and *progress* is a key facet of the gaming experience that depends on learning. The sensation of progress which results from successful learning within the game and associated rewards (be they higher scores, new artefacts, or new parts of the story) encourage the player to continue to put more effort into the game. This effort manifests itself as time and energy put in by the player to progress even further and potentially learn more about how to improve their performance. The interview analysis also indicates how detrimental a lack of progress can be to players. The majority of participants discussed experiences where a game was either too hard, or where they got stuck, that resulted in the decision to quit play. In terms of the DGEM, finding the right balance of challenge (where the game is neither too hard nor too easy) is

integral to the tactical and performative frames. *Progress* and *rewards* relate to some of Juul's (2010) game design dimensions, specifically *difficulty level* and *juiciness*. The themes are also reflected in the other frameworks discussed in Section 4.1.1, such as challenge (Malone, 1981), competence (Ryan et al., 2006), gameplay (Bond & Beale, 2009) and many of Whitton's (2007) universal factors including being good at an activity, seeing improvement and getting stuck. The relationship between learning and progress, as well as instances when breakdowns occur, will be further explored in the form of conjectures which were assessed as part of the analysis reported in Section 6.2.3.

On a macro-level, the two themes which suggest a relationship between involvement and learning were *resources* and *expectations. Resources* are important for when people get stuck in the micro- phase, whether players turn to their friends or different paratexts (in the form of manuals, forums, walkthroughs etc.). Regarding the DGEM, resources can be seen as part of macro-level shared involvement since the player is either directly asking someone for advice or relying on indirect help by consulting a paratext (that has been created by someone else). Looking for help can also be seen as a form of macro-level tactical involvement since the player is likely to be looking into advice on game strategies. Friends and paratexts can also play an important role with respect to player *expectations*. Whether through word-of-mouth, game advertising, reading magazines or checking reviews online, players gain information about which games they should be paying attention to and what to play. *Expectations* also result from experiences on a micro-level. Having played a certain type of game, a player is in a better position to judge whether he or she will like similar titles or not. In addition, certain genres follow specific conventions, e.g. first-person shooters controls are often quite similar from game to game, and the player takes this knowledge with them into new games. In relation to the frameworks of motivation and engagement presented in the previous chapter, it is difficult to use them to consider macro-level involvement in this way. Further, less attention has been paid to the activities that occur around gameplay and support it (i.e. beyond micro-level involvement), and it is not clear how the other frameworks would take these activities into account. The

role of player expectations and their relationship to micro-involvement will be considered in more detail within Section 6.2.3. The themes presented in this chapter suggest that involvement and learning do not just occur during play and that it is important to consider the wider context within which gameplay occurs. The influence of wider activities will be further explored in Section 6.3, Section 6.4. and in more detail within Chapter 7.

Finally, in terms of the themes that relate to gaming capital, *competence* is developed and expressed during play but also manifests on the macro-level, e.g. by displaying knowledge of games and gaming practices, e.g. leetspeak. *Knowledge* is also gained during gameplay and through consulting paratexts and/or friends, while it can relate to any of the DGEM frames on a micro and macro-level. For example, knowledge of narrative could be gained through the macro-level shared frame in the form of paratexts, such as a game review, thus enhancing micro-level affective involvement during play. Considering *community* and gamer *identity* is more appropriate at a shared macro-level, although it is possible that community membership is established, or at least cemented, during specific instances of play. While these themes can be discussed under the frames of the DGEM, particularly in relation to the shared frame, the model does not consider the intricacies of group membership and how these relate to learning.

For instance, the community and identity themes illustrate that not all players identify as gamers, but it is less clear how much someone would have to interact with the wider gaming community in order to benefit from acquiring gaming capital. Is it possible that the recent emergence of the “casual” label has allowed more people, who are less concerned about how good they are or how much they know about games, to play more often? Further, community can be experienced in at least two different ways: with respect to the player’s own personal community (i.e. those he or she will play with/against and talk to about games on a regular basis) and in terms of a wider gaming community (that produces paratexts). Presumably, there are also a number of games and/or genre specific communities. Can someone only be a gamer if they engage with a wider form of

community? Does being a gamer depend on the amount of participation? The themes suggest a higher level motivation for at least some who participate within the practice of gaming: a desire to accumulate gaming capital and be considered members of the wider gaming community. Essentially, a player has to learn what it means to be a gamer. This is not something that previous research has investigated.

The role that community plays in motivations for gameplay relates to views on learning which equate learning with identity change and becoming a member of a community of practice (Lave & Wenger, 1991; Wenger, 1998). The findings also link to Conclave's work on gaming capital and paratexts (Consalvo, 2009) and indicate how players engage with different affinity groups or spaces (Gee, 2004; 2007). However, it is worth noting that the focus of this research is not on a specific community of practice, but rather on a range of different individuals who may or may not belong to different communities. In addition, the majority of the participants were happy to use a variety of external resources, but very few, if any, were involved in the production of these. While several people did not state exactly how they identified themselves within the interviews, Section 6.4 and Sections 7.1.1, 7.2, and 7.3 explore these themes further, particularly in relation to how people identify as players and their interactions with wider resources and communities.

5.3.3 Summary

The set of learning categories and the themes developed as a result of analysing the email interview data provides evidence to suggest how and what learning occurs in the context of gaming. While Gee (2004) provided a strong account of how people can learn through games, the analysis carried out in this chapter has provided further empirical support for some of his claims, especially those regarding activities that occur beyond the instance of gameplay. There is also evidence, as suggested by the inclusion of the learning on a *personal level* category that (for a few players at least) there was a consideration of how their personal identities relate to the characters they play. The majority of the literature exploring informal learning through games typically involves lab

based studies of cognitive ability (e.g. Ko, 2003), one-off observations of gameplay (e.g. Schott & Kambouri, 2006) or focusing on a single online community (e.g. Nardi, Ly, & Harris, 2007). There is a lack of studies which involve asking players whether they think they learn anything from games or not, especially outside a formal educational context. While this means that the findings of the interview study are essentially based on retrospective accounts, they do provide a starting point for further research. Now we have some idea what people say they learn the next step is to consider what they actually do learn. Further, by pinpointing potential links between involvement and learning, we can look for further evidence of the relationships that occur in practice.

This chapter was concerned with identifying learning, and how it links to both micro and macro-level involvement. While the DGEM was a useful starting point, it is clear that on its own the framework cannot be used to account for the wide range of learning identified within the interviews. Nor does it capture the variety of ways in which involvement can manifest on a shared macro-level, e.g. with respect to community. This first study has helped contribute to the literature on games and learning, by moving towards understanding how learning and involvement work together as processes, rather than considering them purely in terms of static constructs. Through exploring the external influences that surround gameplay, we can learn more about how motivation to play and learn is created and sustained in practice. The following chapter takes the examination of learning and involvement to the next phase by discussing specific observations of gameplay and reports on wider gaming activities. This involves applying the learning categories and themes developed to extend the DGEM and considering a number of theoretical conjectures based on the previous literature and the findings of Phase 1.

6. Examining learning and involvement in practice

The second phase of the research investigates some of the claims emerging from Phase 1 and further explores how learning and involvement come together in practice through reporting on the findings of a set of mixed method case studies. As described in Section 3.3, a multiple case study approach (Yin, 2009) was adopted consisting of eight cases and involving the collection of questionnaire, interview, observation, physiological, post-play cued interview and diary data to investigate how learning occurs through micro and macro-level involvement with games. Regarding the micro-level, a methodological decision was made to focus on breakdowns that occur during play. Previous literature indicates that breakdowns can potentially provide learning opportunities with respect to how players go about trying to overcome them (Pelletier & Oliver, 2006; Ryan & Siegel, 2009), though the concept of breakthroughs (Sharples, 2009) has not yet been applied to games research. In terms of analysing macro-involvement, the previously developed learning categories and themes were applied in order to identify what players learn and their interactions with wider communities and resources. The analysis and findings are subsequently discussed in order to address the following research questions:

5. *How can we identify breakdowns that occur during play?*
    a. *How do players attempt to resolve these breakdowns?*
    b. *What role do breakthroughs play in this process?*
6. *What does examining breakdowns and breakthroughs tell us about how involvement and learning come together in practice?*
7. *What evidence is there that players are learning in addition to than learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

The following section, Section 6.1 introduces each of the cases, including an outline of the gameplay sessions in which the participant took part. Section 6.2 considers the analysis of

breakdowns and breakthroughs. Definitions are provided in Section 6.2.1, and the process of analysis is described in Section 6.2.2. In Section 6.2.3, the findings are presented by means of assessing a number of theoretical conjectures that have arisen from the literature and prior analysis. These propositions are then refined on the basis of the data collected within the study, in order to contribute to a theoretical understanding of how involvement and learning come together in practice (presented in Section 6.2.4). Section 6.3 discusses the application of the previously developed learning categories to the diary data, and Section 6.4 considers how players engage with different communities, before the chapter concludes with a discussion of the case study findings in Section 6.5.

6.1 Introducing the cases

Players were recruited from the previous interview study, apart from the first case which served as a pilot. In order to examine a wide a range of experience as possible, a variety of participants were sought (who differed in terms of age, gender and gamer identity). This served to maximise the differences between cases, as recommended by Barr (2007). Table 6.1 illustrates the demographic information relating to each of the participants who took part, along with an indication of the frequency, duration and breadth of gameplay. This included questions about which gaming platforms they used, and the genres they identified as playing often, sometimes or never. The questionnaire (**Appendix 5**) was adapted from previous research carried out by the author as part of the Racing Academy project (Joiner et al., 2007; 2011). Participants filled it in during the first session, where they were asked whether they would describe themselves as a gamer or not (Table 6.1). During this initial session, the diaries were explained and participants were asked to bring in a game of their choice to play for up to 15 minutes in order to introduce them to the format of the subsequent two sessions (as explained in Section 3.3).

In the second session, participants brought in a game of their choice to ensure they would be playing something they were likely to enjoy. In the third session, the researcher chose a game for them that they were unlikely to have played before (making sure that they

were comfortable with this choice), based on the initial session questionnaire and interview. This allowed for an examination of a broad range of gaming experiences.

Table 6.1: Participants in each case

	1. Matt	2. Katy	3. Linda	4. Justin	5. Alex	6. Nick	7. Amy	8a. Natasha	8b. William
Gender	M	F	F	M	M	M	F	F	M
Current age	24	23	59	32	41	29	28	31	32
Age started playing	5-7	5<	18>	5-7	5-7	5-7	8-10	5-7	8-10
How often they play	Several times a week	Daily	Several times a month	Daily	Several times a week	Weekly	Less than once a month	Several times a month	Once a month
How long they play	3hrs	2-3hrs	3hrs	2hrs	1/2hr	2hrs	2hrs	1hr	2hrs
No. of platforms used	5	3	3	3	4	4	1	3	3
No. of genres they play often	3	3	1	7	3	4	0	4	1
No. of genres they play sometimes	6	6	5	3	8	4	6	6	7
No. of genres they never play	6	6	9	5	4	7	10	6	8
Identity	Gamer	Gamer	Non-gamer	Gamer	Gamer	Gamer	Non-gamer	Non-gamer	Non-gamer

While Table 6.1 indicates the number of different genres participants said they play, Table 6.2 outlines the specific genres they played most often, sometimes, or not at all; providing background information on the game preferences of the players involved in the study. Some genres were more popular than others, with Adventure being the most popular choice for the “often” category and Music & Dancing games in the “sometimes” category (which was selected by all the participants). Within the “never” category, Education & Reference and Quiz & Trivia were the least likely to be played.

Table 6.2: Genre preferences

	1. Matt	2. Katy	3. Linda	4. Justin	5. Alex	6. Nick	7. Amy	8a. Natasha	8b. William
Action & Shooter	Often	Often	N	Often	Some	Often	N	N	Some
Adventure	Some	Often	Often	Often	Often	Some	N	Often	N
Arcade & Platform	Some	Some	Some	Often	Some	N	Some	Some	N
Board, card & casino	N	N	Some	N	Some	N	N	Often	Some
Children's	N	Some	N	N	N	N	Some	N	N
Education & Reference	N	N	N	N	N	N	N	Some	N
Fighting	N	Some	N	Often	N	Some	N	N	N
Music & Dancing	Often	Some	Some	Some	Some	Some	Some	Some	Some
Puzzle	N	Some	Some	Often	Often	Some	N	Often	Often
Quiz & Trivia	N	N	N	N	N	N	N	N	Some
Racing	Some	N	N	Often	Often	N	Some	Some	Some
Role-playing	Often	Often	N	Often	Some	Often	N	N	N
Simulation	Some	Some	N	N	Some	Often	Some	Some	N
Sports	N	N	Some	Some	Some	N	Some	Some	Some
Strategy	Some	N	N	Some	Some	Often	N	N	N

Note: “Often” means they selected a category as something they are likely to play often, “some” means they would play it sometimes, and “N” is used to indicate that they never play these sorts of games.

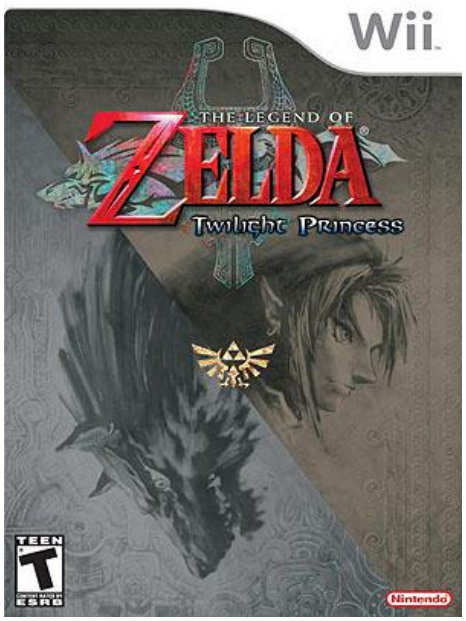
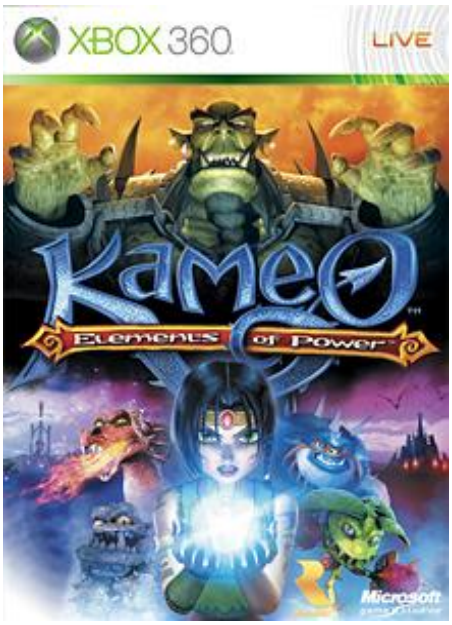
In all cases (apart from case 8 which consisted of two participants), single-player games were used or the single-player mode was adopted within the lab. The initial aim was to get players to bring in something they were currently in the process of playing, but it is worth noting that taking part in the study prompted game playing in different ways than usual. For instance, during the post-play interview Matt suggested that, although he had heard of the game and enjoyed others in the series, one of the reasons he ended up buying *Silent Hill: Shattered Memories* was because he had finished one game, and so “needed something” to play for the study. Similarly, Nick said he was more likely to play PC games since upgrading his computer, but he brought in an Xbox 360 game so he could play on a console in the lab. Although he had enjoyed the game, it was something he had not played in a while. Amy also mentioned within the diaries that taking part in the study

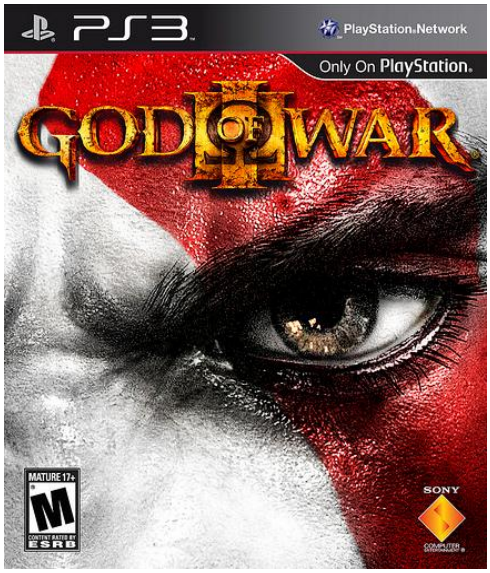
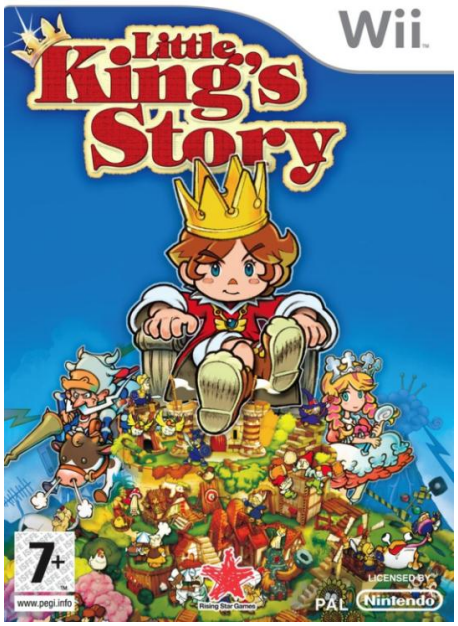
caused her to think about games more than usual, and thus she may have played more often during the first few days of the study. Finally, although Natasha and William do sometimes play games together, they did not actually own a Wii and so chose to play *Big Brain Academy*, not because it was something they were currently playing, but because they were familiar with it from playing it in social situations. However, the aim was to investigate as wide a range of experience as possible and at the very least the case studies were able to explore how involvement and learning occur with respect to both familiar and unfamiliar gaming experiences.

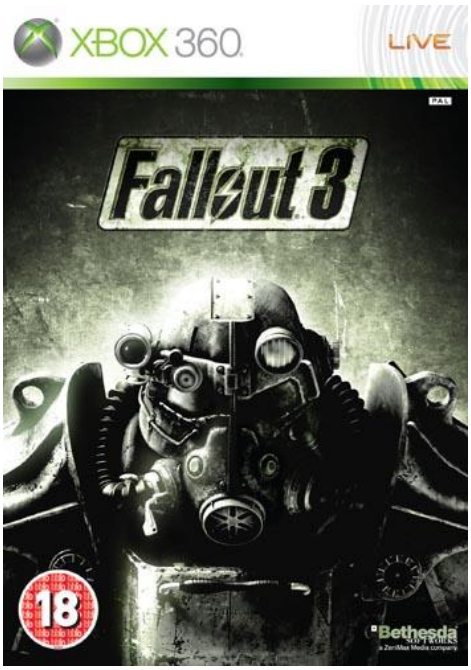
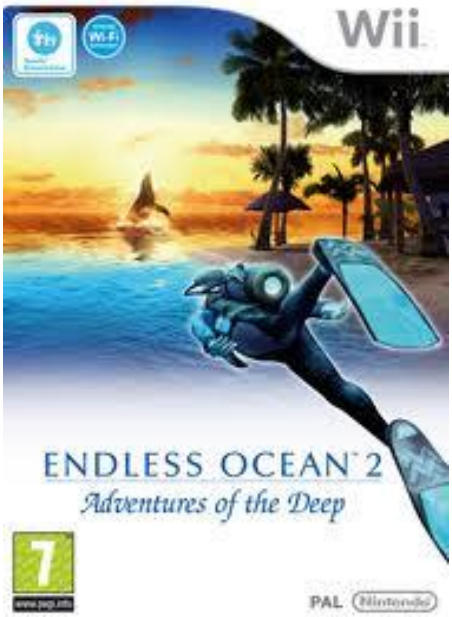
Table 6.3 illustrates the games and platforms played by the participants during each session. A brief description of each of these games is also provided.

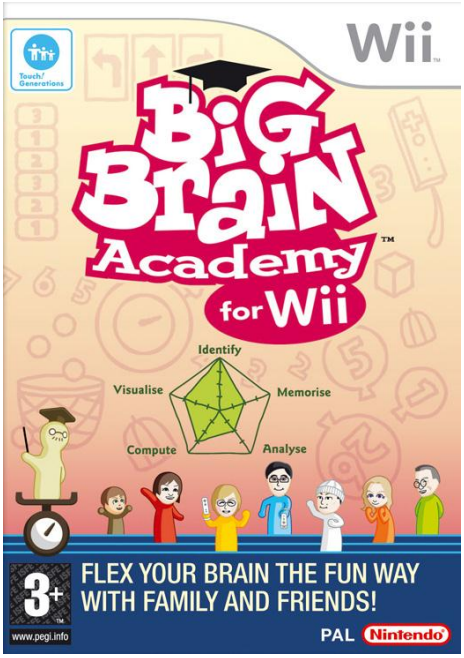
Table 6.3: Games played during the observation sessions

	Session 1 – Player choice	**Session 2 – Researcher choice**
1. Matt	*Silent Hill: Shattered Memories (Wii)*	*Sam & Max: Save the World (Wii)*
		
	The 7th instalment in the Silent Hill survival horror series, this version is a re-imagining of the first where the player plays Harry Mason in search of his missing daughter after a car accident near the spooky town of Silent Hill. Gameplay alternates between real world sections and a nightmare realm where monsters appear.	This is a tongue-in-cheek point-and-click adventure game where the player controls detectives Sam & Max (an anthropomorphic dog and a rabbit) as they uncover different mysteries within the game. Gameply mainly involves talking to characters and solving puzzles.

2. Katy	*Zelda: Twilight Princess (Wii)*	*Kameo: Elements of Power (Xbox 360)*
		
	This action-adventure game is the 13th instalment of the Zelda series where the player controls Link on his quest to restore light to the land of Hyrule.	In this action-adventure game, the player cycles through different elemental warriors (each with unique powers) on their quest to help the title character restore order to the world by defeating her evil sister and the Thorn the Troll King.
3. Linda	*Lego Indiana Jones 2 (Wii)*	*Bayonetta (PS3)*
		
	Similar to other 3D puzzle-platformers in the Lego series, this game allows players to play through all four of the Indiana Jones movies as they explore and solve problems within the Lego environments.	An action game with a focus on combat, where players control the title character Bayonetta: a witch who uses pistols, magic and special attacks to defeat her numerous enemies.

4. Justin	*God of War III (PS3)*	*Little King's Story (Wii)*
		
	The third instalment of the God of War for the PS3 (sixth in the series) this is an action game set in mythological Greece, where the player controls Kratos on his quest for vengeance against the Olympian gods. It also contains puzzle solving elements.	A simulation role-playing game where the player sets about expanding their kingdom through exploring the world as well recruiting and directing party members to perform different sets of tasks such as fighting and farming.
5. Alex	*Super Mario Galaxy 2 (Wii)*	*Flower (PS3)*
		
	A 3D platform game in the long running Super Mario series, where players get to explore and collect coins across different worlds and levels.	An independent art game where the player controls and collects flower petals on a breeze in order to open up and explore new sections of the environment.

6. Nick	*Fallout 3 (Xbox 360)*	*Endless Ocean 2 (Wii)*
		
	An action role-playing game set in a post nuclear fallout world. In this third instalment the player escapes from protected Vault 101 in an attempt to track down their father who left under mysterious circumstances. Gameplay involves exploring an open world and making decisions about levelling up.	The second instalment of this scuba diving simulation involves the player diving and exploring a variety of underwater environments as they attempt to uncover the mystery of the "Song of Dragons".
7. Amy	*Mario Kart (Wii)*	*LocoRoco: Cocoreccho! (PS3)*
		
	A cartoon racing game where the player picks different Mario characters, vehicles and tracks to race on. Players can also collect items to use against other drivers, while opponents do the same.	A puzzle/platform game where players have to find and collect enough LocoRoco dispersed throughout the environment to pass through a series of gates.

8.	**Natasha & William**	*Big Brain Academy (Wii)*	*Little Big Planet (PS3)*
			
		This is a puzzle game where players undertake a series of tests in order to develop various cognitive abilities. It also contains multiplayer modes for players to either compete against each other or cooperate against the computer.	A 3D platform game where the players can control and customise little sackpeople which they navigate through each level. The game can be played cooperatively with up to 3 other players.

In Section 3.3, the procedure and data collection methods used in this second phase of the research project were outlined. In each session, players were asked to play for between ½-1 hour (although they were allowed to quit before the hour was up if they chose). During this time the researcher observed and took notes in a separate room, where real-time feeds of the player, the screen and the player's physiological signals were displayed (Figure 3.1). After the gameplay session, the researcher reviewed a recording of the gameplay with the participant in order to discuss what they were thinking and feeling at the time. The case studies were carried out over a three week period, during which time, participants were also asked to keep a diary of their activities outside of the lab. This diary included questions to prompt the participants; in addition to asking them to take note of what they played every day and for how long, they were asked what they did when they got stuck, who they talked to about games, whether they visited or contributed to forums, and whether they thought they learnt anything from their activities (see

Appendix 6). The case studies culminated in a final interview based on the diary entries of around ½-1 hour duration.

In terms of addressing the research questions, the analysis has been separated into three parts: Section 6.2 considers breakdowns and breakthroughs that occur during play and how they relate to learning and involvement, Section 6.3 discusses the application of the previously developed learning categories to the diary data and Section 6.4 considers player's macro-level involvement with gaming communities and resources.

6.2 Breakdowns and breakthroughs

In order to explain how the sessions and parts of the diaries were analysed, the following sub-sections illustrate how the concepts of breakdowns and breakthroughs were applied to the data collected. A series of steps were carried out to analyse the data including the identification of breakdowns and breakthroughs (6.2.1), collating important episodes and issues (6.2.2), and assessing claims about involvement and learning (6.2.3). Finally, the claims were refined and considered with respect to how learning and involvement come together in practice (6.2.4).

6.2.1 Step 1: Identifying breakdowns and breakthroughs

The concept of breakdowns was introduced in Section 2.3.4.2, but for the purposes of analysing the data collected in the case studies, attention was initially paid to the sorts of breakdowns and breakthroughs Sharples (2009) describes in order to identify learning that occurred during game play. Sharples defines *breakdowns* as "observable critical incidents where a learner is struggling with the technology, asking for help, or appears to be labouring under a clear misunderstanding" while *breakthroughs* are "observable critical incidents which appear to be initiating productive, new forms of learning or important conceptual change" (p. 10). Consideration was also given to instances of interaction and illusion breakdowns (Ryan & Siegel, 2009) where a *breakdown in interaction* relates to what Ryan and Siegel describe as "the natural breakdowns" (which lead to learning within

the game) and a *breakdown in illusion* refers to a loss of “immersion” (in terms of absorbed attention). During the preliminary analysis, the concept of breakdowns and breakthroughs was extended to apply to gameplay.

6.2.1.1 Defining breakdown and breakthrough categories

The first stage of the analysis included transcribing the post-play interviews before INTERACT (Mangold International GmbH) was used to code the multiple data streams (i.e. recordings of the player, gameplay and physiological signals; Figure 6.1). While initial breakdowns and breakthroughs were identified from the transcripts, a coding scheme was developed within INTERACT to identify these within the data recordings. During the preliminary analysis, it became clear that breakdowns and breakthroughs could be seen to occur on three different (though related) levels: with respect to player *action*, *understanding* and involvement.

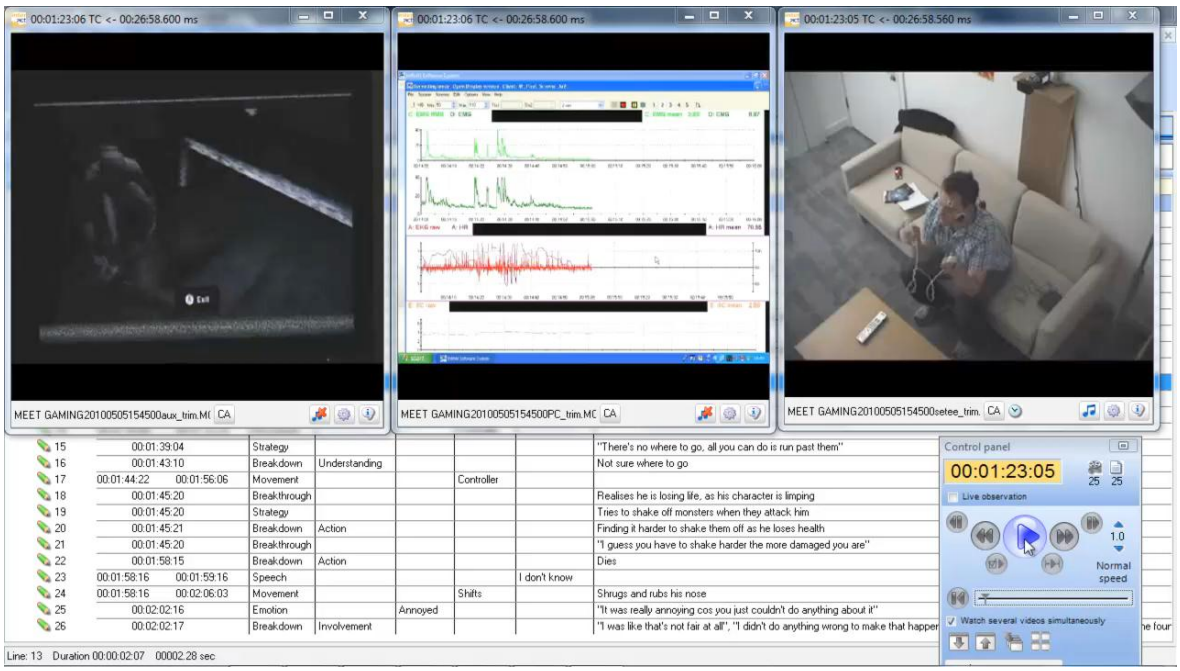


Figure 6.1: INTERACT screenshot - Silent Hill session

In terms of player *actions*, a breakdown occurs when the player fails to execute an action within the game successfully. This may be due to pressing the wrong button, getting the timing of an action wrong, or in-game events, e.g. Amy being hit by a red shell while playing *Mario Kart*. In terms of player *understanding*, the most obvious example of a

breakdown is when the player is unsure about what to do or where to go. For instance, while playing *Endless Ocean 2*, Nick was initially confused about whether a red circle on the map indicated where he was supposed to go next or where he had just come from. With respect to player *involvement*, boredom and frustration were key indicators that a player was no longer engaged within the game and that *flow* was interrupted. For example, Matt was visibly bored with the tutorial he had to go through in *Sam & Max: Save the World* because he was being given information (about the Wiimote controls) that he already knew.

Although breakthroughs are conceptualised by Sharples (2009) as relating to understanding (since they involve conceptual change), they can also be defined as occurring in relation to *action*: when a player successfully carries them out, e.g. Linda having trouble with a specific jump in *Lego Indiana Jones 2*, attempting it several times and then managing to go from one platform to the next. Similarly, instances where a player becomes more involved within a game can be described as breakthroughs relating to *involvement,* i.e. when a player experiences the sensation of *flow* or *incorporation*. An example of this comes from Alex talking about successfully avoiding the ghosts in *Super Mario Galaxy 2*: “So now you’re in that nice kind of, you know, run, jump, don’t know what’s coming, just kind of react”. Positive emotions such as satisfaction, e.g. with the outcome of a boss fight, are useful indicators of involvement. With respect to *understanding*, breakthroughs occur whenever a player learns something about the rules of the game or figures out how to solve a problem. For example, Amy realising that her goal was to collect and guide a certain number of LocoRoco characters to a gate, so she could proceed to the next area in *LocoRoco: Cocoreccho.* A breakthrough in understanding was easier to identify after a breakdown had been identified, since breakthroughs often involved a resolution of the breakdown, although theoretically, there is no reason to assume they can only occur in this instance.

In addition to defining categories of breakdowns and breakthroughs, the preliminary analysis also entailed noting their incidence. The incidents were then reviewed to decide which of them were of particular importance. Initially, the physiological data was intended to signify critical events but the following section explains why the post-play interviews proved more useful for collating important episodes and issues that occurred during gameplay.

6.2.1.2 Reflecting on the use of physiological data and the effect of observation

The initial plan was to use the physiological data during observation to note when significant changes in the signals occurred and to then ask the player for more details about these instances during the post-play interview (as suggested by Hazlett, 2008). The idea was that this would be useful in terms of identifying breakdowns that occur during play. However, observing the gameplay, player and physiological signal feeds at the same time proved to be quite a challenging task for a single observer, so it was decided that it would be more appropriate to use the data during the post-play analysis in order to pinpoint significant episodes and issues. Unfortunately, this also proved to be unfeasible due to the large amount of data collected within each session, where frequent changes would occur within the ½-1 hour episodes. Further, given that these signals can vary greatly between individuals (Mandryk, 2008) and that many of the larger changes were actually due to movement artefacts (rather than the result of the player directly reacting to in-game stimuli), it was not clear how to establish whether a change was significant or not. Even though baseline readings were taken prior to each session, all that can be said is that players did show more physiological activity during gameplay than they did at rest.

Therefore, a final attempt was made to examine the physiological data in relation to specific episodes which had been deemed as significant on the basis of the post-play interview data. However, this was not successful either, due to the difficulty of interpreting the signals and establishing meaningful patterns in relation to the different types of breakdown and breakthrough. As Kivikangas et al., (2010) point out, games are much more complicated stimuli than those adopted within previous psychophysiological

research (e.g. where reactions are measured while participants view a sequence of standardised images). Further, despite the claim these signals can provide an objective measure of the player experience (e.g. Mandryk & Atkins, 2007) they still have to be interpreted and this is not a simple task (Isbister et al., 2007).

In addition, Mandryk (2008) notes physiological sensors measure more than just a player's reaction to a game, and can be confounded by factors such as physical activity, lighting and talking. Research in the area often suggests that researchers need to pay attention to movement artefacts and remove them from the main analysis. However, movement itself can actually influence a player's emotional state (e.g. Bianchi-Berthouze et al., 2007; who found that increased movement increased player enjoyment). Within the case studies movement often provided an indicator of involvement, e.g. participants who were bored would often shift in their seats and sometimes sigh, while those who were engaged would sit forward intently. There were also examples where, after periods of high activity (e.g. being chased by monsters), participants would shrug their shoulders and sit back in their seats, seemingly in an effort to relax. Given that these movements do provide some insight into a player's emotional state, it is odd to have to remove them completely from the analysis. Within their review of physiological research and games, Kikivingas et al., (2010) do suggest that there may be scope to extend physiological research by including an analysis of movement data, to investigate player attention, interest and emotion.

In order to provide an illustration of how using this sort of data proved challenging under these circumstances and how it did not help with identifying breakdowns and breakthroughs, three different examples are provided below. Figure 6.2 shows an extract from Linda's session playing *Lego Indiana Jones 2.* This example indicates the range of individual differences. Linda would frequently talk to herself during the session, and sometimes hum the theme tune, but even in quieter moments, she showed a lot more EMG activity than the other participants. The figure below shows Linda's physiological

activity for part of the section of the game where she returns to the main hub in between levels. The top graph represents EMG cheek activity, the second EMG forehead, the third EKG (red line) and heart rate (purple line) and the bottom graph shows GSR – where EMG refers to electromyography, EKG to electrocardiography, and GSR to galvanic skin response.

Figure 6.2: Linda physiological data - Indiana Jones 2

The first vertical dotted line (in bold) represents her exit from the previous area, while the second one indicates when she leaves the hub. At 18.45, Linda realises that she has not discovered a new part of the game and becomes frustrated, stating during play: “Back here again? How on earth did that happen?”, which she confirms made her “cross” during the post play interview. This frustration does seem to correlate with increases in GSR, EMG cheek and forehead, but several of the other peaks are less easy to interpret. While some of the heightened EMG activity (for both cheek and forehead) can be attributed to

movement and speech (e.g. at approximately 20.05 Linda sighs quite loudly) much of it seems to occur without an obvious cause.

In contrast, Figure 6.3 illustrates Alex's physiological data from a particular episode where he showed very little physiological reaction. This episode is further explained in Section 6.2.2 (Table 6.6), which illustrates how Alex experienced multiple breakdowns with respect to action, understanding and involvement.

Figure 6.3: Alex physiological data - Flower

What is important to note in this example is the complete lack of an obvious reaction, suggesting that this kind of data is not particularly helpful for identifying breakdowns, at least in the case of Alex playing *Flower*. While the first vertical dotted line indicates a change in EMG cheek and heart rate activity – seemingly as a result of a short animation (unlocking a new part of the area for him to explore) – Alex appears to show little reaction to the rest of the canyon sequence (the second dotted line represents the end of this

section). This is despite the fact that he felt “disconcerted” by part of the sequence and got a “bit fed up” with aspects of the game during this time.

Finally, Figure 6.4 illustrates Justin’s reactions while engaged in a boss fight during *Little King’s Story*. In this example, Justin’s EMG cheek and forehead signals are relatively consistent during the boss fight (between each vertical dotted line) but show more of a reaction during the post-fight cut scene. This is despite the fact he describes the cut scene as “all very generic and not very interesting”. He moves to scratch his forehead as soon as he completes the boss fight, which probably explains the large GSR increase at 59.10, but not the changes 20 seconds later.

Figure 6.4: Justin physiological data- Little King's Story

In general, Justin’s GSR appears to be the most responsive signal within this session, though there are also changes in heart rate. Again however, it is hard to decipher why these changes occur. For instance, at 57.35 and 57.40 Justin’s GSR spikes but there is not an obvious reason for this. Further, at 57.45, he is informed one of his party member’s

has died and there is very little reactionm despite Justin explaining in the post play interview that this incident made him think “I’m going to have to raise my game a little bit”. In addition, while Justin says he experienced a breakthrough in the form of realising that once the boss “shoots his head off, he can’t move, so as long as your away from him, you can just yeah, attack”, it is not clear from this data when this realisation occurred exactly, or even if it did lead to a physiological reaction.

In short, the difficulty of interpreting the data and the lack of consistent patterns observed within the sessions meant the signals did not prove useful for identifying breakdowns and breakthroughs which occur during gameplay.

Existing research has examined these signals as the basis for modelling emotion (e.g. Mandryk & Atkins, 2007) and to distinguish between positive and negative emotions (e.g. Hazlett, 2008), on the basis of experiments using controlled conditions. In their review, Kivikangas et al., (2010) note the methodological difficulties of using physiological data and suggest that the area would benefit from more systematic research that is able to validate existing findings and extend them to different modalities, games and settings. They recommend using experimental approaches, with large groups of participants and/or less complex games. However, even if an experimental approach is adopted, the examples provided in this section indicate that physiological data is not very helpful for pinpointing breakdowns and breakthroughs, especially those that relate to understanding. Further, there is another potential confound that requires attention and that is the potential impact that being observed can have on the player.

It was already mentioned that taking part in the study was likely to have an influence on the players in terms of prompting episodes of play. It was also that clear from some of the case studies that participants were reacting to being monitored. Justin for instance, stated he thought there was “something about being observed” that made the session feel different to playing at home, rather than his being attached to various physiological

sensors. Similarly, Nick mentioned feeling a bit “embarrassed” when he had some trouble using the Wiimote while trying to perform a dodge in *Endless Ocean 2.* Thus any changes in physiological data in this example would be less about indicating an action breakdown and more about indicating a breakdown in involvement, in the sense that the player has become conscious of being observed and arguably less involved as a result. Further, player reactions can be quite complex. For instance, Amy would often laugh when playing *Mario Kart* (usually when something negative had happened) and when questioned about it suggested that “if I’d been on my own, I might have just got annoyed” but because she was aware of being watched “I guess you kind of go, well I’m not going to get annoyed, so, I may as well just find it amusing. As an alternative emotional response to, the stupidness that is this game”. This raises an issue in terms of whether the physiological reactions which are being reported in the literature really do represent some of the emotions researchers are attempting to investigate, or whether they are in fact indicators of a complex emotional reaction to playing a game while knowing someone else is monitoring your behaviour. While this means that the an awareness of being observed was likely to affect the players within the cases, any instances of this that the player reported were documented as part of the analysis and were considered in relation to assessing their involvement (**Appendix 9**).

6.2.2 Step 2: Collating important episodes and issues

On the basis of the post-play interview transcripts and the initial analyses, 53 episodes and issues were analysed in further detail to consider how the different categories of breakdowns and breakthroughs relate to each other (as mentioned above, a full list and brief description of each can be found in **Appendix 9**). Episodes were classed as important when the player noted they were having prolonged difficulty figuring out what they had to do to proceed, or when they expressed frustration or boredom within the game. Boss fights were also included as important events since these can be seen as a test of the skills and knowledge the player has developed within the game. Issues were classed as important if they related to recurring problems, e.g. with the controllers, or if

they represented underlying problems that affected the player's understanding or involvement within the session, e.g. failing to understanding a specific game mechanic or not being interested in the narrative of the game. This research focused on problems that occurred, rather than obvious successes, since these situations had the potential to be sources of learning. This does not necessarily mean that learning during gameplay only results from dealing with problem situations, just that a methodological decision was made to focus on breakdowns and how players try to resolve them.

Figure 6.5: Zelda - Steam vents in Zelda

Examples from two different sessions are presented in order to show how specific episodes and issues were analysed in more detail. The first example concerns Katy, playing *Zelda: Twilight Princess* on the Wii. This is a game she had previously completed, but decided to play again because "I care about the story and the characters, so it's like re-reading a favourite book, you don't want to do it every day but you wait a little while and then you know, you want to go back again and experience it over again". Despite having played it before however, she encounters a section of the game where she does not remember how to progress and struggles to get past the steam vents (Figure 6.5).

Katy tries numerous strategies to get by, all of which result in action breakdowns since they fail. She also experiences an understanding breakdown when she mistakenly concludes she must go back in the direction she came to find another way through the area. After she explores and does not find anything, she soon experiences a breakthrough in understanding when she realises “that’s clearly the only path” and so returns to the previous area. After a couple of attempts, she works out the correct strategy, feeling “happy” that she can carry on with the game. This episode is a simple example of how action breakdowns can lead to understanding breakthroughs that eventually lead to progress and contribute to involvement (Table 6.4). The label number (3.3 in the case of getting past the steam vent) represents the session and episode or issue number listed in **Appendix 9**.

Table 6.4: Getting past the steam vent

3.3 Getting past the steam vent Initially assuming she can’t go past the vent, Katy tries numerous strategies before eventually working out how to progress.	Overview [37.35-40.40]
a. Approaches steam vent and waits for a short while, tries to use shield (“Check that having my shield out won't help me”), tries to run straight towards it All fail “I was trying to see if it would happen to have shut off but it's, it turns on whenever you get close to it and doesn't turn off till you go away again” Tries to walk past it: “Can I walk around it? No there's a fence in the way, or so I think, so I go back”. Thinks the fence is in the way, so ends up backtracking.	Strategies Action breakdowns Strategy Understanding breakdown
b. Leaves the area, goes back down to pool at the bottom of the mines in search of another way past. Talks to some Gorons and explores the area. After not finding anything, she decides: “I go back up cos that's clearly the only path”	Strategies Action breakdown, Understanding breakthrough
c. Returns to the vents, tries to roll past the steam as: “I think right, how am I going to do this? Can I go under?”, but she can’t Realises: “No, gotta go round this somehow” Considers climbing past (despite thinking the fence is in the way): “Let's try this, I bet it's not going to work but let's try it anyway”, had exhausted other options: “I was pretty much trying out of desperation and I couldn't find anything else” Accidentally presses wrong button: “Then I push the controls in the wrong direction again, Link climbs up” but tries again Succeeds in getting past [40.35] Realises fence wasn’t in the way: “It was all kind of oh it worked <laughs> and then I'm happy”	Strategy Action breakdown Understanding breakthrough Strategy Action breakdown Strategy Action breakthrough Understanding, involvement breakthrough, emotion (happy)

The next example concerns Alex playing *Flower* on the PS3. This is an independent game where the player controls a flower petal on a breeze and has to collect other petals from

flowers within a 3D environment, before they can unlock new areas. Alex experiences an underlying issue in that he is uncertain about whether to treat *Flower* as a toy or a game (Table 6.5). He is expecting more game-like rewards, or at least a score to represent his progress. While Alex describes the game as generally quite “pretty” and he appreciates the feedback he gets after collecting sets of glowing petals (classed as action breakthroughs), he experiences an understanding breakdown with respect to the petals that do not glow why he should collect petals that do not glow. He does not realise that increasing the number of petals he collects will make him go faster and ultimately he is unable to enjoy the experience of play because accidentally missing petals gets in the way of him achieving the sensation of flow.

Table 6.5: Toy vs. Game

10.2 Toy vs. Game – underlying This is an underlying tension for Alex since where he doesn’t know how to treat Flower as a toy (i.e. something you play around with) or a game (i.e. something with goals).	Overview
a. In terms of goals, starts off "at this point my strategy is, I think I need to get all of these, because I’m a sad completer finisher type of person" Notices that some are glowing: “Well it seems clear I’ve got to get all of these, for something to happen", gets a little animation when he does. When asked how he felt after the first one “That was nice, it was a big wave of, happy green stuff.” Further he seems to like the musical feedback “And it’s a nice feedback, the music is nice in this too.” But later: "I did struggle a little bit with the, so why do I need to collect any of these flowers that aren’t glowing then?", "I'm not even getting a score for them”. Doesn’t realise that more petals make the stream go faster At the end of the first area: "I was expecting when we got to the end, you would have some sort of, you know, you have collected 83% of the flowers or something, but there was nothing" [11.35] Sometimes: “Well again, you’re trying to decide whether to play it partly like, whether you’re playing it like a toy, or whether you’re playing it like a game”	Strategy Understanding breakthrough Action breakthrough Involvement breakthrough Emotion (positive) Understanding breakdown Understanding breakdown (mismatch)
b. Quit after about half an hour of play, after third area (see 10.3) During the third area: “"I still think I’m struggling a little bit in terms of whether I’m viewing it as this is supposed to just be a relaxing experience or whether I’m supposed to be, you know, engaged with the game-like aspects of it?" [24.58] Issue seems to be compounded by how easy it was to miss flowers "because it’s ah, I’ve missed one again” and he suggests this got in the way of achieving a flow experience “I think it’s a nice toy, but I’m not sure about the game element, it feels like it’s trying to be both sort of thing.”	Strategy Understanding breakdown (mismatch – same as above) Action breakdown Involvement breakdown

To appreciate exactly what led up to Alex's decision to quit *Flower*, it is also worth examining one the final sections he played (Table 6.6). After entering a new area where the wind speed noticeably picked up and he had to travel through a canyon (Figure 6.6), Alex soon became confused. Earlier on, he experienced an understanding breakthrough in terms of realising he had to collect petals from the glowing flowers within the game world in order to open up new sections of the game. In this section, the wind speed picked up and suddenly changed direction so that he started to miss flowers, where "all of a sudden we're too high, and then woop, you can't get any of those?".

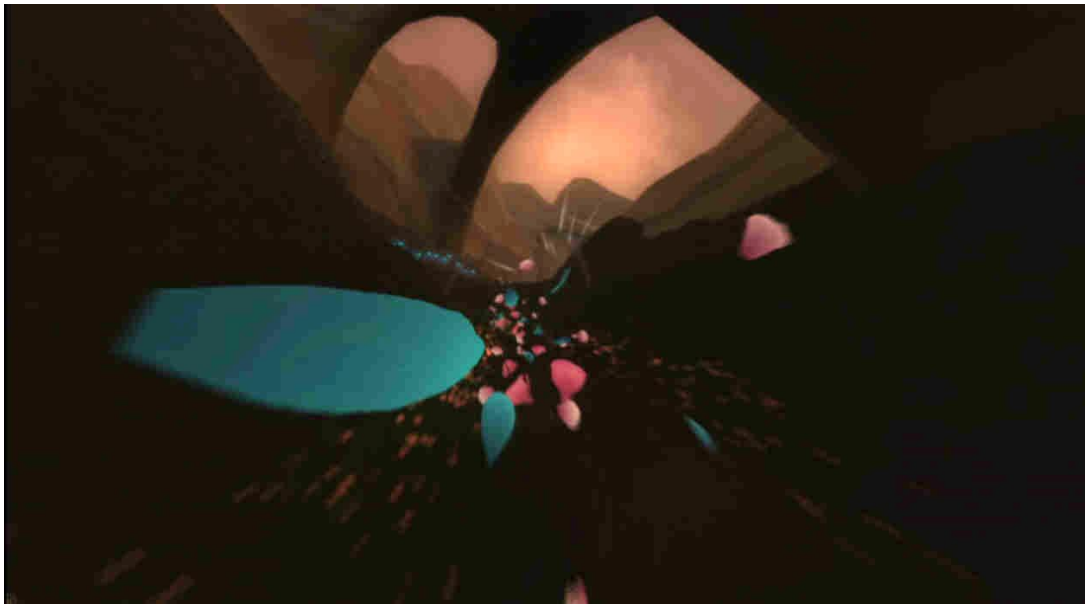


Figure 6.6: Flower - Canyon section

As a result of these action breakdowns, he mistakenly thought the game "was going to penalise me if I didn't get through" by making him go round the section again (in fact he was progressing into a similar looking section). This was further compounded by a breakdown in terms of understanding, as he became unsure whether he was even controlling the petal stream anymore. In turn, his enjoyment was reduced because "I didn't really know what I did, I missed things on the sort of jumps three times, and the only time I got them I had no control over it" so while it might have been a "pretty experience", "as a game that's not very satisfying", suggesting a breakdown in involvement resulting from a reduced sense of agency.

Table 6.6: Navigating the canyon

10.3 In the final section he plays, Alex enters a new area, first admiring it but he still seems confused about the speed at which he is going. He also becomes confused when he starts missing petals, mistakenly assuming the game is punishing him for this by making him repeat the section. Further, he is unsure whether he is in control or not, which arguably leads to a reduction in agency, reducing his enjoyment of the game.	Overview [29.04 – 31.13]
a. Entering new area: "And then I think well this is quite pretty, seemed to be in a, strangely wild west a canyon all of a sudden. " "And trying to work out whether I should be accelerating, or whether actually you're going at a perfectly reasonable speed. Or not." Enjoyed particular section: "That was fun. I liked the marimba style" [29.37] Starts missing flowers: "There we are, and then all of a sudden we're too high, and then woop, you can't get any of those?" Trying to get as many flowers as possible: "Well I got flipped up into the air, so it's seems reasonable that I want to get them", carries on "I'm thinking, I'm guessing we're just going to keep going round this then"	 Strategy Emotion (fun), involvement breakthrough Action breakdown Strategy
b. Rocks collapse [30.00] "I was somewhat disconcerted by the, collapsing bridge thing, partly because I thought, oh come on", "I thought first that it was going to penalise me if I didn't get through, I thought oh that's a bit harsh, nothing else sinister has happened" "You can't tell me now I've only got two goes to get round this" – thinks he is being punished and has to go round again - "I'm assuming that's the end, and I'm going through it again, and I'm thinking well I don't remember this though" Controller issues: "cos all of a sudden, this is actually quite difficult to control" Unsure who's in control: "I'm not sure what's me, I'm not sure what's just happening cos of the breezes" Still trying to get flowers but starts to miss lots	 Emotion (disconcerted) Understanding breakdown Understanding breakdown Understanding breakthrough (partial) Action breakdown Understanding breakdown Strategy, action breakdown
c. "Getting a bit fed up of getting flipped up in the air and missing everything" [30.31] Quickly moves between ledges: "There we go, here we go. Right, what? I did nothing" Then reaches the other side: "And then I thought oh, I'm at the other side. I thought, what about all the ones I missed? I don't understand"	Emotion (annoyed) Action breakdown (not in control) Understanding breakdown
d. "So, it, kind of was a pretty experience as an on rails type thing, then that can be quite nice but, as a game that's not very satisfying.", "Um, but there's been no reward for me, driving through that well, or not doing well, from what I can see. You can get anything and you'd still get through." Finishes the level but then quits because: "It took longer, but I'm not sure it was necessarily more challenging, so that was also why I was quite happy to stop. Cos that was fun, but I thought the next one is just going to be more of the same, and that is lovely, it was really nice to watch." [nice to watch but not so fun to play]	Emotion (dissatisfied) Involvement breakdown (reduction of agency) Strategy

Example 3.3 (Table 6.4) indicates how specific sorts of breakdowns and breakthroughs might relate to each other, while Examples 10.2 (Table 6.5) and 10.3 (Table 6.6) show how an underlying issue relates to a specific episode, giving a clearer picture of how

micro-level involvement plays out over the whole session. Gameplay is only one part of player involvement however, and so the following section seek to address how learning and involvement on a micro and macro-level scale come together in practice, in relation to considering the gameplay and diary data.

6.2.3 Step 3: Assessing claims about involvement and learning

During the final stage of the breakdown analysis, specific theoretical conjectures were proposed on the basis of the literature and the previous findings from Phase 1. These were then subject to assessment through an examination of data. The seven claims, listed below, relate to the relationship between macro and micro-involvement and to potential relationships between the different types of breakdowns and breakthroughs:

i. *People's macro-level expectations and choices depend on different player communities*

This claim stems from the analysis in Section 5.2.1.2 where player expectations and subsequent choice of games appeared to be influenced by resources such as paratexts, and by other people.

ii. *Continued micro-involvement depends on macro-level player expectations being met*

The second claim also emerged from Section 5.2.1.2 where it was suggested that initial player expectations would influence the assessment of a gameplay experience and subsequent involvement.

iii. *The unpredictability of outcomes contributes to what makes games meaningful and compelling*

The third claim relates to the introduction of the DGEM in Section 4.1.1 where, in relation to involvement within the performative frame, Calleja (2007a) states "the unintended and unpredictable consequences of one's actions are precisely what makes the exertion of

agency in games so meaningful and compelling" (p.161). The importance of agency is considered further in relation Claim 7.

iv. Breakdowns in action and understanding are not detrimental to involvement

The fourth claim stems from research which claims that minor breakdowns are a common part of gameplay (Barr, 2007) and that interaction breakdowns do not disrupt the experience of flow (Ryan and Siegel, 2009).

v. Player involvement increases through action and understanding breakthroughs

The fifth claim was developed as a result of considering the influence of rewards on involvement and learning within Section 5.2.1.1 and on the basis of the preliminary analysis reported in this chapter.

vi. Progress requires breakthroughs in understanding

The sixth claim stems from the discussion of progress and rewards and how they might relate to learning in Section 5.3.2. Further, it relates to literature that suggests, with respect to game-based learning, "the assessment of the 'success' of the game is largely through completion of tasks or levels" (de Freitas, 2006, p.33).

vii. A loss of agency leads to a breakdown in involvement

Finally, the seventh claim arose from the preliminary analysis reported in this chapter and refers to Calleja's (2007a; 2007b) DGEM in relation to the importance of agency within the performative frame.

In order to assess the validity of these theoretical propositions, evidence was sought within the collated list of episodes and issues that was either consistent or inconsistent with the claims. This process helps to discern the conditions under which the propositions apply. Nvivo 8 was used to code the diary entries and interviews for any evidence of breakdowns and breakthroughs. References in the diaries normally related to player

responses concerning the question about whether they got stuck during a gameplay session and how they attempted to overcome problems they encountered. Each of the claims is assessed in turn within each of the following sub-sections.

6.2.3.1 Claim 1: People's macro-level expectations and choices depend on different player communities

There was clear evidence to support this claim within the data collected. For instance, Matt mentioned having heard "good things" about *Silent Hill: Shattered Memories* (even though he later said he'd wished he looked further into it as he came to regret buying the game). Further, within the diaries, Matt also discussed his expectations concerning upcoming releases, such as *Red Dead Redemption* and *Alan Wake*, that were based on his exposure to different online paratexts. Similarly, Justin mentioned his friend who recommended *Final Fantasy XIII*, while he also implied he had heard a lot about the game from other sources before purchasing it. In addition, it was clear that players' choice of game for the observation session was influenced by other people. For example, Linda getting *Lego Indiana Jones 2* so she and her daughter could play it together, and Matt buying *Defcon* as it was a multiplayer game he could play with his flatmates.

However, the most commonly referred to source of player expectation seemed to be previous gameplay experiences. For instance, in Linda's case, she shared a long running interest in the Lego game series with her daughter. She even commented that *Lego Indiana Jones 2* was not as good as some of the previous games such as *Lego Batman.* Similarly, Matt had played previous *Silent Hill* games, Justin previous *Final Fantasy* games, Katy other *Zelda* games and Alex other *Super Mario* games, all of which shaped their expectations about the games they were currently playing. There was also one instance where an interest in other media led to the decision to try a game, where Natasha saw an advert for the BBC's *Doctor Who Adventure Game* after watching a Doctor Who episode on TV.

In terms of deciding when and what to play, social situations often prompted gameplay sessions, such as Natasha and William playing *Big Brain Academy* at a party. In contrast

however, for players such as Amy, the presence of other people was viewed as a disincentive due to concerns about not being competent enough. While Justin liked to keep up to date with the latest games and releases through subscribing to sources such as the Edge Twitter feed (Edge is a games magazine), he made a point about not wanting to pay full price for games and waiting until they were available second hand. This example suggests that while opinions from the wider player community (e.g. magazine reviews) can influence the decision to purchase a game, price is another factor players consider. Similarly Nick, Alex and Natasha mentioned downloading mobile games at least in part because they were free. Mobile games in particular were played in "short bursts" while waiting, e.g. for the oven to heat up (Nick), suggesting that the choice of game sometimes depends on the amount of time available for gameplay. Further, gaming platform also influenced where play happened, e.g. playing on a laptop, mobile or handheld, while sat in social space like the living room (Natasha & William).

Interactions with player communities, whether directly through talking to others or indirectly in the form of paratexts do contribute to player expectations of gameplay. However, prior experience is another important influence. Also, when it comes to deciding when and what to play available time, other people, and platform all have affect player choices.

6.2.3.2 Claim 2: Continued micro-involvement depends on macro-level player expectations being met

Repeated engagement with a game was viewed as evidence of continued micro-involvement. In the first observation session, players brought in something they had played before, indicating repeated engagement. Prior to the study, Katy had decided to play *Zelda: Twilight Princess* for the third time, precisely because she wanted to re-experience the game. Similarly, Alex spoke about how he expected *Super Mario Galaxy 2* to include platform and exploration elements, while boss fights are "always good fun". With respect to Natasha and William playing *Doctor Who*, it was clear the game did not meet their expectations (as it was quite "buggy" and they were having trouble progressing)

and so they quit playing and did not go back to it. The latter example shows how micro-involvement is disrupted when expectations are not met.

Regarding the diary entries, more than one episode of gameplay with the same game was viewed as evidence of continued micro-involvement, although it was hard to assess whether this was due to expectations being met if the player did not initially report what their expectations were. In some instances, expectations were partially met and this was enough to continue play, despite the fact players did report being bored with aspects of the game. For example, Alex discussed getting bored of *Zelda Spirit Tracks* when he found he had to back track to areas he'd been before, and Justin reported having to trudge through parts of *God of War III* and *Final Fantasy XIII* in order to build up his characters. Similarly, Matt reported being disappointed with *Metro 2033* as it was not the open sandbox type game he expected but was impressed enough with the story and atmosphere to play the game until completion.

In addition, there was evidence to suggest that in-game experiences caused players to reassess their initial expectations. For instance, Matt assumed *Silent Hill: Shattered Memories* would be like other games in the series (where you could use weapons) but was surprised to eventually realise he could not fight monsters but only attempt to avoid them. Although he soon lost interest in the game (indicating a breakdown in micro-involvement), it was not because his initial expectations were not met but because he did not think the hiding mechanic was implemented well. During the diary interview he referred to other (more engaging) games which had used this mechanic more effectively, and explained how he ultimately found the gameplay quite arbitrary (see Claim 7, Section 6.2.3.7 for a fuller discussion).

There was also evidence that expectations can affect how a player interprets a game in the first place, mistakenly in the case of Katy and Kameo. Before playing the game in the second session, she read the back of the box and suggested during the post-play

interview “I had no idea what I was walking into, beyond it would involve some fighting and some vague pretence at a story apparently”. Although there were moments when she thought the plot may have been more complex than she originally assumed (e.g. when reading the quote in Figure 6.7), Katy soon decided that this was unlikely and appeared to take the game less seriously as a result. It is possible that part of the reason for this was because she does not own an Xbox 360, and so is unlikely to play it again.

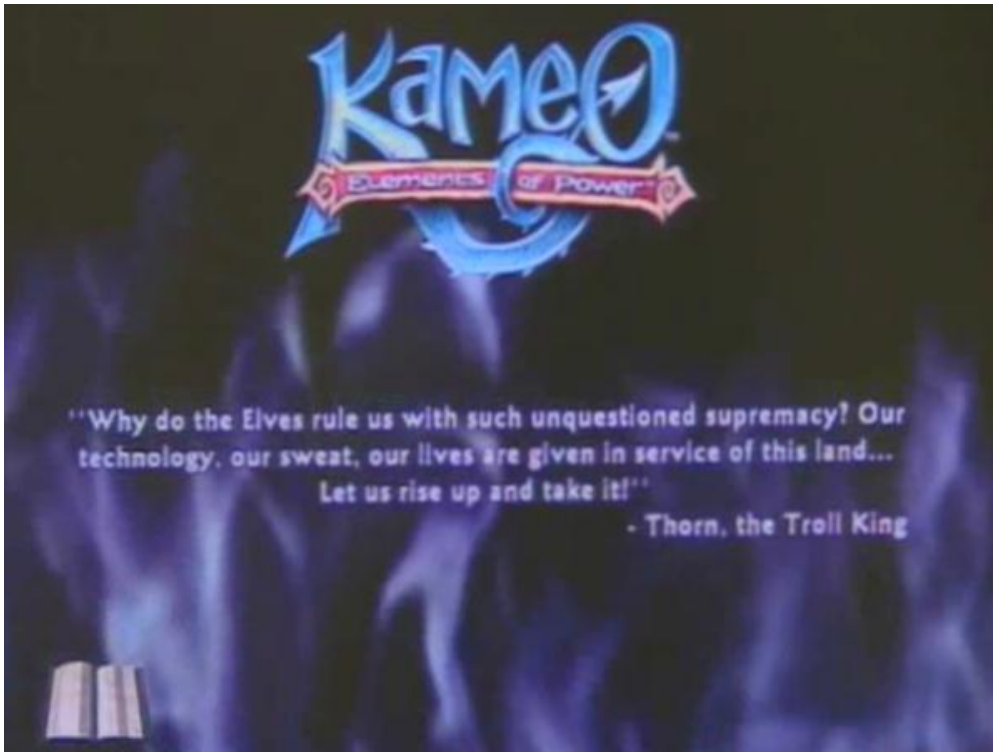


Figure 6.7: Kameo - Troll King quote

Other issues also influenced whether a player went back to a game or not, including preferences for other games (e.g. Natasha and William going back to *Angry Birds* after trying out other iPhone games*)*, preferences for different platforms (e.g. Nick spending more time playing shooters on PC and iPhone games than using his Xbox, despite reporting he enjoyed the *Fallout III* session) and not having access to platforms they were asked to use in the second session (e.g. Katy suggesting she would try *Kameo* again if she had an Xbox 360). In addition, price and game length played a role in how prepared players were to invest in a game. For example, Nick mentioned several free iPhone games he tried once but gave up on, as did Natasha and William, while both Matt and Justin made points about the amount of money they have spent on a console games and

wanting to get the most out of them. There was also an indication from those who identified themselves as gamers that they were more likely to persevere with less enjoyable parts of games (e.g. Justin talking about trudging through boring bits of the game so he can get to the big fights in *God of War III)* but it's difficult to make generalisations about player types on the basis on a small set of case studies.

To sum up, player expectations being met during gameplay did have an influence on whether players went back to a game, but other factors affected continued micro-involvement such as the experience of gameplay itself, the promise of later rewards, preferring other games and platforms, and even price. It is also worth considering that expectations influence how a player interprets gameplay in the first place. Generally however, this was one of the harder conjectures to assess as players did not always refer to their initial expectations. Further research can address this problem by taking initial expectations explicitly into account before considering how they relate to micro-involvement.

6.2.3.3 Claim 3: The unpredictability of outcomes contributes to what makes games meaningful and compelling

In general, it was easier to identify instances where a lack of predictability made the gaming experience less compelling, e.g. Matt realising he can only be harmed in the nightmare realm of *Silent Hill* and subsequently interpreting events outside of these sections as "less scary cos they just, nothing hurts you". Justin did experience unpredictable outcomes as enjoyable, e.g. when he realises he can ride Cerberus and use him to breathe fire and says "Ok this is cool" (Figure 6.8). However, Justin's experience of God of War III illustrates unpredictability can also be frustrating, e.g. when he decides to back track to explore a previous area but ends up dying several times due to his having difficulty performing double jumps. Justin felt that despite the fact he was performing the same actions, they led to unpredictable results (see Claim 4, Section 6.2.3.4 for a more in-depth consideration of how breakdowns like this affect involvement).

Figure 6.8: God of War III - Kratos and Cerberus

Most of the examples from the episodes and issues examined relate to situations where unpredictability was interpreted as not being meaningful, especially when participants mentioned in-game events as being “random” or “unfair”. For instance, while Amy initially suggested she quite enjoys the “randomness” of *Mario Kart* (as this was seen to make the game less serious) but she did not always interpret this positively during the gaming session: “it’s frustrating when it’s like that, where you’re like, last corner and I’m in first, get hit by a red shell and suddenly I’m in fourth”. Similarly, Matt’s comments about the monsters randomly spawning in *Silent Hill* being “unfair” indicate he did not find their occurrence particularly meaningful or compelling. Perhaps the unpredictability of outcomes is only interpreted as meaningful or compelling when the player feels responsible for what occurs and the results are seen as being consistent and fair with respect to the rules of the game. Factors that influence player involvement are discussed in more detail when assessing Claim 4, Section 6.2.3.4, and in terms of agency in relation to Claim 7, Section 6.2.3.7.

While not directly linked to player action, unpredictability within the narrative could also be interpreted both positively and negatively, as in the case of Linda playing *Bayonetta*. She was initially amused by the voice-over talking about "European clans" feuding with each other but she soon lost interest with the increasing complexity of the plot during the lengthy cut scenes: "I got bored and I was looking at the ribbons [in Bayonetta's hair] and I thought have they got some kind of secret language written on them or something". Another factor which may facilitate whether unpredictable outcomes are interpreted positively is the presence of others. When Natasha and William were playing *Little Big Planet*, there was a specific section in the Swinging Safari level when they both died multiple times. They seemed to find this very amusing, both laughing at each other during the process. However, while William was keen to restart the level and try again after they ran out of lives, Natasha said doing so was "kind of annoying" as it meant they had to "do the bits that you've already done". Her reaction suggests that she did not find the unpredictability of the game quite as compelling as William did.

There is some evidence to suggest that the unpredictability of outcomes can make games more compelling and meaningful (and this may be amplified in a social setting) but only if the player interprets these outcomes as being fair and consistent. Unpredictability with respect to narrative also has an influence on how in-game experiences are interpreted. It is worth treating these claims with caution however, as players were not explicitly asked about how they interpreted different outcomes, so it was not always clear whether they found them to be unpredictable, meaningful and/or compelling. Again, further research is required to address these issues more explicitly.

6.2.3.4 Claim 4: Breakdowns in action and understanding are not detrimental to involvement

Throughout the sessions, there were many examples of minor action and understanding breakdowns that did were not detrimental to player involvement. In fact, they were quite a common occurrence and usually overcome quickly. For instance, in the previous example

where Katy was trying to get past the steam vent in *Zelda* (Table 6.4), she did not appear particularly annoyed or frustrated by the situation.

However, there were situations when breakdowns did cause a problem. Some of these instances involved recurring action breakdowns relating to the controller, which caused players to become conscious of their actions, e.g. Katy saying “Hey register!” to the Wiimote when it did not respond to her commands. Repeated problems with the controls sometimes caused players the quit, as in the case of Natasha who got frustrated with *Doctor Who* and passed it on to William. He played the game for a bit longer but then gave up because you “could try something, which didn’t work, but would work 5 mins later”.

Regarding Claim 3, which concerned the unpredictability of outcomes, in Section 6.2.3.3, a more serious issue emerged, in form of the player interpreting an action breakdown as unfair. For instance, when playing *Silent Hill,* Matt died after being caught by the monsters in the nightmare world. Afterwards he said he was “annoyed” not so much because he died, but because he experienced an understanding breakdown. He was did not understand how he could have avoided dying and subsequently interpreted the outcome as “not fair at all”. Similarly, in the diary entries, Justin reports the “injustice” of repeatedly being killed by a boss near the end of *Final Fantasy XIII*. In this case, just before the boss was about to die, he would kill off Justin’s main party member, causing Justin to have to re-start the battle from the beginning. This combination of action and understanding breakdown, where the player does not understand why an action breakdown has occurred, appears to significantly reduce involvement. This issue is further discussed in terms of player agency when assessing to Claim 7, Section 6.2.3.7.

Action and understanding breakdowns were also frustrating when they significantly impeded game progress. For example, Linda experienced an underlying understanding breakdown while playing *Indiana Jones 2* where she was unable to recruit and switch

between the correct set of characters required by the game. This was due to the fact she normally plays the game with her daughter (where a second player can easily switch to the character required), so while she knew how to switch her own character, she did not know how to switch the artificial intelligence character following her around. During this time, she reports being “cross” and “fed-up” when she realises she can’t make any further progress, while her response was usually to quit and try a different part of the game.

Similarly, when playing *Bayonetta*, the fact that Linda did not use ‘witch time’ (which slows down the pace of a fight thus making it easier to defeat more enemies) indicated she experienced an underlying breakdown in understanding. She admitted that after learning about witch time, it was something she “completely then forgot how to do” and “when I’m in the throes of battle, I tend to sort of panic and just <pants> press buttons and things”. Further, “I’m not very good at looking at the peripheral indicators I’m afraid” as “in the middle of the battle, I can’t take my eyes of the screen just to look at my health, I just hope for the best and keep going”.

Figure 6.9: Bayonetta - Fight scene

These comments indicate the breakdown resulted from too high a cognitive load where she was unable to recall in-the-moment what she had learnt previously and to attend to pertinent on-screen cues (such as the transparent clock hands superimposed on screen, which last appeared during the witch time tutorial; Figure 6.9). Arguably, the fact that she is not familiar with fighting games, means she had difficulty interpreting which cues were important to attend to. In the end, she died nine times within the same sequence. However, while she expressed frustration at this, she was keen to keep on trying – so despite these negative emotions, she did not want to quit. The session was stopped after an hour (where she'd spent almost half the session on the same fight) but it would have been interesting to see how much longer she would have continued trying if left on her own or whether she would have come up with a new strategy to try. After the short break between the gameplay and the post-play interview, Linda did suggest maybe she should have used witch time but admitted it did not occur to her during the session.

Another issue which negatively influenced involvement concerned the consequences of action breakdowns. For instance, Justin became particularly annoyed when his death in *God of War III* led to him being returned to a far-away checkpoint, as opposed to a nearer one. Similarly, Alex gave up on a level and decided to try something else in *Super Mario Galaxy 2* when he ran out of lives after a boss fight; trying again "would cause stress" as the boss "was quite involved to get to". In Amy's case, she decided to quit the entire session after 30 minutes of playing *LocoRoco: Cocoreccho* because she couldn't find enough of the LocoRoco's to progress through the second gate: "I've spent quite a lot more time, in the second bit just feeling confused, and that does frustrate me about a game". This represents both an action and understanding breakdown since she had not mastered the game mechanics in order to uncover the extra LocoRoco's and she couldn't figure out where she was going wrong.

There was also a case where involvement influenced action and understanding breakdowns, as opposed to the other way around. When Nick was playing *Endless Ocean*

2, it was clear from the start he was not particularly interested in the game or the narrative. He experienced several problems during play, in particular with respect to interpreting the map and navigating to the correct locations. When asked about this he conceded: "I found it hard to concentrate on the game because I wasn't really enjoying it." This suggests that an initial lack of interest can cause breakdowns on the level of both action and understanding.

In summary, the evidence suggests that breakdowns in action and understanding are not necessarily detrimental to player involvement as long as they are overcome relatively quickly and do not have major consequences. They will affect involvement negatively however, if the player interprets action breakdowns as being unfair. Further, a lack of initial involvement can lead to action and understanding breakdowns since the player won't be paying enough attention to the game.

6.2.3.5 Claim 5: Player involvement increases through action and understanding breakthroughs

There was some evidence to support this claim, especially in terms of player satisfaction that resulted from overcoming breakdowns and achieving progress. For instance, after a struggling to find the solution to a problem in *Sam & Max*, Matt stated "it's satisfying solving the task you know, solving the puzzle, even if it was a bit frustrating getting there". Similarly, Justin expresses his relief at overcoming difficulties he was having in *God of War III*, where once he managed to progress through to a new area "all of a sudden this was a lot more fun again". In the diaries, Justin also refers on several occasions to having made progress within episodes of gameplay, indicating that this is something he enjoys. Similarly, in relation to the earlier example of Katy and getting past the steam vent in *Zelda* (Table 6.4), she experienced an understanding breakthrough when she realised she had to return to this area as she had "exhausted" all other options, and subsequently achieved an action breakthrough when she successfully proceeded past the vent. This in turn increased her involvement as: "It was all kind of oh it worked <laughs> and then I'm happy". She had a similar experience when playing *Kameo* during a boss fight after

working out a strategy to defeat the boss, when she was became keen to find out “what’s going to happen next?”.

Figure 6.10: Mario Kart - Race points

In addition, while Amy was playing the racing game *Mario Kart*, her involvement often related to experiencing a sense of achievement. Amy was happier when she placed in the final three at the end of the grand prix trials (which consisted of a set 4 races), and after each race she would quickly try and calculate her score (Figure 6.10) so she would have some idea of whether she could achieve this goal, e.g. "Fourth, but 1st, 2nd and 3rd are now 8, minimum of 8 points so, you’re kind of thinking unless the computer makes whoever’s in 2nd or 3rd come, like last"..."no, I’m not doing that well here". Reflecting on her overall involvement in the session, she seemed the most pleased with the final set of races where she got a bronze cup for a set of tracks she had not completed using a 100cc bike before: “maybe it’s looking back, there’s more enjoyment from that, because I achieved something at the end of it, whereas the two I played on 150 I didn’t place, so it’s kind of like, ok, that’s fine but, it didn’t achieve anything so there’s less reward at the end

of it". This suggests that action breakthroughs in the form of gaining race positions add to a player's involvement when they feel they have achieved something as a result.

Other people can also have an influence on involvement and understanding. For example, in the diaries Matt reported an incident when playing *Defcon* with his housemates, where he requested help from one of them but was not provided with it. Matt describes *Defcon* as "like a chess game but with nukes and things" which you can choose to play competitively with others or cooperatively against the computer. While playing with his housemates, Matt was playing as U.S.A and had to defend the East and West coast, so he asked for assistance. One of his flatmates in particular, Pete, did not seem to appreciate that the U.S.A was a more difficult country to defend and so at the end of the round he gave Matt some "grief for having a low score" (although they were playing cooperatively the game gives individuals scores at the end). As a result, Matt decided to teach Pete a lesson by getting him to play the U.S.A. in the next round and by deliberately not helping him. Matt suggested that this was the best way to get Pete to appreciate "how hard America was", something which Pete did concede afterwards. This episode is particularly interesting because it illustrates how Matt facilitating an understanding breakthrough for Pete led to an increase in his own involvement (this example is also referred to in Section 6.4, in relation to player *competence* and *community*).

There were several cases however, where it was difficult to pinpoint whether an action or understanding breakthrough actually increased a player's sense of involvement. For instance, when Nick was playing *Fallout 3*, he did not experience any particularly significant breakdowns but neither where there any involvement breakthroughs. However, perhaps the breakthroughs which he did experience, especially in relation to action, meant his experience of involvement was maintained throughout the session since he did report enjoying it. In a different example, when Katy was playing *Kameo,* she came across a flame monster enemy she originally thought was invincible, as she had some trouble working out how to defeat it. In part, this was due to inappropriate transfer from playing

Pokémon in the past, since she did not initially think her ice attack would work on flame monsters, and so she ignored them instead. She eventually reached a point in the game where she realised she had to defeat one in order to progress, and after trying out different attacks, she developed an effective strategy to do so. However, she did not exhibit or report much of a reaction to this breakthrough, and again her involvement seemed to be maintained rather than increased. This could be due to the fact that, while she experienced breakthroughs in understanding and action, this was a minor enemy and so defeating it, unlike the later boss, did not results in a great sense of achievement.

In addition, there were instances where action and understanding breakthroughs actually decreased involvement. For example, when Linda was playing *Lego Indiana Jones 2* at home, she discovered a solution to a problem "by chance" and although this led to progress, it irritated rather than pleased her. Arguably, she did not feel responsible for this progress (see Claim 7, Section 6.2.3.7). In addition, when Matt experienced realised that he could not be harmed outside of the nightmare realm in sections of *Silent Hill*, his involvement was reduced because this understanding breakthrough made the game less scary, and more predictable (see Claim 3, Section 6.2.3.3).

The evidence indicates that while action and understanding breakthroughs can increase involvement, more often than not they may just maintain the experience. Further, they can even lead to a breakdown in involvement, for instance when a player feels less responsible for the outcomes of their actions or realises the game is more predictable than they initially believed. In order for an involvement breakthrough to occur, a player has to experience a sense of achievement either by reaching specific goals or through overcoming significant breakdowns.

6.2.3.6 Claim 6: Progress requires breakthroughs in understanding

There was evidence of progress being dependent on understanding breakthroughs within the game. For instance, when Katy realised she had to return to the steam vent as there was no other way to proceed in *Zelda: Twilight Princess* and when Alex worked out a

strategy to avoid the carpet chomping ghosts within the Haunty Halls of *Super Mario Galaxy 2*. Similarly, in *God of War III,* Justin had to work out how to access and control a set of platforms and levers when attempting to rescue Piritheous before he could proceed in the game. Further, in the case of Natasha and William's playing *Big Brain Academy,* much of the game depended on them being able to answer questions correctly (although there were one or two instances when they would just try and guess). It was also clear when they were playing *Little Big Planet* together that communication facilitated an understanding breakthrough and subsequent progress. For instance, in the Skate to Victory level they came across a drawbridge that they had to lower in order to progress. While both carried out different actions, such as investigating the jet packs they could use and exploring the area, it was not until William asked "What are we actually meant to do?" and Natasha pointed out the drawbridge that he realised they had to lower it. Further, it was William picking up a cylinder and moving it to the other side of the screen that caused Natasha to figure out the solution to the problem: "Maybe if we fill that thing with stuff, it comes down". In this instance, not only did they have to work out a solution before proceeding but one player's actions caused the other to realise what the solution was.

However, there were also several instances where progress was achieved in the absence of understanding breakthroughs. Amy did not experience any particularly significant breakthroughs while playing *Mario Kart*, apart from perhaps realising that she had forgotten to use manual cornering in the second set of races. By the time she noticed this however, the race was almost finished and she did not have enough time to significantly improve her position. This was a racing game (i.e. there were few problems to solve within it) and one she was familiar with so perhaps in this case there was less scope for understanding breakthroughs to occur.

In other instances, progress occurred without a complete understanding breakthrough. For example, in Sam & Max, Matt experienced partial understanding breakthroughs in the sense that he knew that he had to knock out one of the characters (called Whizzer) within

Bosco's store. He also knew that in order to do so he needed to plant an item (in this case, some cheese) on Whizzer so that when he tried to leave the store the security system would knock him down. However, Matt struggled to find a way to plant the cheese without being seen. While he tried out numerous strategies, such as trying to put the cheese in Whizzer's crate when he was not looking (Figure 6.11), in the end, Matt resorted to clicking on all the items in the room, just "hoping something would happen". He eventually clicked on the bathroom door, causing a chain of events that resulted in Whizzer to leaving the room, allowing Matt to plant the cheese successfully.

Figure 6.11: Sam & Max - Trying to plant the cheese in Whizzer's crate

The reason why this is not a complete understanding breakthrough is because Matt did not plan to click on the bathroom door so Whizzer would leave and he could then place the cheese in the crate – in fact Matt didn't know what to do next so he resorted to trial and error and accidentally found the solution. Ultimately, it was an action rather than understanding breakthrough which led to progress. While he knew what he had to do, he didn't quite know how to do it: "And that's what kind of a bit annoyed me because it's like, you know what you've got to do, it's just you've got to do it in the way the game designer

wants you to do it". Similarly, Justin managed to successfully defeat the boss in Little King's Story without ever understanding how the health of his party members was represented in the game.

Other players also resorted to trial and error strategies when stuck, as opposed to working out a solution first. For example, Linda reported in her diary entries that she had resorted to "randomly stabbing" at the DS screen while playing *Jewel Quest*, since she found the objects too difficult to actually find. Justin also had a similar problem to Matt when playing *God of War III* and trying to solve a labyrinth puzzle. During the diary interview, Justin explained how the puzzle involved an elaborate setup with cauldrons of water, pedestals, pressure points and ledges but while he tried numerous different things, it was not until he was using a gem to adopt a different perspective that he inadvertently came across the solution, which actually "made no sense". So again, an action rather than an understanding breakthrough led to progress.

In general, progress cannot occur without action breakthroughs, since they relate to the successful execution of strategies. Taking Amy as an example, when playing *LocoRoco,* she experienced a partial understanding breakthrough when she thought the bubbles in the water might be helpful for reaching the branches above. However, while she tried several strategies such as clicking on and around the bubbles several times, the lack of an action breakthrough meant nothing happened and she was unable to progress, which soon led to her quitting the game.

In many cases, especially with respect to games which involve puzzle elements, understanding breakthroughs are an important part of achieving progress but this does not mean they are always necessary. As Matt pointed out, it's not just about finding a solution to the problem, but about working out the designer's solution to the problem, which may not be the same thing. Achieving an understanding breakthrough can speed

up progress but the interactive nature of gameplay means that trial and error will also work, though arguably, this may be less satisfying (see Claim 5, Section 6.2.3.5).

6.2.3.7 Claim 7: A loss of agency leads to a breakdown in involvement

A player is able to exert agency within the game environment via the game controllers and there were several instances where players experienced problems with the controls of the game. In most cases, these problems were overcome by repeated attempts and did not take too long to resolve. For instance, Katy during the *Zelda* session saying “Hey register” to the controller and commenting that Epona (Link’s horse) did not always respond the way she wanted her to. However, this did not significantly affect her involvement as she did not report being particularly annoyed by the episodes. Similarly, Justin also experienced issues when trying to line up party members to perform tasks in *Little King’s Story*. Here, he did become irritated with the difficulty he was having and even stopped the game to look at the manual for instructions. While he did not find anything useful, after a few more attempts he finally “twigged it" realising “I don’t think it’s even about being lined up correctly actually, it’s just whether it’s highlighted or not" and the issue was no longer a problem.

Amy experienced more serious controller issues in *LocoRoco* however. She was not very familiar with the PS3 controller and although the instruction screen at the start of the game was initially helpful, she became apprehensive as she received more and more instructions. She did suggest that as she starting playing “everything makes sense once you’ve seen it”, but later grew frustrated after the second gate, when she couldn’t work out how to find the number of LocoRoco she required. Although she had picked up the basic controls, she did not realise the extent to which she could interact with the environment, especially in terms of shaking and tilting the controller within different areas to manipulate the environment. This meant that despite coming up with ideas, such as thinking the bubbles might be useful, the controller issues were an obstacle to her expression of agency. This ultimately limited her ability to interact with the game world and progress within it.

Other players also experienced issues relating to agency, such as Matt becoming frustrated with dying in the nightmare realm while playing *Silent Hill.* This had less to do with his character's death, and more to do with the fact he did not think he had done anything wrong: "I just got trapped, I went under the bed but he found me, twice and then I'm trying to run away which is a dead end anyway and as soon as one found me, all three found me, which was quite annoying. I was like, that's not fair at all". This indicates, in addition to an understanding breakdown (not knowing how to avoid the monsters), Matt experienced a breakdown in terms of involvement. Using the phrase "unfair" suggests a loss of agency, where he saw the game as being at fault rather than himself. During the diary interviews, Matt also discussed how he continued to find the gameplay in the nightmare world "arbitrary" as there he could not find a way to avoid the monsters entirely, thus contributing to his growing lack of interest in the game.

Similarly, when Alex was playing *Flower,* he experienced a reduction in agency because he was unable to control the petal stream as effectively as he wanted. This became a more significant problem when he reached the canyon sequence and the game appeared to take over control of the stream (Table 6.6). Further, Justin experienced controller problems when playing *God of War III* dying on several occasions due to the difficulty he was having performing double jumps. Justin blamed the controller for this and felt "just annoyed, because it's not that there's something wrong with the strategy, it's not that there's something wrong with the way I'm doing it, it's just not reading my inputs the way I wanted it too". Later on he realised that part of the problem was the game did not intend for him to head back in that direction: "I can't really see where I'm jumping too"..."because of the way the camera's sweeping back at the moment, maybe you're not supposed to come back this way?". In this instance, the repeated issue with the controller did affect involvement, most likely because it was not overcome quickly and subsequently had a more serious impact on Justin's ability to progress.

While playing Big Brain Academy, Natasha also experienced frustration in response to finding aspects of the Brain Quiz unfair. This mini-game involved competing for the highest score, taking turns on each round until a certain number of trials was completed. The game randomly calculates the difficulty level of each round, e.g. easy or expert, and allocates random bonuses to players, e.g. doubling their score (Figure 6.12). During these rounds, Natasha received a number of tasks with higher levels of difficulty, while William received a disproportionate number of bonuses. William was quite pleased at this, and although Natasha laughed about it, it was clear she had become a bit frustrated by the issue declaring that “it’s not fair” and suggesting to William “you’re a cheat”.

Figure 6.12: Big Brain Academy - Bonus

It is clear that being able to act effectively within the game-world and achieving meaningful results are significant components of player involvement but it there are other factors that can reduce enjoyment. In Natasha and William’s case, when playing both games their different playing styles had an effect of their involvement. For instance, William was generally more competitive and keen to get to the end of each level, while Natasha was happy to explore the game and its mechanisms. This led to situations where William

became impatient, e.g. while Natasha was customising her avatar, and when Natasha was less enthusiastic, e.g. re-trying the Swinging Safari level. As mentioned earlier, understanding breakdowns that significantly obstacle progress will have a negative impact on involvement, e.g. Linda not understanding how to swap characters in *Indiana Jones 2,* and Matt becoming frustrated when trying to knock out Whizzer in *Sam & Max.*

Figure 6.13: Endless Ocean 2 - Using the pulsar gun on a whale shark

Also, in Nick's *Endless Ocean 2* session, there was very little involvement in the first place so it was hard to see how it could have been reduced further. Possibly as a way to increase his enjoyment, he did try out various strategies within the game: "I was just trying to test the boundaries, the physics and stuff I guess, just to see what I could do in the game". Some of these "tests" included seeing whether he could walk him into the ocean without his oxygen tank, and trying to provoke the fish, including a whale shark (Figure 6.13), by using the pulsar gun on them repeatedly. Unfortunately for Nick, none of these strategies had any real consequences in the game and so his involvement remained low. Another important factor to consider in relation to involvement during the sessions concerned the effect of observation. For instance, Nick experienced a few difficulties in terms of using the Wiimote to dodge, something he said he felt "embarrassed" about.

Similarly, Amy explained how she tended to laugh when things went wrong during the *Mario Kart* session in the lab, but would probably have gotten more annoyed if she had been playing it at home. Further, though players sometimes decided to cut the session short, there were one or two instances when they would play for longer than they would normally have chosen to, e.g. Nick deciding to play *Endless Ocean 2* until he ran out of air because "I just thought like you need data".

In general, a reduction in agency is very likely to lead to a breakdown in involvement, and is normally the result of recurring controller problems or players feeling that their actions do not have meaningful consequences within the game-world. However, there are also other factors which adversely affect involvement, including getting stuck, different playing styles and an initial lack of interest in the game itself.

6.2.4 Refining the claims

Assessing the initial claims (introduced at the start of Section 6.2.3) revealed a variety of evidence concerning how learning and involvement come together on a micro and macro-level scale. Learning on a g*ame level* can be seen to occur on the macro-level in terms of acquiring gaming knowledge from other players and external resources (produced by the wider community) and with respect to micro-involvement in the form of experiencing understanding breakthroughs. On the basis of the analysis, a set of refined claims are proposed below. These relate to how different aspects of learning and involvement come together in practice:

I. Macro-level expectations are informed by prior experience, other players and the wider community.
II. Repeated micro-involvement depends on expectations being met, the promise of in-game rewards, and external factors such as the price of the game.
III. The unpredictability of outcomes leads to meaningful and compelling experiences only when the outcomes are interpreted as fair and consistent.

IV. Narrative and social context contribute to what makes a game play experience meaningful and compelling.

V. A lack of initial involvement will cause further breakdowns.

VI. Action and understanding breakdowns contribute to involvement when they lead to breakthroughs.

VII. However, involvement will be reduced when breakdowns take too long to overcome or have major consequences, e.g. a loss of progress.

VIII. Additionally, an involvement breakdown will occur if outcomes are not considered fair and consistent.

IX. Involvement breakthroughs occur when overcoming breakdowns leads to a sense of achievement.

X. Progress requires action breakthroughs, but not necessarily understanding.

XI. Action breakthroughs that occur without understanding (i.e. through trial and error), will be less satisfying.

XII. The experience of agency is necessary for maintaining involvement.

XIII. Recurring controller problems are an obstacle to the expression of agency.

XIV. Agency is reduced if players feel their actions do not have a meaningful impact within the game world.

Assessing the evidence for each of the conjectures presented in Section 6.2.3 and revising them as a result has helped contribute to a more nuanced understanding of how involvement and learning come together in practice. This understanding can be further developed through future research that aims to assess the refined propositions under different circumstances.

6.3 Applying the learning categories to the diary data

This section considers the previously developed learning categories (introduced in Section 5.1.1; Table 5.1) in relation to the diary data. A greater emphasis is placed on learning

through others and learning through external resources, however, as Section 6.2 was primarily concerned with learning through play.

The learning categories were applied to the data collected from the diary entries and interviews (using Nvivo 8 for coding). Table 6.8 shows the number of entries made by each participant during the study in response to the diary questions over the three week study period (see **Appendix 6**). Responses such as N/A or "not today" were not included in the table. While the diaries provide an insight into players' daily activities, participant's admitted they sometimes forgot to include things. The diary interview format overcame this problem to an extent, as referring to entries helped to prompt recall. Nonetheless, the table should be viewed as a rough indication of reported activities since it only contains the numbers of recorded entries for each question. In most cases, the participants reported that the study period was fairly typical of their normal game playing activity (although some players – Amy and Natasha in particular – did wonder whether taking part in the study provided a catalyst for play). Exceptions to this included Nick who was away on holiday for a week (reducing his gaming activities) and Justin who suggested he would normally have spent more time playing with other people (apart from a botched attempt to play *Mario Kart* online with his brother, this did not happen during the study).

As Table 6.7 indicates, the number of responses to the question about whether they thought they had learnt anything was generally quite low. However, the entries relating to speaking to other people, getting stuck within the game, interacting with resources and whether participants had anything else to add often contained references to learning. For example, Linda reflected on game design in one of her entries within the anything else to add section: "Novelty is a great way to sell games but they have to deliver the hype, and be sustaining and interesting throughout". This suggests that players do not view overcoming problems in a game or keeping up to date with gaming news and developments as explicit forms of learning. All implicit and explicit references were coded under the previously developed categories relating to how players learn: *through play,*

through others, and *through external resources* and to what players learn on a: *game, skill* and *personal level*.

Table 6.7: Number of diary entry responses to specific questions

	1. Matt	2. Katy	3. Linda	4. Justin	5. Alex	6. Nick	7. Amy	8. Natasha	9. William
q1. Play games	11	15	21	19	14	12	6	5	3
q2. Speak to others	9	15	15	4	4	3	3	4	7
q3. Get stuck	8	3	7	10	1	0	0	2	2
q4. Interact with resources	8	8	0	4	10	7	0	1	0
q5. Learn anything	8	2	3	9	4	1	3	0	2
q6. Anything else	8	0	4	4	11	0	1	1	1
Gaming identity	Gamer	Gamer	Non-gamer	Gamer	Gamer	Gamer	Non-gamer	Non-gamer	Non-gamer

Participants frequently referred to learning on a *game level*, most often in terms of *learning through play*. As the Section 6.2 indicates, these references often related to playing the game but would sometimes concerned reflecting on game design. For instance, Matt seeing particularly hard to kill enemies in *Metro 2033* as a gameplay mechanic to make the game longer ("extra-padding") and Linda suggesting after a gameplay session "Games need to reward with some positive progression – Jewel Quest is too repetitive and slow". There were also examples of learning on a *game level through others* and *through external resources*. For example, Linda speaking to her work colleagues about *Farmville* to discuss the "merits of new features and how to use it", while Matt and his flatmates discussed *Defcon* tactics. Natasha and William also mentioned instances when they were helping each other play mobile phone games like *Angry Birds.* With respect to external resources, this usually involved activities such as watching game reviews on Facebook and 'liking' them (Justin), using a feed reader to keep up to date on gaming news and developments (Alex), consulting a game guide to find out about available weapons in *Metro* 2033 (Matt) or checking iPhone game reviews in the Apple App Store (Natasha). This community aspect of learning on a *game level* is further considered in Section 6.4 in relation to players' macro-involvement.

The majority of references did concern learning on a *game level*, but the next most commonly mentioned category was learning on a *personal level*. Learning on a *personal level* would occur *through play*, e.g. Justin suggesting in a diary entry that (with respect to *Final Fantasy XIII)* "if anything, FFXIII aspires to teach you the value of hard work!". The category was also mentioned in relation to technological developments, e.g. Alex wondering about the appropriateness of motion control as an interaction method after playing *Flower*. In Nick's case, he did not think he learnt anything new from playing *Armed Assault: Operation Army* but did say the game reminded him of things he had learnt while he was an army engineer, especially since the game uses the same software as the army does for training purposes. Participants would sometimes reflect on their own gaming habits, e.g. Linda noting she should pay attention to the DS warnings about playing time limits to avoid neck ache, and Matt suggesting "I guess I've learnt quite a lot about my gaming habits from this" (i.e. from taking part in the study itself). Similarly Amy said she had learnt more about "my need to actively relax than just sit and watch TV". In terms of picking up *general knowledge*, there were one or two example of players using *tangential sources* as a result of gameplay, e.g. Justin looking up mythological characters he encountered in *God of War III* and Alex looking up trains in Japan after becoming curious about encountering them in *Zelda: Spirit Tracks.*

Perhaps one of the most salient examples of learning *through others* on a *personal level* relates to Katy and her friend Cassie using game narratives (such as the *Zelda* story lines and *Shadow of the Colossus*) as the basis for role-playing, via instant-messaging. During the study, Katy engaged in this activity at least once a week where she once mentioned getting involved in a debate with Cassie about whether: "resurrection [is] good, bad, or neutral in a world where gods have laid out a natural order?". Katy's extended engagement in the Zelda series was also noted during the gameplay session in the lab, since she exhibit a high degree of empathy for the characters within the game. She used the phrase "Poor Link" on several occasions, usually as a response to the character Link dying within the game but also talked about aspects of the narrative being "really sad"

when you considered them from Link's point of view. Further, she reflected on times when she acted within the game in specific ways as "that's the way Link would do it" although she also sometimes did things "just out of curiosity". For instance, while in the Goron Mines, she talked to all the characters within an area, because even though "Link would probably run straight through the door" to carry on with his quest, she wanted to see what they had to say. This sort of thinking is a good example of what Gee (2004) is referring to when he describes the critical learning that occurs when players consider the relationships between their individual and virtual identities. However, it can be argued that part of the reason Katy is able to reflect on identities in this way is the result of her role-playing activities outside of gameplay.

Finally, the category that was least frequently observed was learning on a *skill level*. Almost all of these references related to learning *through play*. Most of the examples referred to *cognitive* problem solving activities, e.g. Justin suggesting "I suppose working out the puzzle in God of War 3 involved some pretty lateral thinking..." Linda also mentioned that her daughter and her developed concentration and rhythm skills as a result of playing *Guitar Hero* together. Further, Matt's example of playing *Defcon* with his housemates can be seen as example of developing *collaborative skills*. This was one of the few examples of learning on a *skill level* by *playing with others*. It is worth noting, Linda was more able to note her adult daughter's improvement in rhythm skills rather than her own. This was similar to Alex discussing how he found it was easier to see how his 8-year old son was developing problem-solving skills, rather than himself, since this was something Alex felt he had already developed through playing games.

Participants often struggled with the question "Have you learnt anything from your gaming experiences?", commenting that it was unusual for them to reflect on learning within this context. As a result, most of the explicit references to learning concerned the *game level.* In addition, while some participants agreed they were *learning through play*, they did not see this as particularly important or worth mentioning in the diaries because: "even if

you're playing a problem solving game, it's not the kind of problem solving that you do in real life" (Natasha), i.e. there was little evidence of transfer. It would seem that there are times when players are not aware they are learning and even when they are, they don't always see what is learnt as particularly valuable. Nevertheless, some examples of learning on a *personal* and *skill level* were provided, and the categories were also able to pick up more implicit references to learning on a *game level*, especially in relation to interacting with communities and gaming resources.

6.4 Assessing wider gaming involvement

In order to consider players' macro-level involvement with games, the gaming capital themes (introduced in Section 5.2.2) were applied to the diary entry and interview data: *knowledge*, *competence*, *identity* and *community*. At the beginning of the study, all participants were asked whether they identified themselves as a gamer (see Table 6.7). Within the diary data itself however, *identity* was rarely referred to. There were one or two instances, such as when Katy expressed a dislike for "lifestyle" games such as Wii Fit: "I think games consoles should be for gamers, people who don't know which end of the graphics card is which, should keep their hands off them" but this theme was definitely expressed the least. *Competence* was also mentioned less often, though it came up occasionally and always in relation to other people. For example, Justin reported how he enjoyed being top of the *Bejewelled* leader boards on Facebook and Matt discussed the gloating between him and his housemates around playing *Defcon*. In Matt's case, it was particularly important not to help Pete because: "I felt I needed to show them what it is like playing as America and I knew if I did help they would get a higher score than I did playing as America and so they would just think it was me playing poorly, not that America needs help when we play." Matt also referred to himself as a "stronger gamer" than his girlfriend, which is why he tried to suggest games with less complex controls for them to play together. In addition, Amy suggested her lack of competence means she is less willing to play games in socially competitive environments, e.g. playing *Mario Kart* with more experienced friends.

The two themes mentioned most frequently were *community* and *knowledge*, and these were usually mentioned in relation to each other, e.g. with respect to acquiring knowledge through interacting with different player communities. There is some overlap with the learning categories here in terms of learning on a *game level*, and in terms of learning *through others* and *external resources*. Regarding *community*, a distinction can be made between player's immediate community, i.e. the people within whom they play games with and talk to about games, and the wider community which produces game paratexts. Obviously, there can be some blurring between the two for players who regularly contribute to/create paratexts and interact with people as a result. However within the eight case studies, there was little evidence of contribution to or creation of shared resources.

In terms of player's immediate community, participants would discuss playing games with partners (e.g. Matt, Natasha & William), with family (e.g. Alex, Linda), work colleagues (e.g. Linda), friends (e.g. Matt, Katy) and even with people about games at social events (e.g. Justin). For most participants, games were simply part of their everyday lives and another leisure time activity which they shared with others. For instance, Alex mentioned how he would regularly talk to his eight year old son about games (especially those on Alex's iPhone) and how they would sometimes watch each other play, or play together. In Amy's case, she noted how she used to play more often when she lived with people who did so, but plays less now she lives with her boyfriend who isn't particularly interested in games. The only game-related conversations she mentioned during the diary period related to telling people about taking part in the gaming study. Linda was the only participant who played social network games on a daily basis, where *Farmville* and similar games were mentioned almost every day. Many of her colleagues also played these sorts of games and so it was often a source of conversation in the office. The only person to mention playing online with other people was Nick, although these were strangers he was matched with for particular rounds, rather than people he had played with before. When he did try playing online with others, Nick described the *Armed Assault* community as

"cliquey" and so he soon went back to single-player mode (he also did not have a micro-phone for his PC, which he said made coordinating gameplay more difficult than playing in a more contained game environment like *Bad Company,* a game he enjoyed more).

The most common references to online resources tended related to using paratexts as a way of keeping up to date with gaming news and developments. Matt regularly checked Reddit games (a site aggregator), Alex consulted his feedreader, which connected him resources such as Eurogamer and gaming podcasts, Nick consulted IGN for game reviews and used Steam to check for new releases, and Justin mentioned looking at game charts and watching Zero Punctuation (which presents tongue-in-cheek game reviews). Natasha also mentioned looking for iPhone games at the App Store although this was not a regular occurrence. In one instance, Matt mentions contributing to a forum discussion on the possibility of there being a MMOG version of the *Fallout* series, but this was the only time anyone contributed to any sort of paratext. Nick also contributed to a discussion about games but this was on an ex-Army forum where a game-related conversation came up. Occasionally, participants mentioned consulting paratexts for specific game information, such as Justin looking up a walkthrough for *Final Fantasy XIII* when he was having trouble progressing and Alex looking up some information about the train pieces he was collecting in *Zelda: Spirit Tracks.*

The only other form of contribution to paratexts mentioned within the diary interviews concerned Katy's previous involvement in writing game-related fan-fiction. It was through writing fan-fiction online that she met her friend Cassie, who she now role-plays with. While Katy did not write any fan-fiction while taking part in the study, this reference and her game-related role-playing activity are particularly interesting examples of how gameplay involvement can extend far beyond the context of play. The fact that game narratives are used as a source of inspiration for writing fan-fiction and setting up role-playing scenarios indicates how games can inspire a range of activities. Katy also mentioned looking up a gameplay script as preparation for role-play and discussed editing

a *Zelda: Ocarina of Time* script on TV tropes (which she describes as “a website of assorted things that show up in stories”) in the past, showing how gameplay activities and interacting with paratexts can intertwine in different ways.

Table 6.8: Comparing player activities

	Non-gamers	Gamers	Total
q1. Play games	35	65	100
q2. Speak to others	29	35	64
q3. Get stuck	11	22	33
q4. Interact with resources	1	30	31
q5. Learn anything	8	26	34
q6. Anything else to add	7	24	32

Returning to the issue of identity, what Table 6.7 suggests, and Table 6.8 makes more obvious, is how differences in identity relate different forms of involvement. While this was not something explicitly mentioned in the diaries, those who identified themselves as gamers during the introductory session tended to report spending more time on games than those who did not. The gamers also report getting stuck more often, but this is likely to be due to the fact they spend more time on play and so have more opportunity to get stuck. However, the most striking difference suggested in the table concerns how often players use different resources. This is only part of macro-level interaction, as there does not seem to be a great difference in terms of talking to people about games, but most of the examples provided of interaction with paratexts came from the gamers. In addition, there also appears to be a difference between the groups in terms of how much they think they learn from their gaming experiences.

Nine participants is a very small sample size, so it is important not to make any statistical generalisations based on this. Further, as mentioned earlier, participants would often remember things they had forgotten to include during the study (e.g. Linda noting she does refer to Nintendo magazine for game reviews and gaming news) and sometimes included things in the interview which may have happened outside of the study period (e.g. Katy editing TV Tropes), so the table only provides a rough indication of the gaming

and related activities over this time. However, the differences suggested do raise the questions about what it means to be a gamer and how this relates to macro-level involvement with games. This will be further explored in Chapter 7, where the results of wider survey on gaming activities and preferences are reported and discussed.

6.5 Discussion

The aim of this chapter was to consider how involvement and learning come together in practice on both a micro and macro-level. This section relates the findings presented to some of the previous literature in order to address the following research questions:

5. *How can we identify breakdowns that occur during play?*
    a. *How do players attempt to resolve these breakdowns?*
    b. *What role do breakthroughs play in this process?*
6. *What does examining breakdowns and breakthroughs tell us about how involvement and learning come together in practice?*
7. *What evidence is there that players are learning anything in addition to learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

Section 6.5.1 addresses question 5 and 6 through considering breakdowns, breakthroughs and their relationship to learning and involvement. Section 6.5.2 considers the evidence of learning beyond play and Section 6.5.3 discuses macro-level involvement before the chapter concludes with Section 6.5.4.

6.5.1 Breakdowns, breakthroughs and how they relate to learning and involvement

Regarding questions 5 and 6, a method was developed for identifying breakdowns and breakthroughs (on the basis of observational and post-play interview data) that occurred with respect to player *action*, *understanding* and *involvement*. To use Calleja's DGEM (2007a; 2007b) terminology, the action level relates to whether strategies are successfully

enacted or not within the performative frame. Breakdowns on this level, and in terms of minor understanding, are a relatively common part of gameplay as Barr (2007) and Ryan & Siegel (2009) suggest. However, they are more significant when they reflect a recurring controller issue (affecting a player's ability to act effectively within the game world) or when they result from an underlying issue with understanding. In terms of resolving action breakdowns, the most common approach adopted by players was to try the action again until they managed to complete it successfully. There were some instances when trying again did not lead to an action breakthrough, e.g. when Natasha was playing *Doctor Who* and gave it to William to play instead. In these cases, the issue subsequently led to an involvement breakdown as the player decided to stop playing.

While action breakdowns can be the result of problems with the controller, they can also signify the occurrence of understanding breakdown where the player is unsure about what to do or where to go next, thus occurring within the tactical and spatial involvement frames of the DGEM respectively. When understanding breakdowns occur, players would try out different strategies (including back-tracking to see if they missed something) until they achieved an action breakthrough. As mentioned earlier, action breakthroughs often precede breakthroughs in understanding, especially when a puzzle of some kind needed to be solved (e.g. Justin figuring out how to lower the platforms in order to gain access to a lever in *God of War III*). However, there were situations where trial and error, as opposed to genuine understanding, led to in-game progress. Another common strategy, that players resorted to when they got stuck (noted within the diary entries) was to take a break and come back later. Finally, understanding was also influenced (positively and negatively) by shared involvement, through communication with other players.

The DGEM frames emphasise particular aspects of involvement, but it is important to note that the analysis carried out focused mainly on affective involvement where negative emotions were viewed as indicators of breakdowns and positive ones as indicators of breakthroughs. This occasionally related to narrative, specifically whether the players

were interested in the story or not, e.g. Nick not being interested in *Endless Ocean 2* and sometimes to shared involvement, with respect to other characters or players, e.g. Katy empathising with Link in *Zelda,* Natasha and William having different playing styles. However, the expression of negative emotion did not always lead to the decision to quit play (which effectively severs any form involvement). A certain amount of struggle seems to be expected during gameplay, as overcoming breakdowns and their associated challenges often led to positive emotions. However, deciding to quit the game is a pretty clear indicator that a significant breakdown has occurred and this decision would occur when players were especially frustrated by their lack of progress. If they were bored, they might try to test the limits of the game for a while, e.g. Matt trying to shoot Max with Sam's gun in *Sam & Max,* although if very little continued to happen they would quit, e.g. Nick and *Endless Ocean 2*. In general, one of the most important issues concerning affective involvement related to the expression of agency within the performative frame, where players would gradually become frustrated if they interpreted the consequences of their actions as being particularly unfair or inconsistent. This provides support for the claim, "gameplay to some extent, *depends upon* and *requires* a positive experience of agency on the part of the player" (Schott, 2006, p. 148). Meanwhile, involvement breakthroughs (as indicated by positive emotions such as satisfaction) resulted from achieving specific goals within the game or overcoming significant challenges. In many circumstance however, it was difficult to decipher whether involvement actually increased, or whether it was just maintained.

Assessing the different claims allowed for a consideration of how micro-level involvement and learning come together in practice, in terms of investigating the relationship between different types of breakdowns and breakthroughs. Categorising breakdowns and breakthroughs with respect to *action, understanding* and *involvement* contributes to the previous literature in the area. For instance, distinguishing between breakdowns in action and understanding (rather than labelling them all interaction breakdowns; Ryan & Siegel, 2009) allows for a more nuanced appreciation of how the different breakdowns relate to

each other. Similarly, while involvement breakdowns appear quite similar to the concept of illusion breakdowns, Ryan and Siegel were not clear about how these relate to interaction breakdowns. In addition, adding the concept of breakthroughs to analysing gameplay extends Sharples' (2009) work, allows for a more positive conceptualisation of gameplay and indicates that learning within this context occurs via breakthroughs in understanding. While Ryan and Siegel (2009) suggest that all interaction breakdowns lead to learning, the analysis reported in this chapter indicates that learning will only occur if there is a subsequent breakthrough in understanding.

Further, regarding Pelletier and Oliver (2006), the different types of breakdown distinguish between exactly what sorts of problems occur during play and how they can affect overall involvement. Including a post-play interview where players described what they were thinking and feeling during play also partly overcame the problem of inference that Pelletier and Oliver reported, not just in terms of identifying different strategies but also in terms gaining insight into player involvement. For instance, when Matt died in *Silent Hill*, it would have been reasonable to assume this annoyed him, especially in conjunction with the footage of him shaking his head afterwards and saying "I don't know" just after the event. However, the underlying issue here would have been missed. Matt was not annoyed because he died, he was annoyed because he did not understand why he died. This breakdown in understanding was compounded by his general confusion about where he was supposed to go, despite the minor breakthroughs he experienced in the form of developing more effective strategies. Further, the diary data also allowed for an examination of player involvement over time, where Matt gave up on *Silent Hill* because he the gameplay "arbitrary" and unsatisfying.

The diary data was also used to track breakdowns and breakthroughs outside of a lab context, and so was able to capture gameplay on a range of devices including computers, handheld consoles and mobile phones. This enabled a consideration of gameplay in more natural contexts, while the final interview allowed players to elaborate on their daily

gaming experiences. However, the data within the diary entries was considerably less detailed than that collected within the lab. A possible limitation of the study is that people commented more on console and PC games than mobile or social network games. Further, while the sessions involved a range of different genres, the majority of games entailed the player interacting within some sort of game world where they controlled an avatar within a particular game-world, usually within 3D space (apart from *Big Brain Academy)*. Further work is required to assess the refined claims presented in Section 6.2.4 and this could also include applying them to different platforms and game types.

A potential strength of the approach adopted is that the diaries enabled a deeper examination how learning and involvement came together in practice across micro and macro-levels. This allowed for a consideration of learning beyond the process of learning how to play and of players' wider involvement in gaming.

6.5.2 Evidence of learning beyond learning how to play

Regarding research question 7, the previously developed learning categories were useful for pinpointing references to how and what people learn from games. However, players often found it difficult to identify explicit instances of learning that resulted from their experiences of play. This was mainly due to them interpreting this question in terms of learning that could be applied outside of gameplay. While there was some mention of learning on a *personal level,* e.g. Justin suggesting *Final Fantasy XIII* teaches you the value of hard work, and on a *skill level*, e.g. Linda mentioning that *Guitar Hero* teaches you rhythm skills, the claims that can be made about this sort of learning are limited due to the fact that the evidence is based on self-report. In particular, it is difficult to establish whether player skills have actually improved, without including some sort of assessment of these skills before and after play.

The analysis did pick up on the instances of learning on a *personal level* in terms of acquiring general knowledge through tangential sources, such as Justin looking up

aspects of Greek mythology as a result of playing *God of War III*. Another interesting example, again concerning learning on a *personal level*, relates to Katy and her involvement with game-related role-play. It was quite clear from examining the *Zelda: Twilight Princess* gaming session in conjunction with the diary entries and diary interview data that Katy was displaying empathy for game characters and reflecting on virtual and real world identities in the way that Gee (2004) describes. However, it is worth noting she did not identify this activity as an explicit form of learning. Further, this was the only example this sort of reflection across all of the cases, and arguably, it resulted from extended micro and macro-level involvement with the *Zelda* series.

Perhaps the main strength of the learning categories is that they are useful for identifying much of the implicit learning going on in practice, especially in relation to *game level* learning that resulted from player interactions with resources and gaming communities. They allowed for a consideration of activities such as players discussing game strategies with other, e.g. Matt talking to his housemates about *Defcon*; how paratexts were used to overcome breakdowns, e.g. Alex using a walkthrough to look up information about *Zelda Spirit Tracks* when he got stuck; and of how players kept up to date with general news and gaming developments, e.g. Justin subscribing to Edge magazine's Twitter feed.

6.5.3 Interacting with wider communities and resources

Activities which involve paratexts also relate to research question 8, concerning the extent to which players interact with gaming resources and communities. While the thematic analysis indicated that *competence* and *identity* were rarely referred to explicitly, it was clear that players gained much of their general gaming *knowledge* from talking to other people (be they friends, family or work colleagues) and from consulting different paratexts (usually online). Essentially, they derived this knowledge from *community* in the form of other players and/or from the wider gaming community. Very few references were made to contributing to or creating paratexts, raising a question about the prevalence of the sort of activity that occurs across the affinity groups and spaces that Gee describes (2004;

2007). Table 6.8 suggests that there are identifiable differences between those that identify as gamers and those that do not. It seems that gamers will spend more time on play, will report learning more from their gaming experiences, and will interact with paratexts on a more regular basis than non-gamers. The next chapter will investigate these claims further.

6.5.4 Summary

This chapter explored how learning and involvement come together in practice by presenting an analysis of multiple case studies. By carefully examining both macro and micro-level experiences we can build a richer understanding of "what players do with games" and "the thinking that is involved in playing them" (Squire, 2008, p.167). Although the analysis provided was in-depth, this was a small scale study so care needs to be taken when making statistical generalisations. Yin (2009) argues that generalising to theory is appropriate, so the refinements made to the claims in Section 6.2 help contribute to an understanding of how learning and involvement relate to each other. However, in terms of the findings presented within Sections 6.3 and 6.4, further evidence is required before any generalisable claims can be made about the differences between types of players. In order to address this issue, the next chapter presents an analysis of a survey study designed to consider research questions 7 and 8 in relation to a larger sample size of participants. An additional research question is also introduced to further investigate player identity.

7. Contextualising gaming

This chapter locates the research within a wider context through reporting on the results of a survey study. The design and procedure were reported in Section 3.4, which described how the questionnaire was designed on the basis of the previous studies and how the survey was carried out. While Phase 2 began to consider the research questions listed below, this final phase examined these questions further and explicitly investigated the role of identity with respect to gaming involvement. In particular, the analysis will focus on assessing whether those who identify as gamers do spend more time on play, report learning more from their gaming experiences, and interact with paratexts on a more regular basis than non-gamers. The following research questions are addressed:

7. *What evidence is there that players are learning anything other than learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

An additional question was also included in order to consider the influence of player identity on interactions with game-related communities:

9. *Does player engagement with these communities and resources relate to how they identify themselves as gamers? If so, how?*

Section 7.1 presents the findings of a qualitative analysis that involved the application of previously developed themes and categories. In Section 7.2, the results of the quantitative analyses are presented with respect to how the various player groups differ. The chapter then ends with a discussion of the results in Section 7.3 and how these relate to the research questions. Screenshots of the questionnaire are reproduced in **Appendix 7.**

7.1 Introducing the players – a qualitative analysis

The survey included two open ended responses: one which asked playing to explain their choice of player category and the other which asked them about what they learnt through their involvement with games. Section 7.1.1 examines the issue of player identity through reporting on the application of the gaming themes (developed during Phase 1, reported in Section 5.1.2, and applied to the diary data collected as part of Phase 2, reported in Section 6.4). Section 7.1.2 discusses the learning categories (developed during Phase 1, reported in Section 5.1.1, and applied to the diary data as part of Phase 2, reported in Section 6.3) in relation to the questionnaire data.

7.1.1 How players identify themselves

The design of the questionnaire and the procedure followed were discussed in the methodology chapter, which also included demographic information about the respondents (Chapter 3, Section 3.4.3). As noted earlier, an attempt was made to recruit a range of respondents who differed with respect to how they identified themselves as game players. Players were asked choose from the following labels and then explain their choice: “casual gamer”, “moderate gamer”, “hardcore gamer” or “I would not describe myself as a gamer”.

Table 7.1: Percentage of hours spent playing games per week in relation to gamer identity

	All (232)	Non gamers (31)	Casual gamers (50)	Moderate gamers (118)	Hardcore gamers (33)
None	4.3	29.0	2.0	0	0
5 hours or less	32.8	58.1	60.0	20.3	12.1
6-14 hours	36.6	9.7	28.8	52.5	18.2
15 hours or more	26.3	3.2	10	27.1	69.7

Out of 232 respondents, 13.4% said they would not describe themselves as a gamer, 21.6% described themselves as casual gamers, 50.9% as moderate gamers and 14.2% as hardcore gamers. Table 7.1 provides an overview of these categories in relation to number of hours spent playing games per week. The table suggests there is a relationship between these categories and how much time people report playing games, since the

more strongly respondents identify as gamers, the more time they report spending on the activity. The following analysis relates to the qualitative differences between the groups indicated by the open-ended responses, while Section 7.2 reports on the quantitative analysis of group differences with respect to the closed-ended survey items.

The open-ended responses were analysed by applying and refining the themes that relate to gaming capital (introduced in Chapter 5, Section 5.2.2). Table 7.2 indicates the number of references coded for each theme, split up by player group. In addition to the existing themes, two new ones were added, *Motivation* and *Dedication* (discussed in the sub-sections below). Many of the statements were coded under more than one theme, due to the fact that respondents would make multiple references within the same extract. For example, one casual gamer stated "I occasionally play games. It's quite rare, though and I kind of suck, but I still enjoy it every now and then"; this was coded under *Dedication*, because he refers to frequency of play, and *Competence,* because he refers to his gaming ability. Thus the table below only provides as an indication of how commonly the themes came up, rather than an exact count of statements made by participants.

Table 7.2: Number of references per theme

	Identity	Competence	Knowledge	Community	Motivation	Dedication
Non-gamers (N = 31)	8	3	1	5	13	17
Casual (N = 50)	15	3	1	8	31	24
Moderate (N = 118)	53	25	16	38	41	72
Hardcore (N = 33)	8	10	9	10	12	17
Total no. of references coded	84	41	29	61	97	130

In order to provide a clearer picture of how the themes relates to the different player categories, Figure 7.1 displays the number of references to each theme, divided by the total number of participants within each group, represented as a percentage value. For example, on average, 25.8% of non-gamers [(8/31)*100 = 25.8%] made references to the *identity* theme in comparison to 44.9% of moderate gamers [(53/118)*100 = 44.9%]. Again, these figures only serve as a rough indication of how often the different themes

were mentioned within each group as there were occasions when participants would make more than one reference to a theme and occasions when they did not make any references at all. The findings are reported below in relation to each of the themes.

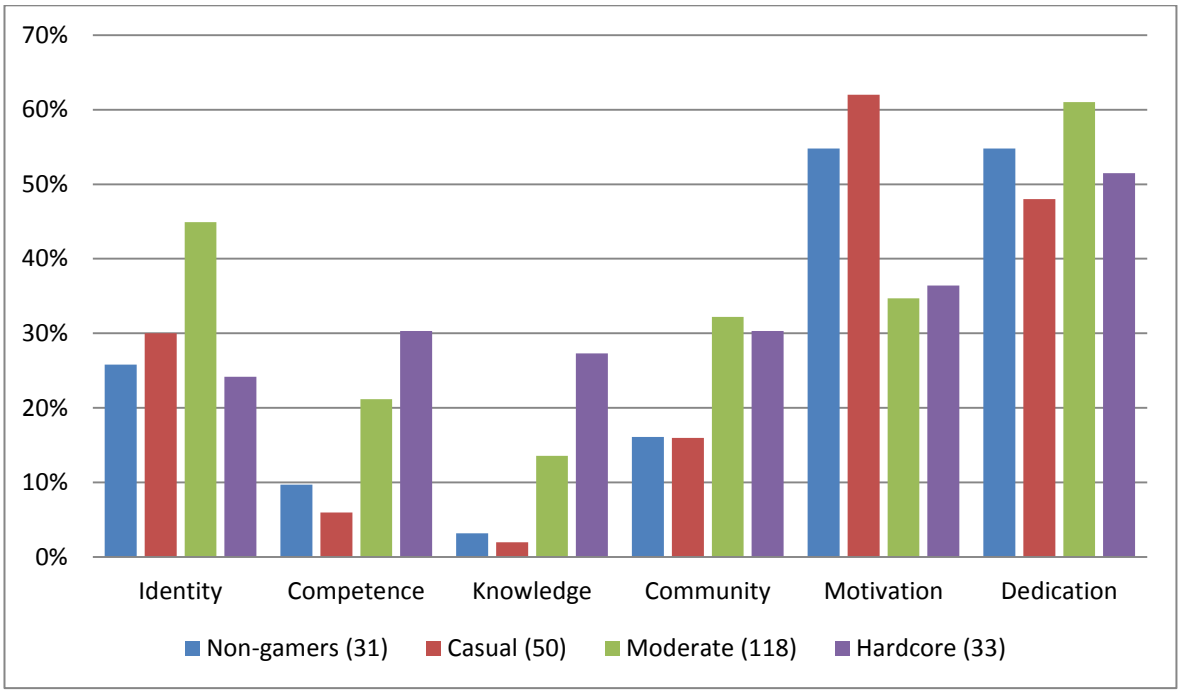


Figure 7.1: References made by group in relation to each theme

7.1.1.1 Identity

In Phase 1, *Identity* was created as a theme in order to capture when participants made a specific reference to whether they saw themselves as a gamer or not. This included referring to themselves as casual players. In the Phase 3 survey, respondents were asked to choose a specific category and then to explain their choice, so technically all the answers submitted provide some insight into different aspects of identity. However, some answers did contain more explicit references. As in the email interviews, respondents would sometimes mention their game playing history, e.g. one hardcore player stating "I have played games for over 20 years on a variety of platforms". One of the main reasons why this theme was more frequently mentioned, especially by moderate gamers (Figure 7.1), was due to the way in which respondents would position themselves in relation to the other player categories. For moderate gamers, this involved situating themselves in

between casual and hardcore. For example, “I've become more casual in my gaming approach, but I still have my moments of playing a game for a whole day non-stop :) Hence, I feel I'm a moderate gamer, i.e. not quite 'Hardcore' anymore, but not 'Casual' either as I make an effort to put time aside to game :)”. Further, some respondents referred to problems they had in the past with excessive gameplay. For instance, one non-gamer said “I forbid myself to spend more time playing games though, since in the past I used to be really addicted”. These quotes suggest that player identity is not a static construct and indicate how it can fluctuate over time.

7.1.1.2 Competence

Competence concerns being good at games and was suggested by Consalvo (2007) as one of the ways in which players acquire gaming capital. As Table 7.2 indicates, this was not one of the more commonly referenced themes. It was usually mentioned in relation to the respondent’s own playing ability or in terms of attaining achievements, but the emphasis differed between the groups. For instance, one non-gamer commented they “lack skills” while a hardcore player said “I like to achieve the best I can when I play games.” Figure 7.1 suggests that this theme was more of a concern for hardcore gamers. The theme was also noted in relation to identity, e.g. one moderate gamer said “I'm not "hardcore" - it's not the focus of my life and I'm not THAT good at them”. Similarly, “My ego doesn't ooze out of my head (I hope), but I would say I play better than someone considered a "casual" gamer” (moderate gamer). The majority of references made my moderate gamers is due to the positioning of respondents in relation to how competent they compared to the other categories of player. There is also some overlap between this theme and *Motivation* (discussed in Section 7.1.1.5).

7.1.1.3 Knowledge

Consalvo (2007) also suggested that *Knowledge* of games and gaming-related issues is an important component of gaming capital, although this theme was referenced the least by respondents (Table 7.2). Non-gamers and casual gamers hardly mentioned it at all, but other players would sometimes mention keeping up to date with gaming news and make

references to gaming culture (Figure 7.1). Hardcore players referred to knowledge the most frequently, for instance, one player pointed out “I can recite the Konami code from memory so I think I'm pretty hardcore. :)”. The Konami code is a cheat code that can be used in several games produced by Konami, which first emerged in the mid-1980s. Two hardcore respondents also submitted links to their blogs, which can be seen as further evidence of their interest in and knowledge of games.

7.1.1.4 Community

Knowledge was often coded in conjunction with *Community,* especially when players refered to keeping up to date with gaming news and developments, e.g. one moderate gamer said he chose the moderate category because “Admittedly, I'd blog about the game and interact with a lot of other players whilst not actually PLAYING the game (twitter, forums, etc.), but because I wasn't on the cutting edge of progression/content, the term "hardcore" didn't feel appropriate.” As discussed in Section 5.2.2.2, the fact these two categories are related to each other makes sense when considering that much of a player’s gaming knowledge (beyond the experience of playing a game) is likely to have come from paratexts produced by the wider gaming community, whether this involves engaging with online or even printed resources. For example, one moderate gamer explained “I don't participate in much gaming culture anymore (e.g. buying magazines, forum posting etc.) although I used to do these sorts of things regularly a few years ago”.

Community came up more often than *Knowledge* (Table 7.2) however, in part because statements about playing with (or because of) others were coded under this theme. Some responses referred to playing with others in the same real world space, and sometimes to playing online. For example, one respondent suggested they were a non-gamer because “I do not own any games, I only play things that are handed to me occasionally by my partner...” while another moderate gamer pointed out “I play online with a core of friends and also with my children, in particular my son.” In contrast, another respondent suggested they were moderate precisely because “I would not however choose to play online against others”. In terms of playing online, *World of Warcraft (WoW)* was the most

frequently mentioned game, e.g. a moderate gamer discussed his wider involvement with the game (albeit in the past): “I've definitely been in the hardcore gamer category until quite recently (running a guild in WoW, raiding etc.) but now only play games I can dip in and out of at the drop of a hat. Slightly more than casual though, as I still follow gaming news, WoW news and so on.”

In addition, there was some suggestion that certain types of social experiences were more casual, e.g. one casual gamer stating “I like social games i.e. those you play on consoles such as Guitar Heroes, Singstar, Wii sports, Raving Rabbids etc.”, while others were less so, e.g. another casual player stating “I don't really socialize about gaming and don't play multiplayer.” The use of the term multiplayer is most likely referring to playing games online. Engaging in online play was mentioned more often by moderate and hardcore players, e.g. one hardcore gamer stated: “I enjoy games on several levels - both as social events to enjoy with friends online (such as Words with Friends on iPhone) and as pieces of digital art telling a story in a particular way.” Figure 7.1 indicates that references to different forms of community occurred across the player groups, something the analysis reported in Section 7.2 explores in further detail.

7.1.1.5 Motivation

Motivation was introduced as a new theme to capture the different reasons people had for playing games. For example, one respondent chose the non-gamer category because “While I do enjoy playing games occasionally at home, and play Zynga games online quite often, I see it as something that just passes time rather than something I seek out for entertainment.” For non-gamers and casual gamers, gameplay was often described as a way to pass the time when bored. The high proportion of responses coded within this theme in relation to players on the lower end of the gamer identity spectrum reflects the fact they would often make a point of stating their main motivation for play was to have some fun e.g. “I do it to have fun… I’m the type to play socially, or play things I can pop in and out of” (casual player). The suggestion that was often made by these sorts of players was that they do not take gameplay as seriously as those at other end of the spectrum.

In contrast, hardcore gamers who would refer to motivations such as completing achievements and improving their performance (suggesting a link to the Competence theme), e.g. “I like to achieve the best I can when I play games and often try to complete games to 100% mainly for self-satisfaction and sometimes bragging rights when competing against my friends” (hardcore gamer). For moderate gamers, the issue of motivation was a little less clear. For instance, some indicated their main motivation was to have fun: “I am not a hardcore gamer because I play for fun and [to] enjoy myself. The hardcore crowd tend to be elitist and focus too much on their stats”. However there were others who were motivated by a desire to achieve competence: “I am only moderate at best, I only take a few games seriously and I do like to get good at a game”. This theme has some connection with *dedication* in that motivations seem to be linked to how much of a priority gaming is to the player.

7.1.1.6 Dedication

Dedication was developed as a theme in order to capture references to how much time and energy people invested in their gaming activities. The majority of the answers focused on the frequency and duration of game playing activities e.g. “I play games a lot” (hardcore gamer), and sometimes the range and type of games that were played, e.g. “I play all types of games on PC, Wii and other consoles. I would not however choose to play online against others” (moderate gamer). Money was also sometimes referenced in this context, e.g. one moderate gamer stated “I do have a large interest in games and gaming, however I do not have the time or money to invest into it as much as I used to when I was younger!”.

The majority of responses from non-gamers and casual gamers involved them making a point about how they did not spend a lot of their time on gameplay. For example, one casual player stated they “Very rarely play games these days, apart from Angry Birds when I have spare time. I don't put aside time for gaming, unlike watching telly or internet.” In terms of time spent, moderate gamers were again somewhere in-between, e.g. “I tend to play a fair number of games and use gaming as a form of relaxation. I do not tend to be

of the more hardcore, where I would do nothing but gaming, but I do enjoy it more so than any other hobby". There was also some suggestion from players who were not hardcore that while they may enjoy playing games, their daily lives took priority over them playing more often. As one moderate gamer pointed out "I also have other hobbies (and people!!!) that I want to make time for. There are, unfortunately, only so many hours in the day". Further, some respondents reported that they "Enjoy games but prefer real life", so there was occasionally a sense of people not wanting to turn gaming into priority. This can be contrasred to hardcore gamers who made statements such as "I take games seriously".

The responses coded under this theme indicate that being a certain kind of gamer depends on how often you play, what type of game you play, and whether you make gameplay a priority or not. There was some overlap with the *Identity* theme in terms of how people would position themselves amongst the categories, e.g. a moderate gamer suggested "I don't think I play games frequently enough to be a hardcore gamer nor do I play a wide enough variety, but I'm not a casual gamer either". *Dedication* also connects to the *Knowledge* and *Community* themes in the sense that engaging with paratexts and wider communities (i.e. macro-level activities) requires an investment from the player. For instance, one respondent chose the hardcore gamer category because: "I feel that the amount of time I dedicate to talking about video-games outside of playing them qualifies me to call myself a 'hardcore gamer'."

7.1.1.7 Summary

These themes are useful for considering not only how players identify themselves but how they think about other kinds of players. The analysis suggests that how strongly a player will identify as a gamer depends on a number of factors such as: how *competent* they are, their *knowledge* of games and gaming culture, how much they interact with different *communities*; their *motivations* for play, and how they position their *identity* amongst other types of players. However, the most frequently mentioned theme across all the categories, related to how *dedicated* players were to gaming. This seemed to be a defining feature of player identity, based on a consideration of how much of a priority games are to a player,

how much time is spent on games and the range of games that are played. Despite some clear qualitative differences between the groups, it is worth noting that the player categories should not be viewed as static constructs since players are able to move between them over time.

7.1.2 Learning through gaming involvement

Players were also asked to discuss whether they thought they could learn from games and to provide any examples if they so. The learning categories introduced in Chapter 5, Section 5.1.1 were applied to the data and further refined during the process of analysis. This question was the final item within the survey and was left optional for people to fill in. Out of 232 respondents, 185 provided an answer. However, out of these, 19 simply wrote down that they did not have an answer for this question, sometimes adding an additional comment about how they thought games were just a bit of fun.

Table 7.3: Learning categories per theme

	No or negative response	Through play	Through other players	Through external resources	Game level	Skill level	Personal level
Non-gamers (N = 21)	10	17	7	1	2	11	9
Casual (N = 31)	19	29	9	3	10	19	21
Moderate (N = 89)	29	86	41	13	8	59	73
Hardcore (N = 25)	8	24	12	4	4	14	19
Total	66	156	69	21	24	102	122

Overall, 71.5% of people who filled in the questionnaire thought they had learnt something from their gaming experiences. Table 7.3 indicates the number of references coded for each category, split up by player group, where N refers to the number of respondents who filled in a response to the open-ended question and referred to learning.

In order to provide a clearer picture of how the different learning categories relate to the player groups, Figure 7.2 displays the references to each category divided by the total number of participants within each group as a percentage value. For example, on average, 54.8% of non-gamers [(17/31)*100 = 54.8%] made references to learning

through play as opposed to 72.7% of hardcore gamers [(24/33)*100 = 44.9%]. Again, these figures only serve as a rough indication of the proportion of the learning categories mentioned within each group, although it does appear that moderate and hardcore gamers were more likely to provide a positive response to this question.

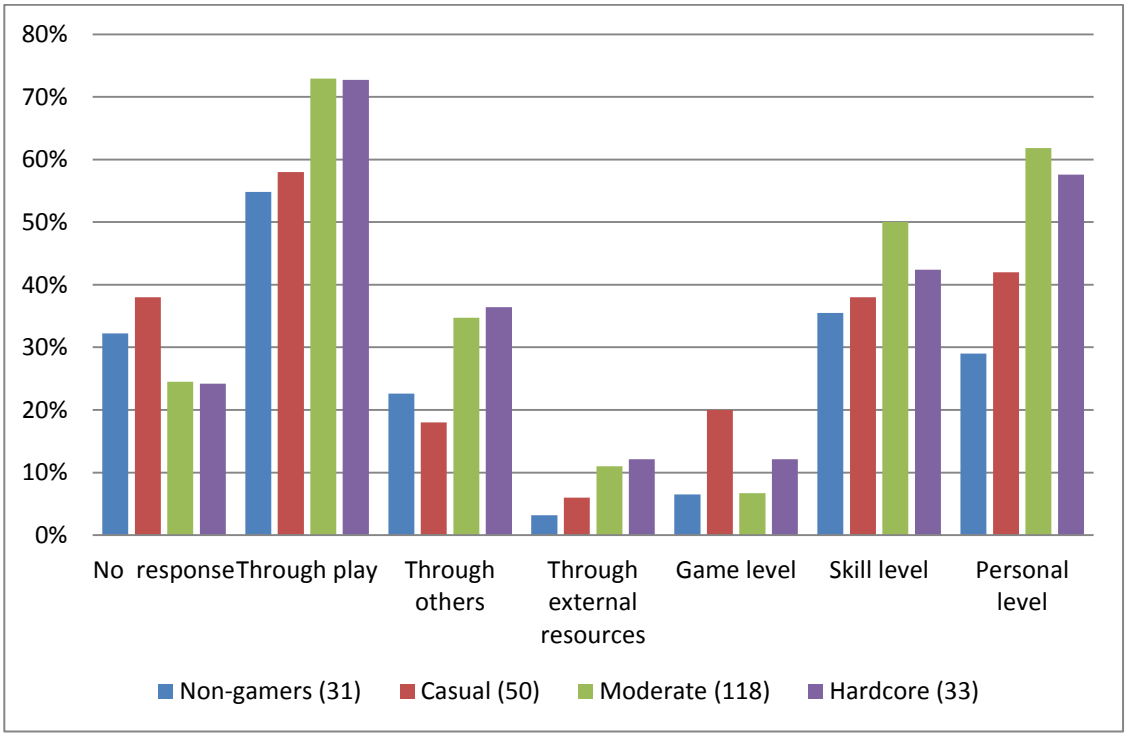


Figure 7.2: Learning categories by player groups

7.1.2.1 How do players learn?

Learning through play was coded when respondents referred to what they had learnt as a result of playing games, and this was the most frequently coded of the learning how categories across the player groups. Figure 7.2 indicates that moderate and hardcore gamers were more likely than casual and non-gamers to mention this sort of learning, presumably because they spend more time playing games. Responses often referred to specific games, e.g. one moderate gamer suggested "With a game called Fall Out: New Vegas there is a lot to know and remember within the game and so this game has helped me redevelop my memory skills (which are really quite bad! lol)". Though sometimes the link between learning and playing was implied, e.g. one casual gamer's response was "Better coordination and strategic thinking."

The learning *through others* category was applied to references where respondents spoke about learning as a result of their interactions with other people. This was the next frequently mentioned learning how category, with again, moderate and hardcore gamers more likely to refer to it than the other groups. In the Phase 1 email interviews, participants were asked what they would do when they got stuck and their answers often referred to asking someone for help. In the Phase 3 survey, this rarely came up and most of the items related to playing with others (which were also coded as learning *through play)*, e.g. one hardcore player who stated "Yes my social skills have developed because of online gaming", and to interacting with others through forums and guilds, e.g. "I am a guild leader in Warcraft -- I have learned to manage people and resources to form a strong team. This has strongly impacted my skills at work and school, since I am frequently the one to coordinate group projects or collaborative efforts." Unfortunately, not all player experiences with others were positive and a minority people mentioned the negative experiences they had online, e.g. one moderate gamer listed a number of things they had learnt including "that there are some very disturbed people out there who think it is acceptable to behave one way when they are a faceless game character with a micro-phone, compared to how they behave in a real situation with real people."

The least referenced category according to Table 7.3 is learning *through external resources.* Figure 7.2 suggests that the more strongly someone identifies as a gamer the more likely they were to refer to this sort of learning. There is some potential overlap here with the previous category, as guilds and forums technically involve interacting with other people but they can also be viewed as gaming paratexts. In practice, players would not always distinguish between what they learnt from playing with others and what they learnt from interacting with *paratexts* so in these few cases the references were coded under both categories. For example, the quote above from a casual gamer, who used to be a guild leader in an MMOG, reflects how playing the game with others and having to organise guild members outside of play, both led to an improvement of management and

collaborative skills. There were also references made to using *tangential resources* to find out more about things which had been encountered in the game world, e.g. one moderate gamer suggesting they "can easily name and give the dates of many dinosaur groups and taxa - thanks to several dinosaur related games and consequent Google searches (one notable game would be Jurassic Park Wrath!), for example."

7.1.2.2 What do players learn?

When respondents were asked what thought they learnt from their involvement with games, the learning on a *game level* was the least referenced category (Figure 7.2). This is likely due to the fact the question explicitly asked them to discuss learning "apart from learning how to play the game". Nevertheless, there were some instances when people mentioned having improved their performance within *specific games*, e.g. one non-gamer suggested "The only online game I have played for fun is Scrabble. My performance in this game has improved by using the online version." The majority of extracts coded into this category usually referred to learning about *games in general*. For instance, one moderate gamer suggested they "have learned a great deal about game design as well!" while someone else said "It's like I've learned some kind of weird 'game logic' where it's fairly obvious how a game plays and what the limits of the game are likely to be, where they're not obvious to the less experienced gamer" (casual gamer). Though casual gamers made the highest proportion of references in this category, it is not clear why this is the case.

In terms of *learning on a skill level*, Chapter 5, Section 5.1.1 also introduced some relevant sub-categories to capture what skills were being learnt. *Psycho-motor skills* came up occasionally in the survey responses, e.g. "games like Guitar Hero/Rock Band can help with hand and Eye Co-Ordination" (moderate gamer), and more frequent references were made to developing *cognitive* and *collaborative* skills, e.g. "I usually play online with others and can observe and practice leadership and collaborative problem-solving skills" (moderate gamer). The collaborative skill sub-category was re-labelled as *social skills*, in order to encapsulate examples of players developing general social skills. For example,

one hardcore gamer suggested “playing video games somewhat helped me to build several skills such as teamwork and cooperation, friendship, or competitiveness; this last skill, however, must be learnt in the "healthy" way: learn to accept a victory or a defeat fairly, respect your player no matter their skill or state, and most of all, have fun.” The survey responses also indicated further sub-categories including *literacy and numeracy skills*, e.g. “I think my sense of geometry and physics have improved” (moderate gamer) and “foreign languages” (casual gamer), and *technical skills*, e.g. “I believe that gaming experience has made me better at learning and using computer-based systems in my work life” (moderate gamer). Figure 7.2 suggests that moderate players were more likely to make reference to developing different skills, although again it is not obvious as to why this is the case.

According to Figure 7.2, the most referenced category in terms of what people learn is *learning on a personal level.* Further, the more strongly someone identifies as a gamer, the more likely they were to refer to this category (although this is seen to drop slightly for hardcore gamers). The category was coded when respondents mentioned learning that was likely to transfer beyond the *game* and *skill level*s. Similarly to the email interview study, respondents would refer to *general knowledge* they picked up from gameplay, e.g. “I've learned some stuff about History (e.g. from Red Dead Redemption) even as a former History teacher and interesting things about physics, etc.” (casual gamer) and also to *changing as a person*, e.g. “Roleplaying games have allowed me to explore different aspects of personality and also helped me when I started studying Performing Arts” (moderate gamer). This latter sub-category was renamed *emotional development* in order to capture instances where player’s discussed learning to deal with their emotions. For example, one hardcore gamer stated “In my case, playing video games have somewhat helped me to build a strong sense of battle and persistence: when you play a game there may be challenges which try to stop you from achieving your goals, and to beat these challenges you should not give up and keep on trying. Definitely I can link this feeling to many hard tasks I went through in life such as accomplishing my studies, where it is vital

to be persistent, work hard and never give up if you want to reach your goal." Not all references within this category were positive however. For instance when discussing issues such as excessive or escapist gameplay, e.g. one hardcore player suggested that some "negative issues are: 1. Using the game as an exit to consume or "bend" time or until a "shift" to happen in my RL 2. Substituting the lack in RL action with in-game activity 3. Occupying myself having a feeling of achievement while in a "static" phase of RL" (where RL means "real life").

Two additional sub-categories were added to the *personal level*: *cultural development* and *career influence*. The former was included in order encapsulate references to the way in which games had broadened people's horizons and introduced them to different cultures, e.g. "I learn about other cultures. How other people view the world and tackle it. About different parts of the world" (casual gamer). Further, extracts that considered games as a type of art form where also included in this category, e.g. "Dragon Spirit (Arcade) proved to me that a game can be far more than just a craft. Through art and music, a game can become a work of art in itself. At least equal to that of film" (moderate gamer). The *Career influence* sub-category contained any references to how games had influenced player career interests and development, e.g. one non-gamer said he had developed an "awareness of games playing - who does it, why they do it, how they do it etc. - informs an ongoing interest in HCI and online open, non-compulsory education", while a moderate gamer explained how "as a young kid, I spent time writing games, understanding logic, learned a lot of programming as a result of getting an Atari 400 and a ZX Spectrum, and that's shaped my entire life (I now work in IT)." These were usually positive, but there was one example of someone who was once a games tester and how their experience in this role had ruined their enjoyment of games "I worked as a game tester for [company name removed to preserve anonymity] for 5 years, so the gaming experience has been somewhat soured ... in that time I learnt a lot about how different types of games are constructed, the process the dev team goes through before you end up with what you get on the shelves, and it was a heart breaking process... seeing this ideal vision that the dev

team has started out with, then slowly watching it get whittled away into generic rubbish, just so we could get the title out the door" (casual gamer).

7.1.2.3 Value and transfer

In Chapter 5, two further themes were discussed: *value* and *transfer.* In the Phase 3 survey responses, there were examples where people were unsure about the value of what they had learned, mainly because it was not seen as applicable to the "real world", e.g. "Not really. Only learning things about other cultures, due to the different people you play against online ... I don't feel like have picked up any skills that are going to come in too handy in the big wide world" (non-gamer). However, there were also instances when players would discussed how learning transferred to other contexts, e.g. "games like cooking mama/ gardening mama, that take real life scenarios with game play elements that can with time help me focus on these tasks in the real world" (hardcore gamer).

It was clear from some of the extracts that gaming could have quite a serious impact on people's lives. While this was occasionally negative (e.g. references to excessive addiction or bad experiences of dealing with others online), many positive examples were provided. They often related to people forming and cementing friendships with others through online play, with one moderate player stating "via gaming and it's periphery I was able to meet my spouse. So gaming has been very good to me ^_^". In addition to developing relationships, people mentioned how much they'd learned about themselves from their involvement with games (quotation marks are used to indicate that the quotation is a response from the survey itself):

> "I used to be terrible at it [teamwork], but I realised that my ego was getting in the way of my role in the team. That was actually a big deal for me in my personal and professional life as well ... Finally - I just want to say here, even though it might not be the most appropriate section, that when I moved out to go to university my relationship with my brother would have suffered so much if it wasn't for World of

> Warcraft giving us a virtual space to meet in a couple of times a week. ... Games are amazing things" (moderate gamer).

Finally, the quote below indicates a number of points to consider. It not only shows the value that games can bring into people's lives and how this translates to the real world, but can also be seen as an example of how learning *through play* and *external resources* (in this case through creating paratexts) can lead to learning on a *personal level*. The respondent, a moderate gamer, had submitted a piece of *Warcraft* fanfiction to a competition hosted by Blizzard, which he subsequently won:

> "It might sound silly, but the acknowledgement gave me back some confidence that I really needed (both with regards to my writing, and just generally speaking) - and I found myself taking more risks after that. In fact, a few weeks after the winners were announced, I applied for a job with a well-known company that I probably would have normally said I stood no chance at getting, but I was riding a major confidence high from the contest at the time ... and I got the job. Since then, I've been doing a ton of creative writing - something I used to do nearly all the time when I was younger. And I'm in a job I find much more satisfying and rewarding than I was previously in, too! World of Warcraft and the community surrounding it has helped me find my voice (as well as some people I consider very close friends), and that means more to me than any loot drop. ;)"

7.1.2.4 Summary

The qualitative analysis helped developed our understanding of different kinds of players and indicates how players can learn a wide range of things from games in a combination of ways. Further, the analysis suggests, for many people, their micro and macro-level involvement with games leads to experiences which are both valuable and rewarding. There does appear to be a relationship between identity and learning, although examples of learning were provided across the different player categories. The following section

further examines the relationship between learning, involvement and identity through reporting on a quantitative analysis.

7.2 Examining the player groups – a quantitative analysis

While the qualitative analysis provided some insight into the dimensions of player identity and what people gain from their gaming experiences this section examines how the player groups differ with respect to the closed questionnaire items. By examining responses in this way we can start to build up a picture of what it means to be a certain kind of player and how these identities relate to experiences of learning and involvement. In the following sections, the groups are first compared using non-parametric statistics (Section 7.2.1). A factor analysis is reported, where three gaming constructs are presented that relate to the types of games people play, the wider gaming activities they engage in and what people think they learn from their involvement with games (Section 7.2.2). The relationship between the player groups and the new constructs is examined (Section 7.2.3). An overall discussion is provided in Section 7.3.

7.2.1 Comparing the groups

In order to investigate how the player groups differ, non-parametric statistics were employed during the analysis as much of the data collected was on an ordinal rather than interval scale. A Chi-square test was used to establish whether gender distribution within the groups (Table 7.4). Since only one person identified as "other", they were excluded from this analysis. The differences in the distribution of genders across the player categories were not statistically significant (χ^2 (3) = 4.33, p = 0.23).

Table 7.4: Gender distribution

		Non-gamer		Casual		Moderate		Hardcore		Total	
		N	%	N	%	N	%	N	%	N	%
Gender	Female	18	7.8	19	8.2	57	24.7	12	5.2	106	45.9
	Male	13	5.6	30	13.0	61	26.4	21	9.1	125	54.1
	Total	31	13.4	49	21.2	118	51.1	33	14.3	231	100

The items reported in the sections below, include Question 1, 3 and 4 concerning demographic information (Table 7.5), Question 5 which was taken from the ISFE (2010) survey about general leisure time activities (Table 7.6), Question 9 and 10 about how often people play with others (Table 7.7) and use different gaming formats (Table 7.8), Question 11 and 12 about how long different play sessions last (Table 7.9) and Question 13 about what players are likely to do when they get stuck (Table 7.10). Screenshots of the questionnaire can be found in **Appendix 7**. The medians for each item are provided since the non-parametric tests require this value to compute whether the differences between groups are significant.

A Kruskal-Wallis one-way analysis of variance by ranks was applied with respect to each of the items. This test is used to establish whether a difference lies between group medians by computing the *H* statistic (reported in each table). The Kruskal-Wallis is essentially the non-parametric equivalent to a one-way ANOVA that takes the rankings of different scores into account to test whether groups are significantly different. It is also similar to an ANOVA in the sense that further tests are required in order to establish where the differences lie. In cases where the hypotheses were nondirectional (i.e. it was hypothesised the group scores would differ but not in which direction) Mann-Whitney tests were used to compare scores between pairs of groups. With respect to items which entailed a directional hypothesis, Jonckheere's trend test was applied.

Jonckheere's trend test (also known as Jonckheere-Terpstra test) examines whether an ordered pattern can be found with respect to the medians of the groups being compared, i.e. it addresses the question do the medians of the groups ascend (or descend) in the order specified by the researcher? (Field, 2009, pp. 568-569). Essentially, it can be used to examine whether the trend across the groups is monotonic. If the various player groups are viewed as existing on a continuum of gaming identity (from non-gamer to hardcore gamer), this allows us to consider the hypotheses that the more strongly player identifies as a gamer the higher the frequency and longer the duration of play they will report. It is

hypothesised that this effect will occur with regard to playing with other people and to the use of different gaming platforms and formats. For example, in respect to the question about how many hours the respondent plays digital games per week, it is predicted that the hardcore gamer median > moderate gamer median > casual gamer median > non-gamer median. The order of medians needs to be specified *a priori* in order to apply this test properly, though this makes it a more powerful test than the Kruskal Wallis due to the adoption of a more specific hypothesis (Siegel & Castellan, 1988, p. 223).

In order to reduce the chance of Type I error, (which is increased by carrying out multiple tests) the significance level α was set at 0.01. Table 7.5-Table 7.10 show the medians for each group for each item and indicate whether significant differences were found after applying the Kruskal-Wallis (h) and the Jonckheere tests (J). The Jonckheere results are only reported for items where median order effects were specified *apriori*.

Effect sizes are reported for Mann-Whitney and Jonckheere's test, which were computed using the formula $r = z/\sqrt{N}$, as suggested by Field (2009; p. 550 & p.570-571). On the basis of Cohen (1992), Field (2009; p. 57) reports that when r = 0.10 this represents a small effect which explains for 1% of the variance within variable scores, when r = 0.30 this constitutes a medium effect which explains 9% of the variance, and when r = 0.50 this can be viewed as a large effect which explains 25% of the variance. It worth noting that Person's correlation coefficient *r* is not measured on a linear scale, so a value of 0.6 is does not translate to double the effect size of 0.30. However, an effect size 0.60 of does explain twice the variance of an effect size of 0.42 (36% compared to 18%).

7.2.1.1 Demographic information

Regarding the demographic questions (Table 7.5) only education level differed significantly between the groups (H (3) = 21.09). Mann Whitney tests indicated that the significant differences lay between non-gamers and moderate gamers (U = 1076.50, z = -3.651, r =-0.30), non-gamers and hardcore gamers (U = 226, z = -3.98, r = -0.50), and casual gamers and hardcore gamers (U = 538, z = -2.74, r = -0.30). This means that non-

gamers (Mdn = 5) had significantly higher qualifications than moderate (Mdn = 4) and hardcore gamers (Mdn = 4). The same was true of casual gamers (Mdn = 4.5) when compared to hardcore gamers (Mdn =4).

Table 7.5: Demographic information results

	Non gamer median	Casual median	Moderate median	Hardcore median	H
Age	2	2	2	2	3.69
Education	5	4.5	4	4	21.08*
Age started playing	1	1	1	1	8.77

* significant at p < 0.01. Note: Age "2" = 26-35, Education "4" = Undergraduate, "5" = Masters, Age started playing "1" = Under 12

7.2.1.2 Leisure activities

This item was previously introduced in Chapter 3, Section 3.4.3 as part of the ISFE survey. As expected, the results (Table 7.6) indicate that the player groups differ in terms of how many hours per week they report playing digital games (H (3) = 77.93).

Table 7.6: Leisure time activities results

	Non gamer median	Casual median	Moderate median	Hardcore median	H	J
How many hours a week do you spend:						
Going to the cinema	1	1	1	1	2.11	-
Reading newspapers/magazines	2	2	2	2	3.53	-
Playing sports/exercising	2	2	2	2	5.95	-
Reading books	2	2	3	3	0.59	-
Watching DVDs	2	2	2	2	3.50	-
Playing digital games	2	2	3	4	77.93*	13584*
Listening to the radio	2	2	2	1	12.52*	-
Listening to music players (e.g. iPod)	2	2	3	3	8.64	-
Watching TV	2	2	2	2	6.74	-
Socialising with friends/family	3	3	3	3	9.24	-
Surfing the internet	4	3.5	3	4	1.72	-

* significant at p < 0.01. Note: "1" = none, "2" = 5hrs or less, "3" = 6-14hrs, "4" = 15hrs or more

The Jonckheere test indicates significant trends across the scale, where the more strongly the player identifies as a gamer, the more time they spend playing games (J = 13584, z = 9.19, r = 0.60). The only other significant result related to the amount of time spent listening to the radio (H (3) = 12.515). Further analysis suggests that hardcore gamers

(Mdn = 1) spend significantly less time listening to the radio than non-gamers (Mdn = 2; U = 308.50, z = -3.48, r = -0.36), and this was also the case when comparing casual gamers (Mdn = 2; U = 486.50, z = -3.36, r = -0.37) to moderate gamers (Mdn = 2; U = 1403.50, z = - 2.60, r = -0.21).

7.2.1.3 Frequency and duration of gameplay

This section reports the results regarding frequency of play with other people, frequency of play on different types of platforms, and duration of play on these platforms. Table 7.7 indicates significant differences in relation to playing with family (H (3) = 12.15), friends (H (3) = 35.42), and strangers (H (3) = 56.38).

Table 7.7: Frequency of playing with others

	Non gamer median	Casual median	Moderate median	Hardcore median	H	J
During the last 12 months, how often have you played with or against:						
Partner or spouse	0	1	1	2	5.13	9990.5
Family	1	1	2	2	12.15*	9853.5
Friends	0	1	2	2	35.42*	11872.5*
Strangers	0	1	1	2	56.38*	12856*

* significant at p < 0.01. Note: "0" = Never, "1" = Once a month or less, "2" = Several times a month, "3" = Several times a week, "4" = Daily.

Significant trends were found with respect to friends (J = 11872.50, z = 5.90, r = 0.39) and strangers (J = 12856, z = 7.65, r = 0.50). The more strongly someone identifies as a gamer, the more frequently they will play games with both friends and people they have not met before (e.g. online, or at a competition).

In terms of how often respondents play games in different formats and on different platforms (Table 7.8), significant differences were found with respect to playing PC games (H (3) = 29.53), console games (H (3) = 29.85), handheld consoles games (H (3) = 14.20), playing single-player games alone (H (3) = 19.22), and playing multiplayer games online (H (3) = 51.11).

Table 7.8: Frequency of gameplay

	Non gamer median	Casual median	Moderate median	Hardcore median	H	J
During the last 12 months, how often have you played:						
Social network games	0	0	0	0	2.92	8956
Browser based games	0	0	0.5	1	4.75	9733.5
PC/Mac games	1	2	2	2	29.53*	11650.5*
Console games	0	2	2	2	29.86*	11443*
Handheld console games	0	0	0.5	2	14.20*	10714*
Mobile phone games	1	2	1.5	1	1.09	8977.5
Single-player games	2	2	2	2	19.22*	10809.5*
Single-player games with others (turns)	0	1	0.5	1	6.97	9019.5
Multiplayer games (online)	0	1	2	2	51.11*	12653.5*
Multiplayer gamed (in the same room)	1	1	1	2	5.84	10053.5

* significant at $p < 0.01$. Note: "0" = Never, "1" = Once a month or less, "2" = Several times a month, "3" = Several times a week, "4" = Daily.

Further analysis indicated that the more dedicated the player, the more frequently they play PC games (J = 11650, z = 5.39, r = 0.35), console games (J = 11443, z = 5.09, r =0.33), handheld consoles games (J = 10714, z = 3.78, r = 0.25), single-player games alone (J = 10809.50, z = 4.16, r = 0.30), and multiplayer games online (J = 12653.50, z = 7.26, r = 0.48).

Regarding the amount of time people spend playing (Table 7.9), significant differences were found with respect to PC games (H (3) = 27.07), console games (H (3) = 26.640), playing single-player games alone (H (3) = 38.33), playing multiplayer games online (H (3) = 56.38) and playing multiplayer games in the same room as other players (H (3) = 13.18). Jonckheere's test was significant for the same items indicating that as the strength of gamer identity increases, so does the length of the gameplay sessions involving: PC games (J = 11644, z = 5.27, r = 0.35), console games (J = 11402.50, z = 4.91, r = 0.32), handheld consoles games (J = 10126, z = 2.59, r = 0.17), playing single-player games alone (J = 12067.50, z = 6.171, r = 0.40), playing multiplayer games online (J = 12935, z = 7.70, r = 0.51) and playing co-located multiplayer games (J = 10593, z = 3.363, r = 0.22).

Table 7.9: Duration of gameplay

	Non gamer median	Casual median	Moderate median	Hardcore median	H	J
On average, how long does a session last when you play:						
Social network games	0	0	0	0	2.17	9033.5
Browser based games	0	0	0	1	6.81	9991
PC/Mac games	1	2	2	4	27.07*	11644*
Console games	0	2	2	4	26.64*	11402.5*
Handheld console games	0	0	1	1	6.97	10126
Mobile phone games	1	1	1	1	1.16	8657.5
Single player games	1	2	2	4	38.33*	12067.5*
Single player games with others (turns)	1	2	0	2	9.59	9169
Multiplayer games (online)	0	1	2	5	56.38*	12935*
Multiplayer games (in the same room)	2	2	2	2	13.18*	10593*

* significant at $p < 0.01$. Note: "0" = N/A, "1" = Less than 30mins, "2" = 30mins-1hr, "3" = 1-2hrs, "4" = 2-3hrs, "5" = 4-5hrs, "6" = more than 5hrs

7.2.1.4 What players do when they get stuck

Concerning the strategies that players adopt when they get stuck within a game (Table 7.10), players differ in terms of whether they go and ask someone specific for advice ($H(3) = 17.82$), look online for help ($H(3) = 25.44$), use a video or written walkthrough ($H(3) = 12.15$), take a break ($H(3) = 12.15$), or give up on the game ($H(3) = 23.70$).

In terms of going to someone specific for help, moderate gamers (Mdn = 3) are significantly more likely than non-gamers (Mdn = 2) to pursue this option ($U = 1146$, $z = -3.275$, $r = -0.27$), while they are also more likely than casual players (Mdn = 2) to do so ($U = 2061.50$, $z = -3.16$, $r = -0.24$). Regarding looking online for help, moderate gamers (Mdn = 4.5) are again more likely than non-gamers (Mdn = 4) to try this out ($U = 929$, $z = -4.53$, $r = -0.39$) and casual gamers (Mdn = 4) to do so ($U = 2034$, $z = -3.43$, $r = -0.26$). Concerning the use of walkthroughs, moderate gamers (Mdn = 4) are more likely than non-gamers (Mdn = 2) to resort to this option ($U = 845$, $z = -4.75$, $r = -0.39$), while hardcore gamers (Mdn = 4) are more also likely than non-gamers to do so ($U = 253.50$, $z = -3.55$, $r = -0.44$).

Table 7.10: Getting stuck results

	Non gamer median	Casual median	Moderate median	Hardcore median	H
If you get stuck during play, how likely are you to::					
Ask someone present for help/advice	2	2.5	4	2	7.09
Keep trying for a while	4	4	5	5	11.17
Consult the manual	2	3	3	2	9.11
Refer to a game guide (published book)	1	2	1	1	6.77
Go to someone specific for help/advice	2	2	3	2	17.82*
Look online for help/advice (forums/guide)	4	4	4.5	4	25.44*
Use a written or video walkthrough	2	4	4	4	24.90*
Take a break and come back later	4	4	4	4	12.15*
Use a cheat code or hack	1	2	2	1	8.88
Give up on the game	3	3	2	2	23.70*
Use in-game hints	4	4	4	3	9.40
Ask someone else to play the section of a game for you	1	1.5	1	1	2.58

* significant at $p < 0.01$. Note: "1" = Definitely not, "2" = Highly unlikely, "3" = Somewhat unlikely, "4" = Somewhat likely, "5" = Highly likely

With respect to taking a break and coming back to the game later, casual gamers (Mdn = 4) are more likely than hardcore gamers (Mdn = 4) to pursue this option (U = 533, z = -2.93, r = -0.32), and moderate gamers (Mdn = 4) are more likely to do so than hardcore gamers (U =1386, z = -2.72, r = -0.22). Finally, non-gamers (Mdn = 3) are more likely than moderate gamers (Mdn = 2) to give up on a game (U = 1244.50, z = -2.83, r = -0.23), and more likely than hardcore gamers (Mdn = 2) to do so (U = 261.50, z = -3.48, r = -0.44). Further, casual gamers (Mdn = 3) are more likely to give up than moderate gamers (U = 2144, z = -2.90, r = -0.22) and hardcore gamers (U = 434, z = -3.75, r = -0.41).

7.2.1.5 Summary

The results presented in this section indicate how the types of players differ, not just in terms of how they identify themselves but with respect to the activities they engage in and the strategies they adopt. The findings indicate the more strongly someone identifies as a gamer the more time they will spend playing games in general, where this was only at the expense of time spent listening to the radio. A relationship between identity and a range of gaming experiences was also found but this did not apply to playing mobile and social

network games. Further, the more someone identifies as a gamer, the more likely they are to engage in multiplayer and online play.

Regarding the strategies players are likely to adopt, the results did not reveal any significant differences between non-gamers and casual gamers. However, the other player groups differed with respect to how likely they were to ask someone specific for advice, look online for help, use a video or written walkthrough, take a break and come back later, and to give up on a game. In particular, those who identify less strongly as gamers seem less likely to use paratexts and more likely to give up on a game when stuck but there is scope for further research to examine these differences further.

The next section reports on the factor analyses carried out to reduce the number of questionnaire items being investigated and to examine potential underlying constructs within the data set.

7.2.2 Developing gaming-related constructs

Three separate factor analyses where carried out, in an approach similar to Richardson (2010) and Ullah, Richardson and Hafeez (2011), who used exploratory factor analysis techniques to create different scales and examine the relationships between them. With respect to the Phase 3 survey, the analysis of each of the data sets included an initial principal components analysis and O'Connor's (2000) program to run a parallel analysis of 1000 random correlation matrices. The eigenvalues from the correlation matrix of the principal components analysis were compared to those produced by the parallel analysis. Any eigenvalues below the values produced by O'Connor's program were rejected, while the remainder represented the number of factors which required extraction. Principal axis factoring was used to extract these factors, and an oblique rotation was applied if required. In accordance with Field (2009; p. 645) loadings of 0.4 and greater were regarded as salient for the purposes of interpretation. Respondents were assigned scores on factor based scales according to the means of their scores on the salient items within

each extracted factor (Pedhazur & Schmelkin, 1991, pp. 625-626). A second-order factor analysis was carried out on these factor based scores in order to explore the relationships between the constructs that were measured by different parts of the questionnaire. The final stage of the analysis (reported in Section 7.2.2.4) examined how these constructs relate to player identity, in order to investigate the relationship between learning, involvement and group membership.

7.2.2.1 Game genres

The first factor analysis concerned Question 6 from the questionnaire, which asked respondents about the genre of games they were likely to play. They had to rate this likeliness on a 5 point Likert scale from 1 ("definitely not") to 5 ("highly likely"). Across the groups, the means suggest that Role-Playing games are the most popular choice (M = 3.58, SD = 1.56) and Sports games the least popular (M = 2.07, SD = 1.28). The Kaiser-Meyer-Olkin measure verified the sampling adequacy, KMO = 0.79 (described as "good" by Field, 2009, p. 647) while Bartlett's test of sphericity χ^2 (232) = 1261.08, $p < 0.001$ indicated that correlations between items were large enough to carry out an exploratory factor analysis. Three factors were suggested by the analysis, accounting for 53.52% of the variance. The loadings are indicated in Table 7.11, with those above 0.4 indicated in bold.

The factors were interpreted as representing different levels of approachability. The concept of approachability was based on Juul's research on casual games (Juul, 2010) and relates to complexity of the game and how much time and energy the player is required to invest in the activity. So, in terms of Factor 2, this included games with simple controls and that do not require a large investment, e.g. Board and exercise games. Factor 1, contains more arcade-like games with standard game interfaces and somewhat more complicated game mechanics, e.g. Fighting games. Finally, Factor 3 includes games with the most complex controls and that require the highest investment from players in terms of time and effort. As a result, the three factors have been labelled High

Approachability (Factor 2), Medium Approachability (Factor 3) and Low Approachability (Factor 1) to reflect the types of games contained within each construct.

Table 7.11: Factor loadings for game genres

	Mean	SD	Factor loadings		
			1	2	3
Shooter	2.99	1.38	***0.66***	-0.22	0.23
Simulation	2.59	1.34	***0.63***	-0.14	0.02
Fighting	2.53	1.34	***0.54***	0.20	0.31
Sports	2.07	1.28	***0.54***	-0.01	-0.15
Party	2.77	1.36	***0.53***	***0.48***	-0.03
Platform	2.93	1.38	***0.53***	0.33	0.20
Action/Adventure	3.32	1.36	***0.46***	0.12	**0.45**
Education & Reference	2.68	1.26	-0.01	***0.67***	-0.02
Quiz	2.58	1.29	0.01	***0.59***	-0.15
Exercise	2.54	1.34	0.14	***0.58***	-0.17
Puzzle	3.37	1.28	-0.08	***0.58***	0.14
Board	3.32	1.25	-0.29	***0.53***	0.08
Music & Rhythm	2.83	1.39	0.37	***0.50***	-0.04
Virtual life	2.60	1.39	-0.05	*0.35*	0.23
Role playing games	3.58	1.56	-0.04	-0.07	***0.84***
Strategy	3.34	1.38	0.08	-0.04	***0.61***
Factor inter correlations					
Factor 1			1.00	0.13	0.18
Factor 2			0.13	1.00	0.12
Factor 3			0.18	0.12	1.000

The factor correlations indicate there is little overlap between the categories although some items did have salient loadings on more than one scale. For instance, Action/Adventure loads on both the *Medium* and *Low Approachability* scales, while Party and Platform load on both *High* and *Medium Approachability* scales. This suggests that specific games within these genres may differ in terms of their approachability. So some Action/Adventure games will be harder to pick up and play than others, while some Party games may be easier to work out than others. Further, the cross loadings are likely to reflect the fact that games can contain multiple elements from different genres. For the purposes of further analysis, items which showed cross loadings higher than 0.4 were removed (i.e. Action/Adventure and Party) as were items that scored lower than 0.4 on any of the three factors (i.e. Virtual life).

7.2.2.2 Use of paratexts

The next analysis related to Question 14, which concerned player use of paratexts. Respondents were asked how often they had engaged in different activities over a 12 month period, on a 5 point scale ranging from 1 ("not at all") to 5 ("daily"). The most common activity was visiting gaming websites (M = 2.66, SD = 0.88) and the least common was writing game-related fan-fiction (M = 1.13, SD = 0.47). In this case, KMO = 0.79 (described as "great" by Field, 2009, p. 647) while Bartlett's test of sphericity χ^2 (232) = 1261.07, $p < 0.001$ was also satisfactory. Two factors were suggested by the analysis, accounting for 46.34% of the variance. The loadings are indicated in Table 7.12.

Table 7.12: Factor loadings for paratexts

	Mean	SD	Factor loadings	
			1	2
Reviews	2.30	1.02	***0.98***	-0.18
Trailers	2.23	0.92	***0.78***	-0.51
Visit sites	2.66	1.37	***0.74***	0.07
Podcasts	1.52	0.88	***0.59***	0.12
Contribute	1.87	1.18	***0.57***	0.23
Write fan fiction	1.13	0.47	-0.08	***0.80***
Read fan fiction	1.32	0.69	0.21	***0.59***
Create mod	1.22	0.54	0.04	***0.51***
Play mod	1.72	1.03	0.32	0.37
Hack	1.19	0.05	0.19	0.19
Factor correlations				
Factor 1			1.00	0.56
Factor 2			0.56	1.00

Factor 1 contains items which relate to the use of paratexts for accessing or contributing *Information* about games, while the items underlying Factor 2 relate to *Extended activities* in terms of engaging with wider paratexts such as game-related fan fiction (in terms of both reading and writing) and creating mods (modifications) for games. The item about hacking games and platforms did not load highly on either factor, suggesting that it is not related to either type of activity. While the loadings for playing mods are somewhat higher, and exhibit similar loadings on both factors, these still fall below 0.4, so both these items were removed for the purposes of further analysis. In addition, the factor correlations indicate a relatively high correlation between the factors, suggesting that *Information* and *Extended activities* share a close connection.

7.2.2.3 What do people gain from their involvement with gaming?

The third factor analysis concerned Questions 16 and 17, which asked respondents how far they agreed with 26 different statements regarding what they thought they gained from their involvement with gaming. Responses ranged from 1 "strongly disagree" to 5 "strongly agree". Participants were also given the option to select "I don't know what this means", which was scored as 0 and removed from the analysis. One of the items ("I regularly pwn other players") was excluded as 39 respondents did not know what this meant. Across all items, 22 respondents selected the "I don't know what this means" option reducing the total number of participants who completed Questions 16 and 17 to 210. In this case, KMO = 0.89 (described as "great" by Field, 2009, p. 647) while Bartlett's test of sphericity χ^2 (210) = 1863.34, $p < 0.001$ indicated that correlations between items were large enough to carry out an exploratory factor analysis.

Table 7.13: Factor loadings for learning

	Mean	SD	Factor 1
I like to discuss different gaming strategies	3.52	1.21	***0.75***
I have picked up some general knowledge from games	3.87	1.04	***0.69***
If I come across interesting facts in a game I sometimes look them up to find out more	3.70	1.19	***0.68***
I'm not interested in the latest gaming news and developments (r)	3.46	1.17	***0.66***
Certain gameplay experiences have affected who I am as a person	2.90	1.27	***0.65***
I think playing games with others has helped me develop my general collaborative skills	3.36	1.08	***0.65***
All I have ever learnt from games is how to play them (r)	3.81	1.08	***0.63***
I feel like I am part of a wider gaming community (beyond the people I tend to play with)	3.22	1.34	***0.61***
I don't like talking about different games and genres (r)	3.76	1.09	***0.59***
I don't think games have helped me to develop my general problem solving skill (r)	3.77	1.08	***0.58***
Other people ask me for help with games	3.14	1.28	***0.58***
I think games have helped me to develop better hand-to-eye coordination	3.78	1.09	***0.56***
I don't think it is possible for games to be art (r)	4.26	0.98	***0.55***
I sometimes compare myself to the character I am playing	2.79	1.26	***0.53***
Games have taught me to keep trying no matter what	3.28	1.07	***0.52***
I often think games are a waste of time (r)	3.91	1.11	***0.51***
I have never empathised with a game character (r)	3.62	1.34	***0.50***
I try to reflect on mistakes I make within a game and not to repeat them	4.01	0.94	***0.49***
I have different reasons for playing different types of games	4.18	0.83	0.37
I'm not very good at a lot of games (r)	3.07	1.29	0.37
I like to consider a game from the designer's point of view	3.14	1.21	0.36
Games are usually just a bit of fun	2.25	0.91	0.34
I finish most of the games I start playing	3.43	1.08	0.29
I like to watch and learn how to play from others before I try a new game in a social situation	2.78	1.26	0.26
I worry that I spend too much time on games (r)	2.63	1.21	0.17

Two factors were initially suggested, although very few items loaded on the second factor, even after rotation (in fact only 2 items showed loading higher than 0.4). As a result, it was decided to repeat the analysis and extract a single factor instead. This single factor accounted for 28.60% of the variance. The loadings of each item are shown in Table 7.13, where (r) indicates a reverse item. This single factor was used as a scale to represent what people thought they learnt from games, where a single factor based score was produced consisting of the 18 items which showed loading higher than 0.4. This scale was titled Learning and was used in the subsequent second order factor analysis.

7.2.2.4 Examining the relationship between the factor based scales

In the second order analysis, the six factors produced were analysed in order to examine the relationship between them. In this case, KMO = 0.70 (described as "good" by Field, 2009, p. 647) while Bartlett's test of sphericity χ^2 (214) = 282.67, $p < 0.001$. The analysis identified two factors which account for 60.12% of the variance in the scale scores. The mean, standard deviations and factor loadings are shown in Table 7.14.

Table 7.14: Second order factor loadings

	Mean	SD	Factor loadings	
			1	2
Information activities	2.14	0.88	***0.93***	-0.18
Learning	3.57	0.97	***0.74***	0.07
Low approachability	3.48	1.26	***0.50***	0.01
Extended activities	1.23	0.45	***0.45***	-0.05
Medium approachability	2.60	0.97	***0.40***	0.32
High approachability	2.90	0.88	-0.06	***0.54***
Factor correlations				
Factor 1			1.00	0.14
Factor 2			0.14	1.00

Five of the six factors show salient loadings on the first factor, with only one (*Easily approachable games*) showing a loading above 0.4 on the second factor. This suggests that the measure of *Learning* is more closely associated with accessing and providing *Information*, engaging in *Extended activities*, and playing games with *Medium* and *Low approachability*. Further, playing games with *High approachability* was not connected to wider game-related activities or learning.

7.2.2.5 Examining the relationship between player groups and the new constructs

The creation of factor-based scales means that the scores for each of the constructed factors can be treated as existing on an interval scale. A multivariate analysis of variance was carried out to examine how the player groups differ with respect to the factor based scores. The means and standard deviations for each scale are reported in Table 7.15. The total number of participants included in this analysis was 214, as respondents who ticked the "I don't know what this means" box for any items within the *Learning* scale were removed from the analysis.

Table 7.15: Means and standard deviations for player groups' factor based scores

	Non-gamer mean (SD)	Casual mean (SD)	Moderate mean (SD)	Hardcore mean (SD)	Total mean (SD)
High approachability	2.82 (0.89)	3.15 (0.83)	2.89 (0.88)	2.66 (0.87)	2.91 (0.88)
Medium approachability	1.84 (0.90)	2.52 (0.99)	2.70 (0.89)	3.08 (0.94)	2.60 (0.97)
Low approachability	2.19 (1.20)	3.14 (1.23)	3.72 (1.08)	4.28 (0.94)	3.48 (1.26)
Information Activities	1.16 (0.30)	1.74 (0.68)	2.35 (0.73)	2.85 (0.97)	2.13 (0.87)
Extended Activities	1.05 (0.15)	1.11 (0.25)	1.28 (0.40)	1.39 (0.81)	1.23 (0.44)
Learning	2.76 (0.63)	3.17 (0.63)	3.80 (0.55)	4.06 (0.56)	3.57 (0.71)

Note: N = 214

Using Pillai's trace a significant result was found after the initial MANOVA [V = 0.52, F = 7.17 (18, 621), $p < 0.001$]. Separate univariate ANOVAs indicated that non-gamers, casual gamers, moderate gamers and hardcore gamers do not differ in terms of how likely they are to play games with *High approachability* such as Quiz or Puzzle games [F (3, 210) = 2.16, p = 0.94]. However, there are differences in terms of how likely they are to play games with *Medium approachability* [F (3, 210) = 9.57, $p < 0.001$] and games with *Low approachability* F (3, 210) = 20.73, $p < 0.001$, whether they engage in *Information* F (3, 210) = 34.66, $p < 0.001$ or *Extended activities* F (3, 210) = 4.53, $p < 0.01$, and with respect to their scores on the *Learning* scale F (3, 210) = 38.33, $p < 0.001$.

A significant linear trend was found for all items, apart from *High approachability* games, [*F* (1, 210) = 1.16, p = 0.28]. This suggests that the more strongly a player identifies as a gamer, the more likely they are to play games with *Medium,* [F (1, 210) = 27.38, p < 0.001, r = 0.35] and *Low* approachability [F (1, 210) = 57.97, p < 0.001, r = 0.48], to engage in *Information* [*F* (1, 210) = 95.20, p < 0.001, r = 0.58] and *Extended activities* [F (1, 210) = 11.08, p < 0.001, r = 0.25], and to gain a higher score on the *Learning* scale [F (1, 210) = 98.93, p < 0.001, r = 0.59]. Effect size was computed with the formula $r = \sqrt{(SSm/SSt)}$ (Field, 2009, p. 389 does suggest the ω^2 formula can provide a slightly less biased measure of effect size, but *r* is reported here for the purposes of consistency).

7.2.2.6 Summary

Creating game-related constructs allowed for a consideration of the different types of games people play (Section 7.2.2.1), the range of game-related activities they engage in (Section 7.2.2.2) and what they think they gain from their involvement with games (Section 7.2.2.3). The analysis also indicated how these constructs relate to each other (Section 7.2.2.4) and how they relate to issue of player identity (Section 7.2.2.5) furthering our understanding of the relationship between different aspects of involvement and learning. The section below considers these results along with the rest of the findings reported within this chapter.

7.3 Discussion

The previous chapter adopted an in-depth approach to investigating how learning and involvement come together in practice. The case-study findings also began to address research questions 7 and 8, and helped feed into the design of a larger survey designed to examine learning and involvement on a wider scale and further explore the influence of player identity. This discussion section reviews the results of the survey in relation to following research questions:

7. *What evidence is there that players are learning anything other than learning how to play?*

8. *To what extent do players engage with different gaming-related communities and resources?*
9. *Does player engagement with these communities and resources relate to how they identify themselves as gamers? If so, how?*

7.3.1 Evidence of learning

Regarding question 7, the previously developed learning categories were applied to the open ended responses and refined, to examine both how and what people learn from their gaming experiences. Similar to the results reported in Chapter 5, the survey findings indicate that people learn from games via a combination of different ways, *through play* (alone and with others), through *interacting with others* outside of play, and *through external resources*. The analysis also indicates that people learn on multiple levels, although, due to the way the question was worded, there was less emphasis on *game-level* learning and more on learning different *skills* and the *personal level*. Nevertheless, players would comment on how playing games led to learning about games in general, whether in terms of strategies they adopt or in terms of reflecting on game design.

Additional sub-categories were added to the original set to build a fuller picture of what people learn from their involvement with games. The sub-category *games in general* was added to the *game level* to take into account evidence of learning about gaming news and developments and developing familiarity with different types of genres. With respect to the *skill level*, in addition to *psycho-motor*, *cognitive* and *social skills* (previously *collaborative skills*), *literacy, numeracy* and *technical skills* were added as sub-categories. In terms of the *personal level*, *cultural development* and *career influence* were added to the existing *general knowledge* sub-category while *changing as a person* was renamed *emotional development*. Table 7.16 presents the refined version of the learning categories.

Value and transfer were also considered in order to illustrate the impact games can have on players lives, whether they view these experiences in terms of explicit learning or not.

While not all players do think they learn anything from their experiences, the majority of respondents did report learning from their involvement with games. There was also a tendency to report multiple things that had been learnt when answering this question.

Table 7.16: Gaming informal learning categories

How people learn from games	What people learn from games
1. Through play - Single player - Multiplayer 2. Through interacting with others 3. Through external resources – Via game paratexts – Via tangential sources	1. On a game level – Controls/interface – Content – Strategies – Behaviour of others – Games in general 2. On a skill level – Psycho-motor – Cognitive – Social – Numeracy – Literacy – Technical 3. On a personal level – General knowledge – Emotional development – Cultural development – Career influence

Regarding the factor based *Learning* scale (Section 7.2.2.3), many of the questionnaire items within questions 16 and 17, were initially designed on the basis of the original *learning how* and *learning what* sub-categories (presented in Chapter 5, Section 5.1.1). These sub-categories were not reflected in the factor analysis, as only a single factor was extracted during the process. The emergence of a single factor indicates that players who report learning from games do not necessarily distinguish between learning on a *game, skill,* or *personal level.* The analysis of the open-ended question on learning supports this interpretation, as when listing the things they thought they had learnt, participants would often include items from the different levels and refer to learning in different ways within the same response (Section 7.1.2).

7.3.2 Gaming communities, resources and identities

Research questions 8 and 9, concerning the extent to which players engage with different communities and resources and the influence of player identity, were also addressed through the survey study. An open ended question asked respondents to explain their choice of player category and the analysis involved applying and refining the themes developed in Chapter 5, Section 5.2.2. In addition to the existing themes (*Knowledge, Competence, Community* and *Identity) Motivation* and *Dedication* were developed during the analysis in order to capture responses about people's reasons for play and the amount of time spent on gaming (Sections 7.1.1.5 and 7.1.1.6). The qualitative analysis reported in Section 7.1.1 suggested that the more strongly someone identifies as a gamer, the more likely they are to play games for longer periods of time, set time aside for the activity, to be concerned with achievement and improving their abilities and to engage with wider gaming communities. The fact that *dedication* was the theme most frequently referred to by respondents, indicates that it is a key component of player identity.

Concerning the quantitative data reported in Section 7.2.1, the analysis contributed to an improved understanding of how the player groups differ through a consideration of: wider leisure activities, the frequency and duration of play on different platforms and formats, and how likely players were to engage with different resources when stuck (or to choose other strategies). The results are consistent with the qualitative findings as, by and large, it was found that those who strongly identify as gamers play more frequently and for longer, with respect to platforms such PC and gaming consoles. However, in relation to more casual formats such as mobile games and social network games, the groups did not differ and so these games are just as likely to be played by those who do not identify as gamers at all as well as those who do. Further, the more strongly someone identifies as a gamer, the more likely they were to spend time playing alone and also with others online, including both friends and strangers. Regarding the strategies that players adopt when stuck, the findings are a little less clear cut. There was little distinction between non-gamer and casual gamer responses, but some indication that moderate and hardcore players are

more likely to ask or seek help in the form of talking to a friend, looking online or using a walkthrough. These activities can be seen as instances of *learning through others*, and of *learning through paratexts*, providing additional evidence that group membership relates to engagement with wider communities. With respect to taking a break, the results indicate that players with stronger gaming identities are more persistent. However, while hardcore gamers and non-gamers are just as likely to take a break, non-gamers are much more likely to give up, so they may not always come back after a break!

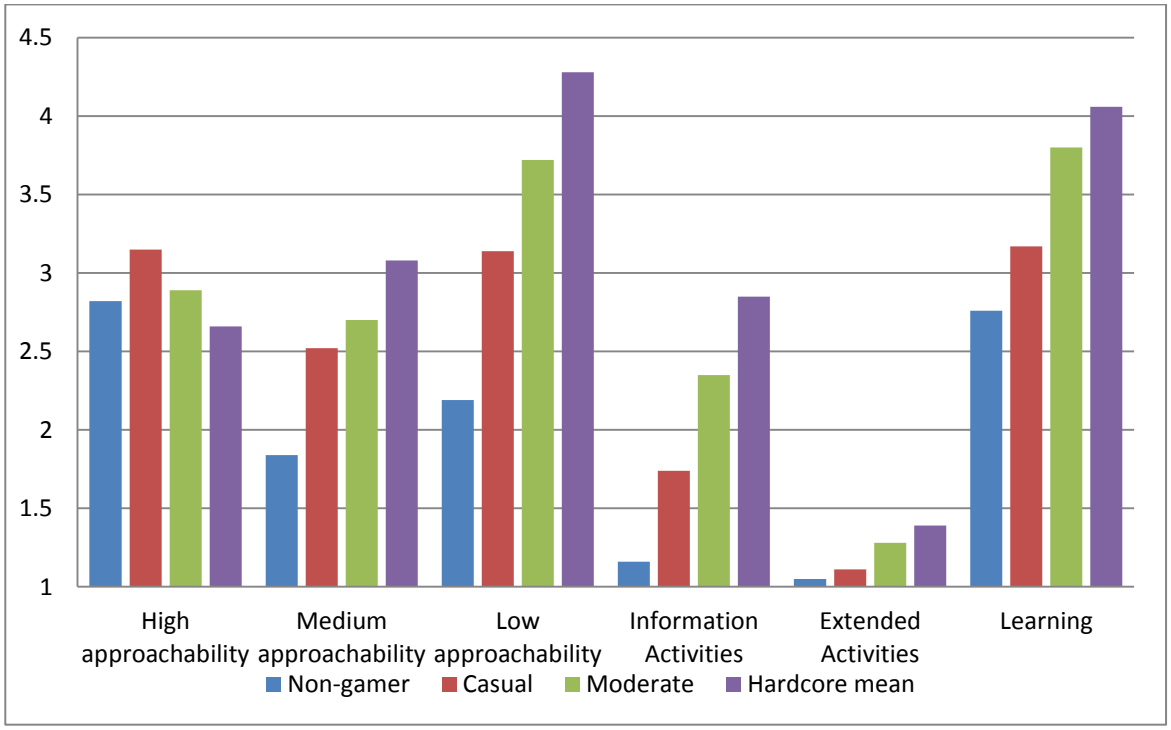


Figure 7.3: Mean factor based scores across the groups

The factor analyses and the creation of factor based scales presented in Section 7.2.2 enabled an examination of the ways in which identity relates to micro and macro-involvement and learning. Figure 7.3 provides a graphical representation of the mean factor based scores displayed in Table 7.15. The graph clearly illustrates there is little difference between the groups when it comes to playing games with *High approachability*, but that there are quite clear linear trends when it comes to *Medium approachability* games, *Low approachability* games, consulting or contributing to sources *Information*, engaging in *Extended activities*, and in terms of *Learning*. In Chapter 6, Section 6.5.3 it

was suggested that gamers spend more time on play and engaging with paratexts, while they also report learning more from their gaming experiences. The results presented in this chapter provide support for these claims as they indicate that those who identify more strongly are more likely to play games (although not necessarily with respect to games with *High approachability*) and to spend more time engaging in wider activities, i.e. they show greater micro and macro-level involvement. Further, the results suggest they are more likely to learn from their involvement.

To an extent, the game related constructs reflect the definitions of casual and hardcore games that Juul (2010) provides. Juul discusses how casual games have become so popular in part because they have lower barriers of access then more traditional games (which often require knowledge of gaming conventions). He argues that more approachable games appeal to a wider audience, though also points out that this does not preclude hardcore players from playing them. Figure 7.3 illustrates there a similar chance of different players engaging in games with *High approachability*. Further, it indicates that the likelihood of playing games with *Medium* and *Low approachability* increases with the strength of player identity. However, the mean factor based scores for each of the groups, in particular the non-gamer and casual groups, are actually higher with respect to games with *Low approachability* when compared to those with *Medium approachability*. This is contradictory to Juul's claims, because it indicates that games which are low in approachability are more popular than games of medium approachability, across all the categories. Though beyond the scope of the thesis, further research is required to examine the types of games people play and how this relates to player identity.

Of more relevance to this thesis is the lack of a relationship between the *High approachability* category and how highly players score on the *Learning* scale. In contrast, people who play games within the *Medium* and *Low approachability* categories report learning more from their gaming involvement and spending more time interacting with gaming communities and resources in the form of *Information* and *Extended activities*.

However, it is worth noting that the scores with respect to both the activity scales, especially when it comes to the non-gamer and casual gamer groups, are generally quite low. This indicates that although there is some evidence of the kinds of participation within affinity groups and semiotic domains that Gee (2004; 2007) describes, it appears less common amongst those on the lower end of the gamer continuum, especially when it comes to extended and more creative activities such as reading fan-fiction and developing mods. There are likely to be communities of players who are much more involved in these sorts of activities but amongst the population surveyed, there were few examples of this being the case.

7.3.3 Summary

This chapter presented the results of a qualitative and quantitative analysis of survey findings and helped to locate the research within a wider context through considering learning and involvement on a more generalisable scale. Across the player categories, examples were presented of how gaming involvement resulted in a variety of valuable and rewarding experiences. The refined learning categories illustrate the range of learning experiences that can result from gaming involvement, beyond just learning how to play. Evidence was provided regarding participation within a variety of different gaming communities (from the immediate group of people play with to the wider gaming community which produces paratexts), although it was clear that the extent of this involvement relates to how players identify as gamers. Further, gamer identity influenced how much people reported learning from their gaming involvement. These findings will be discussed further in the following chapter where the research presented in this thesis will be considered as a whole.

8. Conclusions: Bringing it all together

In this final chapter, the work from previous sections is drawn together in order to address the overarching research question “How do motivation, engagement and informal learning relate to each other within the context of digital gameplay?”. Section 8.1 provides a reminder of the research conducted to address different aspects of this question. Further, it includes an overview of the findings in the form of the *Gaming Involvement and Informal Learning* framework (Figure 8.1). Section 8.2 refers back to this framework to discuss the findings in terms of the contributions made to the literature. The limitations of the thesis and suggestions for future research are discussed in Section 8.3, before the thesis concludes with a final summary in Section 8.4.

8.1 Overview of the research

The overarching research was decomposed into a number of sub-questions to be addressed. As a starting point, the following questions were proposed:

1. *What motivates people to play games?*
    a. *What factors affect this motivation?*
2. *What factors affect engagement during play?*
3. *How do players describe learning within the context of gaming?*
4. *What links can be identified between motivation, engagement and learning from player accounts of their gameplay experiences?*

The first phase of the research involved a conceptual analysis, where the Digital Game Experience Model (DGEM; Calleja, 2007a) was applied as an overarching framework with respect to other models of engagement and motivation. Using the DGEM in this way illustrated a number of commonalities between different frameworks and led to the reconceptualisation of “motivation” and “engagement” as forms of macro and micro-involvement respectively. Additionally, this phase involved a set of email interviews with thirty players. The DGEM was used to code to the interview data, enabling a more

dynamic understanding of different aspects of player involvement, especially in terms of shared involvement on both a micro and macro-level (Chapter 4). Question 4 was reworded to reflect the reconceptualisation:

4. *What links can be identified between involvement and learning from player accounts of their gameplay experiences?*

The interview analysis in Phase 1 also addressed questions 3 and 4, where a set of informal learning categories and a number of themes that related to the concept of gaming capital were developed. These categories and themes drew attention to learning on a *game*, *skill* and *personal level* that arises from micro-level gameplay and wider macro-level activities (Chapter 5). The findings were based on retrospective accounts so the next phase considered how involvement and learning occur in practice. The following questions were addressed:

5. *How can we identify breakdowns that occur during play?*
    a. *How do players attempt to resolve these breakdowns?*
    b. *What role do breakthroughs play in this process?*
6. *What does examining breakdowns and breakthroughs tell us about how involvement and learning come together in practice?*
7. *What evidence is there that players are learning anything other than learning how to play?*
8. *To what extent do players engage with different gaming-related communities and resources?*

The second phase (Chapter 6) adopted a multiple case-study approach, involving eight cases, and the collection of observation, interview, physiological and diary data. Although the physiological data did not prove useful for the identification of breakdowns and breakthroughs, a method was developed in order to categorising them in terms of *action*, *understanding* and *involvement*. Through assessing a number of claims based on the

literature and the findings in Phase 1, the analysis of the case studies contributed to understanding of how learning and involvement come together on a micro and macro-level. This understanding was supported by applying the previous categories and themes to the diary data. While *identity* was first introduced as a theme in Section 5.2.2.4, it was not until the diary analysis that its potential significance was recognised. However, due to the small sample size, claims about how identity influenced micro-involvement, macro-involvement and learning required further investigation. As a result an additional research question was included to be addressed in the final phase:

9. *Does player engagement with these communities and resources relate to how they identify themselves as gamers? If so, how?*

A questionnaire was designed on the basis of Phase 1 and 2. This was filled in by 232 respondents, providing data on a wide range of gaming habits, preferences and practices. The Phase 3 analysis provided evidence of learning beyond the *game level* and included an examination of player identity and its relationship to involvement and learning. The findings suggest that the stronger a player's gamer identity, the more likely they are to engage in both micro and macro-level activities and to learn from their involvement with games (Chapter 7).

The answer to the question "How do motivation, engagement and informal learning relate to each other within the context of digital gameplay?" is not a simple one to provide. However, this thesis provides an empirically grounded account which has furthered our understanding of how these processes come together in practice. Figure 8.1 provides an overview of the relationships between micro involvement, macro involvement and learning in the form of the *Gaming Involvement and Informal Learning* framework. Based on the findings of each research phase, the diagram refers back to the gaming informal learning categories presented in Table 7.16. These categories indicate how learning occurs and what kinds of learning result from involvement with gaming practices.

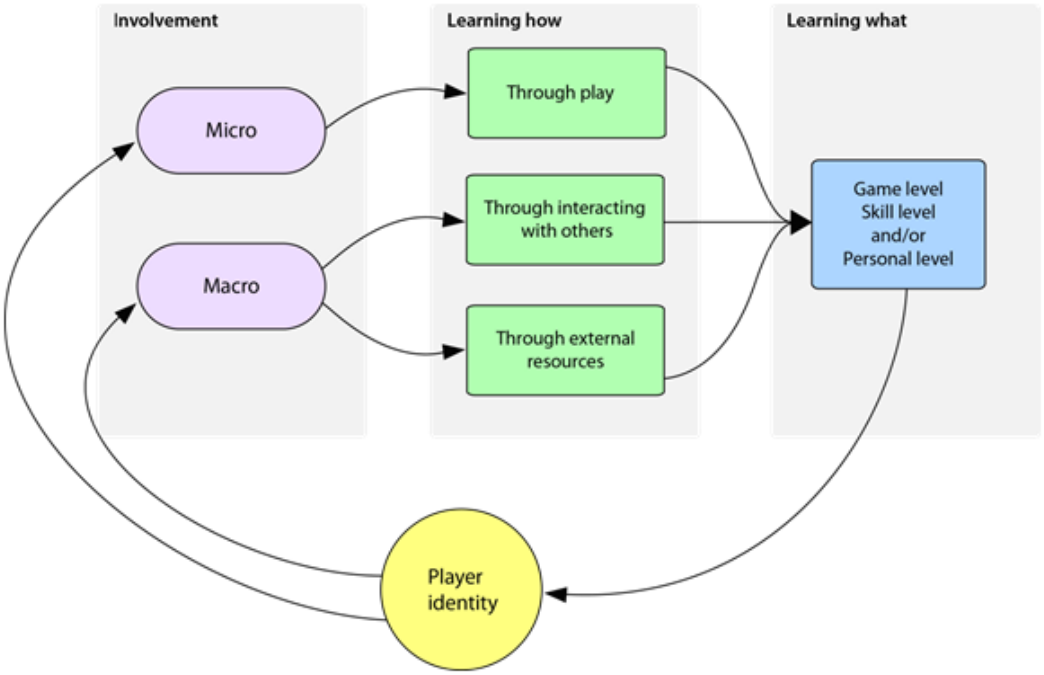


Figure 8.1: Gaming Involvement and Informal Learning framework

With respect to micro-level involvement, learning occurs *through play*, whether this is single-player or multiplayer. Learning through macro-level involvement occurs via engaging in game-related activities, in the form of *interacting with others* outside of play or using *external resources* such as paratexts or tangential sources. While micro-level practice may involve engaging with other people during multiplayer or even single-player play (e.g. if there is an audience), it is gameplay which is the core activity. Thus, learning *through interacting with others* refers to macro level activities, where the primary activity relates to discussions about gaming. Any of these practices can result in learning on a *game, skill* or *personal level*, which in turn feed into a sense of player *identity*. Player *dedication* is another important component to consider, as players who are more dedicated will spend more time going through the micro and macro-level cycles. The result is an iterative relationship between identity, involvement and learning: where the more strongly someone identifies as a gamer, the greater their micro and macro-involvement and the more likely they are to learn from their gaming experiences. The following section refers back to Figure 8.1 in order to consider the specific contributions of the thesis and how they relate to the findings.

8.2 Contributions and related work

The following sub-sections consider the implications of the research and how the findings contribute to methodology (Section 8.2.1), the field of game-studies (Section 8.2.2), the literature on informal learning (Section 8.2.3), the literature on motivation and engagement (Section 8.2.4), and to an understanding how involvement and learning relate to each other (Section 8.2.5).

8.2.1 Methodology

Crawford (2011) argues "video gaming needs to be understood not as a solitary leisure activity that occurs only at certain isolated times and locations, but rather as a culture which extends far beyond the sight of a video game machine or screen" (p. 143). A number of methods were developed to provide more "rigorous research into what players do with games (particularly those that don't claim explicit status as educational) and a better understanding of the thinking that is involved in playing them" (Squire, 2008, p. 167).

First, an email interview protocol was designed to establish what players think about motivation, engagement and learning in this context (Section 3.2.2). Second, a combination of observation, post-play interviews and diaries were used to examine gaming practices which occur on a micro and macro-level (Section 3.3.2). These practices relate to the *learning how* categories presented in Figure 8.1. A method of analysis was also developed based on the concept of breakdowns and breakthroughs (Sharples, 2007) in order to examine different aspects gameplay with respect to *action*, *understanding* and *involvement* on a micro-level (Section 6.2.1.1). During this phase, the collection of physiological data did not prove helpful for the purposes of this research. The difficulty of interpreting the signals and the lack of consistent patterns meant this data was not useful for identifying breakdowns and breakthroughs, especially in relation to *understanding* (Section 6.2.1.2). However, the combination of observation, interview and diaries was particularly useful for investigating how learning on a *game level* occurs in practice.

Finally, a survey was developed which provided valuable demographic information about the gaming habits and preferences of a wide range of players (Chapter 7). Unlike previous questionnaires that focus on one game (e.g. Griffiths et al., 2004; *Everquest*), a single concept (e.g. Yee, 2006; motivation), a specific context (e.g. Whitton, 2007; the use of games in formal education) or that serve a marketing purpose (e.g. ISFE, 2010), the Phase 3 survey allowed for a consideration of informal learning in relation to player involvement. The results indicated the range of learning that occurs, on a *game, skill* and *personal level*, as a result of engaging in different gaming practices (Figure 8.1).

8.2.2 "Player" vs. "Gamer"

The research conducted contributes to the field of games studies by illustrating how not everyone who plays games relates to them in the same way. This is despite the fact that games are appealing to more people than ever before (Juul, 2010) and becoming part of our everyday lives (Crawford, 2011). Rutter (2011) suggests a distinction can be made with respect to the term "player" and "gamer" where the former is used in the literature to refer to someone during an instance of play, and the latter is used in reference to gaming practice, which "extends beyond the immediate experience as a player" (p. 6) and so involves a wider set of activities across different sites. This distinction was reflected with respect to how players identify themselves, as the more strongly respondents identified as gamers, the more involved they were with different gameplay and game-related activities (Chapter 7). The analysis revealed some clear differences between the different groups of players, though there was also evidence that these categories should not be seen as static constructs since examples were provided of how identity had changed over time. Thus *dedication* is not only dependent on how often someone goes through the cycles identified in Figure 8.1 but also relates to how recently they have done so. It is clear that not everyone who plays games will identify as a gamer, and even if they do, it could be anywhere on the continuum of gamer identity (from casual to hardcore). This thesis improves our understanding of the factors which influence gaming identity (Section 7.1.1), e.g. dedication to gaming practices, and how different kinds of players relate to games

(Sections 7.1.2 and 7.2), e.g. casual players spend less time playing online games than hardcore players. The findings also have implications for education (see Section 8.2.5).

Although not everyone who completed the survey described themselves as a gamer (even a casual one), over 50% of survey respondents selected the moderate label. It could be argued that this was due to some sort of sampling bias (maybe there is generally a higher proportion of people connected to universities who would describe themselves as moderate gamers). However, the qualitative analysis (Section 7.1.2.3) indicated there were also some concerns about the value of gaming as a leisure time activity (especially in comparison to "real life"). This suggests, despite the increasing popularity of games, there is still some stigma attached to the hardcore gamer label. Perhaps, as it has been argued, "the most serious problem of current public discussion [around games] is that it produces images of gamers and game cultures that make it impossible for most gamers to identify as "gamers" at all" (Kallio, Mayra and Kaipainen, 2011, p. 21). This thesis counteracts some of that stigma by providing an empirically grounded account of the multiplicity of gaming experiences that can lead to valuable forms of learning.

8.2.3 Informal learning

The research reported within this thesis addressed the need for further examinations of informal learning and how this occurs within the context of digital games. In particular, the informal learning categories (refined version presented in Section 7.3.1; Table 7.16) helped pinpoint *how* learning occurs: *through play*, *interacting with others* and *interacting with external resources* and for considering *what* is being learnt: on a *game*, *skill* and *personal level*. These categories not only provide insight into the role that learning plays in relation to gaming, i.e. how people learn on a g*ame level*, but also indicate the wide range of valuable and rewarding experiences that people have as a result of their gaming involvement. Of particular importance are the examples provided of learning in relation to the *personal level* (Sections 5.1.1, 6.3 and 7.1.2.2) as this is not an area which previous gaming research has addressed in depth.

There is an overlap between these categories and some of the research that examines the impact of reading imaginative literature. For instance, Usherwood and Toyne (2002) present the results of a study where people reported developing literacy skills, learning lessons about the world, and engaging in personal development through their reading activities. These findings are very similar to the responses given to the Phase 3 survey where, for example, players discused their gaming experiences in terms of improving their language skills, finding out about different cultures, and developing persistence and patience (Section 7.1.2.2).

Regarding the framework produced by Vavoula et al., (2005), the research focus initially concerned *unintentional informal* learning, where players are not necessarily using games as a way to learn, but where they learn as a result of their experiences, e.g. through developing hand-to-eye coordination or picking up general knowledge during play. However, the analysis also revealed instances when *unintentional learning* shifted towards becoming *intentional,* e.g. when a player looked for advice about a game to overcome a problem, or used a tangential source to find out more about information encountered during play. Examples of this shift occurred across all of the studies (Sections 5.1.1, 6.3 and 7.1.2.1). While the vast majority of examples of learning provided were positive, not everyone viewed learning on a *game level* as being valuable however. It was also rare that participants would refer to activities such as keeping up to date on gaming news as explicit forms of learning (Sections 5.1.2, 6.3, and 7.1.2.3).

These findings suggest that while intentionality is something to consider with respect to informal learning, the analysis of each of the studies indicate the following questions should also be addressed:

1. Are people *aware* of what they are learning?
2. Do they *value* what is being learnt?

Both questions are especially important to consider in relation to unintentional informal learning. Arguably, the question about value is also worth addressing with respect to intentional informal learning and formal learning.

8.2.4 Motivation and engagement

Concerning the literature on motivation and engagement, this thesis moves the field forward by viewing these as fluid processes rather than static constructs. Section 4.1 discussed different models of motivation and engagement in games, e.g. Malone and colleagues work on intrinsic motivation (Malone, 1981; Malone & Lepper, 1987). The DGEM was highlighted as one of the only frameworks that considered motivation and engagement with respect to how they relate to each other, as forms of micro and macro-involvement. The analysis in Section 4.2 indicated people play games for a range of reasons that relate to the *spatial, narrative, tactical, affective, performative* and *shared* frames. The analysis also indicated the importance of the *shared* involvement frame and how it extends far beyond playing a game with other people.

However, the themes that relate to gaming capital (developed in Section 5.2.2 and added to in Section 7.1.1), indicated how factors such as *identity* and *dedication*, which the DGEM cannot account for, have a significant impact on both engagement and motivation. For instance, the analysis in Section 6.2.3 indicates how (in addition to previous gameplay experiences) expectations about gameplay arise from knowledge gained through macro-involvement with paratexts and other players. As Figure 8.1 illustrates, learning through macro-level practices leads to learning on a *game level*, which informs player expectations that influence micro-level gameplay. This shared involvement across different game-related contexts helps players maintain their awareness of what is happening within the wider gaming community by keeping them up to date with games in general; arguably contributing to their sense of identity. Examples were also provided within Section 6.2.3 of breakdowns which occurred during gameplay that subsequently led to players consulting macro-level resources in order to overcome these difficulties and

continue with a game. Further, a significant relationship was identified between gamer identity and macro-level involvement where those who identify more strongly as gamers were spent more time engaging in wider game-related activities (Section 7.2.2.5).

In relation to understanding micro-involvement, the survey reported in Chapter 7 also provided information relating to the preferences and habits of the different player groups (Section 7.2.1.3). There was evidence that those who identified as more hardcore gamers were increasingly likely to play games more often and for longer, especially in relation to playing PC games, console games and multiplayer games online. However, the frequency and duration of time spent on more casual platforms such as mobile phone or social network games, did not distinguish the player groups. Similarly, the factor analysis indicated that there was little difference in terms of playing for games with *high approachability*, though a preference for games that require greater familiarity with gaming conventions and more complex control systems was related to how strongly someone identified as a gamer. These findings provide some support to the claim made by Juul (2010), that casual games are more likely to appeal to players of all kinds but that hardcore games are more likely to appeal to hardcore players.

With respect to maintaining micro-level involvement, the findings presented in Section 6.2.3 highlight the importance of player agency and of overcoming breakdowns to achieve a sense of progress. The analysis of the case studies illustrates how breakdowns are a common part of gameplay which contribute to the challenges of gameplay. As the conceptual analysis in Section 4.1 indicates, feelings of competence and control are an integral part of player involvement that can be accounted for with reference to the DGEM *performative* frame. Similarly, in relation to flow (Csikszentmihalyi, 1990) involvement is seen to breakdown when the challenge is too difficult (leading to frustration) or too easy (leading to boredom). What the micro-level analysis adds to the previous literature is a consideration of how these experiences relate to learning. For instance, progress itself is not always an indicator that learning has occurred, unless it has been accompanied by an

understanding breakthrough (Section 6.2.3.6). These findings also have implications with respect to the design of games in educational contexts. For example, it would be important to ensure that situations do not occur where learners are able to proceed within the game without experiencing some form of conceptual change. The breakdown and breakthrough categories would also be useful for considering the design of commercial games, e.g. through comparing the occurrence of both during testing of prototype designs.

8.2.5 Involvement and learning

One of the main contributions of this thesis relates to its consideration of learning with respect to both micro and macro-level involvement. As the previous paragraph indicates, it is difficult to separate the implications of the findings without considering these issues in relation to each other. While the previous theories of motivation and engagement mentioned in Chapter 4 do consider certain social influences, e.g. recognition (Malone & Lepper, 1987), relatedness (Ryan et al., 2006) they do not explicitly consider involvement and learning beyond the experience of play. The DGEM can be used to consider learning on a *game level* (in the form of internalising the relevant frames) and it was particularly useful for drawing attention to how involvement manifests on a micro and macro-level. However, it was not able to account for the variety of learning experiences reported by participants. Further, although factors such as *community* can be considered with respect to the shared frame, it was not clear how to use the model to discuss the influence of *identity* on player involvement and learning. Figure 8.1 illustrates how micro and macro-involvement relate to the learning categories, which have been developed throughout the thesis, in order to account for these factors. In terms of how the framework relates to the other gaming capital themes: *competence*, *knowledge, motivation* and a sense of *community* are developed as a result of engaging in micro and macro-level practices. Meanwhile, *dedication* is reflected in the frequency and recency of iterations through the micro and macro-level cycles.

Considering learning on both a micro and macro-level in conjunction with the categories and themes reflects constructivist and socio-cultural accounts of learning. This is due to the findings that illustrate how learning is an active process (occurring *through play*) that also occurs within a wider socio-cultural context (through *interacting with others* and *with external resources*). The analysis of micro-involvement reported in Section 6.2 especially, shows how learning on a g*ame level* results from the experience of breakdowns and breakthroughs. These findings build upon the previous work carried out by Pelletier and Oliver (2006), Barr (2007), Ryan and Siegel (2009) and Sharples and colleagues (Anastopoulou et al., 2008; Sharples, 2009; Vavoula and Sharples, 2009) and provide a useful analytical tool for analysing episodes of gameplay from a HCI perspective. Further, they contribute to an in depth understanding of how different types of breakdowns and breakthroughs relate to each other. This understanding is manifested in the refined conjectures presented in Section 6.2.4 and discussed in Section 8.3 below.

The thesis builds upon work that examines gaming and learning within a wider context, e.g. Squire (2005b), Oliver and Carr (2009). However, the research was not focused on a distinct community of players (e.g. Nardi, Ly & Harris, 2009; examining *World of Warcraft* players) but on individual people who interacted with a range of games, people and resources to varying degrees. Rather than looking at how players interact on a micro and macro-level with respect to one specific game, the studies focused on player involvement with games in general. While this means that little can be said about how players learn to become members of a specific community of practice, the research provides insight into to how individuals engaged in a variety of practices across different game-related contexts.

In terms of these practices, there was evidence (in particular, the themes presented in Sections 5.2.2 and 7.1.15, the diary analysis in Sections 6.3 and 6.4, and the qualitative and quantitative survey results in Sections 7.1 and 7.2) of participation within the kinds of affinity groups/spaces and semiotic domains that Gee (2004; 2007) describes. However, the survey results indicate that it is more common for players to use, rather than

contribute to, resources or create their own. These wider activities relate to player identity in the sense that those who identify more strongly as gamers were more likely to interact with wider communities and resources. While Gee (2004) does stress the importance of identity with respect to learning, he does so in relation to how players identify with their avatars or characters rather than in terms of how they identify as gamers. In fact, there was very little evidence that players were reflecting on the relationship between their real and virtual identities in the way Gee describes (Section 6.3). The findings of this research highlight the importance of considering how people identify as players since their identity relates to how involved they are in gaming practices and how much they learn from their involvement.

The influence of gaming identity with respect to the use of games in educational contexts is something which requires further investigation, though the thesis does raise some important issues to consider. First, learning was seen to result from both micro and macro-level involvement so any use of games in a formal learning environment is likely to benefit from considering additional support in the form of resources and supporting discussions around gameplay. The difficulty is that it may be hard to provide this support in the way players may expect based on their usual gameplay activities, especially for those that identify strongly as gamers. Nonetheless, it would be possible to encourage the sort of reflection Gee (2004) describes by, for example, encouraging student discussion on the relationship between their virtual and real world identities. Second, the findings indicate that designers and practitioners not only need to consider exactly what kind of learning they want to support but also what kind of players their students are. For instance, Walsh (2010) was successful in improving the literacy skills of disengaged learners (who were also identified as gamers) by recognising the value of their experience and openly acknowledging their gaming capital. This approach may only be appropriate for those who identify more strongly as gamers however. Players who are less experienced and have less gaming capital are likely to be at a disadvantage. These

issues do not mean that games will not be successful in formal education, just that care needs to be taken when considering game-based learning approaches within education.

To sum up, the findings of the research indicate that while there are a variety of reasons people play games, their motivations are also influenced by discussions with other players and by the wider community in the form of paratexts. In addition to prior experience, these external influences lead to expectations of play on a micro-level and whether they are met or not will have consequences on player engagement. In particular, agency and progress are significant factors that play an integral role in maintaining a gameplay experience. While learning results from breakthroughs achieved during play, progress can occur without understanding. However, this is unlikely to be a satisfying experience for the player since they will not feel responsible for their actions. When stuck, there are a range of strategies players resort to, including consulting the wider community for help. Through interacting with paratexts, players not only learn how to overcome problems but also increase their knowledge of gaming. For certain players this is particularly important since interacting with the wider community means they are engaging with different forms of gaming practice. In particular, those who identify as hardcore gamers are more likely to be driven by achieving competence and more likely to participate within a specific community of practice, e.g. a World of Warcraft guild. For other players, while learning does occur on a macro-level, it may never reach the stage of full participation. Nevertheless, involvement with gaming can still lead to rewarding and valuable learning experiences which manifest on a *game*, *skill* and *personal* level.

8.3 Limitations and future research

In terms of the research conducted, a developmental approach was adopted where each phase built upon the previous one and where claims which emerged from the findings were assessed in the next. However, there are limitations that need to be addressed in each case. In Phase 1, the conceptual analysis presented (Section 4.1), where the DGEM was applied as an overarching framework, was not intended to serve as a comprehensive

review of existing models of engagement and motivation. The main purpose was to use a sample of frameworks to illustrate the overlaps that occur and to test the extent to which the DGEM was able to account for a range of factors that have been shown to support engagement and motivation. There were some external factors such as price (which came up in Sections 4.3.2 and 6.2.3) which were difficult to categorise under the DGEM. However, the most significant problem with regard to this research was the fact that the DGEM is unable to account for learning beyond *game level*. Nor is it able to capture the intricacies of player identity (these limitations were discussed further in Section 8.2.5).

With respect to the email interview study, the main limitation is that the learning categories and themes were developed on the basis of retrospective accounts of learning and involvement. The case studies in Phase 2 addressed this issue through the collection of observational data and the inclusion of diaries. Although diaries are also retrospective in nature, filling them in on a daily basis ensured that reports occurred closer in time to when they occurred thus improving their accuracy. However, while the observation and interview data allowed for a consideration of how learning occurred during play and the analysis revealed learning in the form of breakthroughs in understanding, specific learning outcomes were not explicitly assessed, e.g. through tests of cognitive abilities. This was because the main aim of the research was to explore potential relationships between involvement and learning, rather than to prove that learning had occurred through the use of pre and post-tests. Further, it is likely that learning on a *personal level* develops as part of a gradual process and so quite hard to assess in practice, e.g. even if a player makes repeated attempts at the same task, how do you measure whether general patience and persistence have developed as a result of this episode of gameplay? The learning categories developed were useful for analysing reports of learning but they were less useful for identifying learning that occurs in practice, particularly in relation to the *skill* and *personal levels*.

Assessing the evidence for each of the original set of conjectures presented in Section 6.2.3 and revising them as a result has helped contribute to a more nuanced understanding of how involvement and learning come together in practice. However, though the evidence regarding the claims about the different types of breakdown and breakthrough was substantial, future research studies are required to evaluate the refined claims and subject them to further testing. The list of refined claims is reproduced below:

I. Macro-level expectations are informed by prior experience, other players and the wider community.
II. Repeated micro-involvement depends on expectations being met, the promise of in-game rewards, and external factors such as the price of the game.
III. The unpredictability of outcomes leads to meaningful and compelling experiences only when the outcomes are interpreted as fair and consistent.
IV. Narrative and social context contribute to what makes a game play experience meaningful and compelling.
V. A lack of initial involvement will cause further breakdowns.
VI. Action and understanding breakdowns contribute to involvement when they lead to breakthroughs.
VII. However, involvement will be reduced when breakdowns take too long to overcome or have major consequences, e.g. a loss of progress.
VIII. Additionally, an involvement breakdown will occur if outcomes are not considered fair and consistent.
IX. Involvement breakthroughs occur when overcoming breakdowns leads to a sense of achievement.
X. Progress requires action breakthroughs, but not necessarily understanding.
XI. Action breakthroughs that occur without understanding (i.e. through trial and error), will be less satisfying.
XII. The experience of agency is necessary for maintaining involvement.
XIII. Recurring controller problems are an obstacle to the expression of agency.

XIV. Agency is reduced if players feel their actions do not have a meaningful impact within the game world.

Though this list does contribute to a deeper understanding of learning and involvement, it is important to note that the refined claims are not meant to represent conclusive findings. While they may apply to the cases investigated, there may be other instances where they do not. In accordance with Section 3.1, the claims are purposefully presented as a set of definitive statements in order to enable futher assessment of the conditions under which they apply. As stated by Aczel (1998), knowledge is warranted by the extent to which it is "tested critically" (p. 20); phrasing the claims as testable conjectures allows for a continuation of their critical assessment and for the elimintation of any erroneous ideas they may contain.

Future investigations would be able to evaluate this refined set of claims under a range of different circumstances e.g. with respect to different types of games, such as mobile games. Though an effort was made to investigate as wide a range of game playing experience as possible (through recruiting participants who differed in terms of age, gender and gaming identity), the range of games played within the lab were still all console games – the majority of which entailed controlling an avatar within a 3D environment. Further, it is clear from Section 6.2.3 that there is scope to further examine the influence of player expectation through studies which explicitly assess expectations before relating them to subsequent experiences of micro-involvement. Players could also be asked about whether they find outcomes to be unpredictable, in order to investigate how predictability relates to outcomes being interpreted as meaningful and/or compelling. In addition, it was often difficult to assess whether involvement had increased (or decreased) during the sessions, so another avenue of research may be to relate these claims to questionnaire which have been designed to measure specific aspects of the gaming experience.

In relation to the collection of physiological data, while this was not helpful for indicating breakdowns and breakthroughs, there is scope for further research to establish how these sorts of signals can be interpreted, e.g. in terms of identifying specific emotions. For those who wish to investigate this kind of data, Kivikangas et al., (2010) recommend an experimental approach using large groups of participants and/or less complex games. Further, any physiological signals collected should also be triangulated with interview (or questionnaire) and movement data. Finally, it is important to take into account the effect that observation may have on a player's reaction. This is because the signals will not only indicate how the player is responding to the game but how they are responding to being watched while they play the game.

Regarding the limitations of the case study data, it would not have been appropriate to make statistical generalisations about how player identity related to involvement on the basis of a limited number of case studies. The survey reported in Chapter 7 addressed this issue by investigating gaming habits and preferences, interactions with paratexts, player identity and opinions about learning from games on a wider scale. As noted previously, although an effort was made to recruit a range of people to fill in the survey, the fact that an opportunity sample of participants was recruited and a sizeable proportion of these chose the moderate gamer label may mean that the sample was not representative of the normal population. Essentially, although the survey did include people who do not play games very often it could have attracted more people that do. Further, it was a particularly well educated sample and all the participants involved across the studies were adults so the findings may not apply to children.

Thus there is scope to apply the survey, as well as the learning categories and themes to different contexts, e.g. different populations including younger players. The themes could also be used outside the context of informal learning to examine aspects of gaming culture. For example, the influence *competence* and player *identity* could be investigated in relation to learning within a classroom environment. While the studies provide evidence

of the wide range of learning experiences that result from gaming involvement, it is not clear how a player goes from solving a problem within a specific game, to developing general problem solving skills, to being able to view their life experience from different perspectives. Developing methods to assess how learning occurs in practice on each of these levels would be a useful contribution to the area, particularly in relation to examining the *skill* and *personal levels*.

With respect to gamer identity, there is a need to further examine the strategies different kinds of players are likely to adopt when encountering breakdowns during play. The survey results indicated that those who identify more strongly as gamers are less likely to give up during play but it would be worth establishing whether this occurs under controlled observation. Further research could investigate the strategies more experienced players use to overcome breakdowns in terms of how these differ from the strategies adopted by those with less gaming experience. It is also unclear how gamer identity relates to expertise, for instance, is it possible for someone to be a novice hardcore gamer? In addition, the conclusions presented apply to the context of informal learning so it is important to explore how they apply within formal education. In particular, it would be useful to assess whether gaming identity affects learning outcomes when games are being used within an educational context.

In terms of future research, there is some suggestion within the literature that Actor Network Theory is worth exploring as a way to investigate the connections between human and non-human actors within gaming networks (Pelletier, 2009; Jenson & de Castel, 2008b). As opposed to a communities of practice perspective or an Activity Theory approach, this would avoid the issue of trying to identify which particular communities (or activity systems) that players are involved in. Pelletier (2009) for instance, draws on Actor Network Theory in order to consider how technological objects, including games, are "enacted" rather than "embedded" in practices. The emphasis turns to "how a game comes into being as a result of the actions of individuals, institutions, or systems, how it

becomes, an object of meaning" and as such "one can examine how objects emerge as meaningful, and how subjects emerge as meaning-makers" (pp. 88-89). This thesis did not apply Actor Network Theory to the study of gaming but it did focus on exploring the connections between an individual player, the games they play, other players, paratexts and external resources, in order to indicate how a variety of involvement leads to different forms of learning.

8.4 Summary

This thesis investigated the relationships between motivation, engagement and informal learning within the context of digital games. A conceptual analysis and three separate studies were carried out to examine different aspects of learning and involvement and the relationship between them. The thesis not only contributes to knowledge but also provides analytical tools for examining gaming activities. The main empirical contributions relate to: (1) providing an account of how informal learning occurs as a result of micro and macro-involvement in gaming practices, summarised in the form of the *Gaming Involvement and Informal Learning Framework*, (2) a set of learning categories that indicate the range of learning experienced in this context, (3) developing an in-depth understanding of how breakdowns and breakthroughs relate to each other during play and how they affect learning on a micro and macro-level, and (4) highlighting the role of player identity in relation to learning and involvement, where the more strongly someone identifies as a gamer, the more likely they are to learn from their gaming experiences.

References

Aczel, J. (1998). *Learning equations using a computerised balance model: a Popperian approach to learning symbolic algebra*. Unpublished PhD thesis; University of Oxford, UK.

Aczel, J. (2006). Learning from interactions with software: a Popperian analysis. *International Journal of Learning Technology*, *2*(2), 159–184.

Anastopolou, S., Sharples, M., Wright, M., Martin, H., Ainsworth, S., Benford, S., Crook, C., et al. (2008). Learning 21st Century science in context with mobile technologies. *Proceedings of mLearn 08: the bridge from text to context*, October 7-10th, Wolverhampton, 12-19.

Baker, E.L., & Mayer, R. E. (1999). Computer-based assessment of problem solving. *Computers in Human Behavior*, *15*(3-4), 269–282.

Bampton, R., & Cowton, C. J. (2002). The e-interview. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 3 (2). Retrieved March 1st, 2012, from: http://www.qualitative-research.net/index.php/fqs/article/view/848/1842

Barr, P. (2007). *Video game values: Play as human-computer interaction*. Unpublished PhD thesis; Victoria University of Wellington, New Zealand.

Bentley, T., Johnston, L., & Von Baggo, K. (2005). Evaluation using cued-recall debrief to elicit information about a user's affective experiences. *Proceedings of the 17th Australian conference on Computer-Human Interaction (OZCHI)*, November 21-25th, Canberra, 1–10.

Bianchi-Berthouze, N., Kim, W., & Patel, D. (2007). Does body movement engage you more in digital game play? And Why? *Lecture Notes in Computer Science, Vol. LNCS 4738 . Berlin/Heidelberg: Springer*, 102–113.

Bogost, I. (2007). *Persuasive games: The expressive power of videogames*. Cambridge, MA: The MIT Press.

Bond, M., & Beale, R. (2009). What makes a good game?: using reviews to inform design. *Proceedings of the 23rd British Human Computer Interaction Conference,* September 1-5th, Cambridge, 418–422.

Bourdieu, P. (1984). *Distinction: A social critique of the judgement of taste*. Cambridge, MA: Harvard University Press.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience and school*. Washington, DC: National Academies Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Butler, J. (1999). *Gender trouble: Feminism and the subversion of identity*. New York and London: Routledge.

Caillois, R., & Barash, M. (2001). *Man, play, and games*. Chicago: University of Illinois Press.

Calleja, G. (2007a). Revising immersion: A conceptual model for the analysis of digital game involvement. *Situated Play*, 24–28.

Calleja, G. (2007b). *Digital game involvement*. Unpublished PhD thesis; Victoria University of Wellington, New Zealand.

Calleja, G. (2011). *In-Game: From immersion to incorporation*. Cambridge, MA: The MIT Press.

Calvillo-Gamez, E. H. (2009) *On the core elements of the experience of playing video games.* Unpublished PhD thesis; University College London, UK.

Calvillo-Gamez, E. H., Cairns, P., & Cox, A. L. (2010). Assessing the core elements of the gaming experience. In R. Bernhaupt (ed.), *Evaluating user experience in games: Concepts and methods* (pp. 47-72). London: Springer.

Carr, D. (2005). Contexts, gaming pleasures, and gendered preferences. *Simulation & Gaming*, *36*(4), 464–482.

Chatfield, T. (2010). *Fun Inc.: Why games are the 21st Century's most serious business*. London: Virgin Books.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159.

Consalvo, M. (2007). *Cheating: Gaining advantage in videogames*. Cambridge, MA: The MIT Press.

Consalvo, M. (2009). Hardcore casual: Game culture Return(s) to Ravenhearst. *Proceedings of the 4th International Conference on Foundations of Digital Games*, April 26-30th, Orlando, 50-54.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, *88*(4), 715-730.

Crawford, G. (2012). *Video gamers*. New York: Routeledge.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal performance*. New York: Harper and Row.

de Castell, S., Boschman, L., & Jenson, J. (2009). In and out of control: Learning games differently. *Loading...*, *2*(3). Retrieved March 1st, 2012, from: http://journals.sfu.ca/loading/index.php/loading/article/viewArticle/66

de Freitas, S. (2006). Learning in immersive worlds. *London: Joint Information Systems Committee.* Retrieved March 1st, 2012, from: http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf

de Freitas, S., & Oliver, M. (2006). How can exploratory learning with games and simulations within the curriculum be most effectively evaluated? *Computers & Education*, *46*(3), 249–264.

Douglas, Y., & Hargadon, A. (2000). The pleasure principle: immersion, engagement, flow. *Proceedings of the 11th ACM Conference on Hypertext and Hypermedia*, May 30th-June 3rd, San Antonio, 153–160.

Economics and Social Sciences Research Council. (2010). *ESRC Research Ethics Framework*. Swindon; ESRC.

Egenfeldt-Nielsen, S. (2006). Overview of research on the educational use of video games. *Digital Kompetanse*, *1*(3), 184–213.

Egenfeldt-Nielsen, S., Smith, J. H., & Tosca, S. P. (2008). *Understanding video games: the essential introduction*. New York and London: Routledge.

Elliott, H. (1997). The use of diaries in sociological research on health experience. *Sociological Research Online* 2(2). Retrieved March 1st, 2012, from: http://www.socresonline.org.uk/2/2/7

Engeström, Y. (1987). *Learning by expanding. An activity-theoretical approach to developmental research*. Helsinki, Finland: Orienta-Konsultit.

Entertainment Software Agency. (2011). *Essential Facts about the Computer and Video Game Industry*. USA. Retrieved March 1st, 2012, from: http://www.theesa.com/facts/pdfs/ESA_EF_2011.pdf

Field, A. P. (2009). *Discovering statistics using SPSS*. 3rd Edition. London: SAGE Publications Ltd.

Floyd, D., & Portnow, J. (2008). *Video games and learning*. Accessed March 1st, 2012, from: http://www.youtube.com/watch?v=rN0qRKjfX3s

Gabbard, J. L., Hix, D., Swan, J. E., & others. (1999). User-centered design and evaluation of virtual environments. *IEEE Computer Graphics and Applications*, *19*(6), 51–59.

Galloway, A. R. (2006). *Gaming: Essays on algorithmic culture*. University Of Minnesota Press: Minneapolis.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, *33*(4), 441–467.

Gee, J. P. (2004). *What video games have to teach us about literacy and learning*. New York: Palgrave Macmillan.

Gee, J. P. (2007). *Good video games+ good learning: Collected essays on video games, learning, and literacy.* New York: Peter Lang Publishers.

Green, C. S., & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature, 423*(6939), 534–537.

Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2004). Online computer gaming: a comparison of adolescent and adult gamers. *Journal of Adolescence, 27*(1), 87–96.

Habgood, M. P. J. (2007). *The effective integration of digital games and learning content*. Unpublished PhD thesis; University of Nottingham, UK.

Habgood, MP, Ainsworth, S., & Benford, S. (2005a). Intrinsic fantasy: motivation and affect in educational games made by children. Presented at the 12th *International Conference on Artificial Intelligence in Education*, 18th-22nd July, Amsterdam.

Habgood, MPJ, Ainsworth, S., & Benford, S. (2005b). Endogenous fantasy and learning in digital games. *Simulation & Gaming, 36*(4), 483–498.

Hamilton, R. J., & Bowers, B. J. (2006). Internet recruitment and e-mail interviews in qualitative studies. *Qualitative Health Research, 16*(6), 821-835.

Hazlett, R. (2008). Using biometric measurement to help develop emotionally compelling games. In K. Isbisiter & N.Schaffer (Eds.), *Game usability: Advancing the player experience* (pp. 187–205). Burlington, MA: Morgan Kaufmann.

Hazlett, R. L., & Benedek, J. (2007). Measuring emotional valence to understand the user's experience of software. *International Journal of Human-Computer Studies, 65*(4), 306–314.

Iacovides, I. (2009). Exploring the link between player involvement and learning within digital games. *Proceedings of the 23rd British Human Computer Interaction Conference*, September 1-5th, Cambridge, 418–422.

Interactive Software Federation Europe. (2010). *Video Gamers in Europe 2010*. Prepared by Gamevision Europe. Accessed March 1st, 2012, from: http://www.isfe.eu/sites/isfe.eu/files/video_gamers_in_europe_2010.pdf

Isbister, K., Höök, K., Laaksolahti, J., & Sharp, M. (2007). The sensual evaluation instrument: Developing a trans-cultural self-report measure of affect. *International Journal of Human-Computer Studies*, *65*(4), 315–328.

Iwata, S. (2008, April 25). *Financial Results Briefing for the 68th Fiscal Term Ended March 2008*. Accessed March 1st, 2012, from: http://www.nintendo.co.jp/ir/en/library/events/080425/06.html

Jenkins, H. (2001). *From Barbie to Mortal Kombat: Further reflections*. Playing by the Rules: The Cultural Policy Challenges of Video Games. October 26th-27th, Chicago. Accessed March 1st, 2012, from: http://culturalpolicy.uchicago.edu/papers/2001-video-games/jenkins.html

Jenson, J., & de Castell, S. (2005). Her own boss: Gender and the pursuit of incompetent play. *Proceedings of the 2nd Digital Games Research Association Conference*, June 16-20th, Vancouver.

Jenson, J., & de Castell, S. (2008a). From simulation to imitation: New Controllers, new forms of play. *Proceedings of 2nd European Conference on Games Based Learning*, October 16th-17th, Barcelona, 213-218.

Jenson, J., & de Castell, S. (2008b). Theorizing gender and digital gameplay: Oversights, accidents and surprises. *Eludamos. Journal for Computer Game Culture*, *2*(1), 15–25.

Joiner, R., Iacovides, I., Darling, J., Drew, B., Owen, M., Gavin, C., & Clibbery, S. (2007). Racing Academy: A preliminary evaluation of an online racing car simulation game for supporting students learning of engineering. Presented at the *12th Biennial Conference of the European Association for Research on Learning and Instruction* Aug 28th – Sept 1st, Budapest.

Joiner, R., Iacovides, J., Owen, M., Gavin, C., Clibbery, S., Darling, J., & Drew, B. (2011). Digital games, gender and learning in engineering: Do females benefit as much as males? *Journal of Science Education and Technology*, 20(2), 178-185.

Jones, A., & Issroff, K. (2005). Learning technologies: Affective and social issues in computer-supported collaborative learning. *Computers & Education*, *44*(4), 395–408.

Juul, J. (2005). *Half-real: Video games between real rules and fictional worlds*. Cambridge, MA: The MIT Press.

Juul, J. (2010). *A Casual revolution: Reinventing video games*. Cambridge, MA: The MIT Press.

Kafai, Y. B. (2006). Playing and making games for learning. *Games and Culture*, *1*(1), 36-40.

Kafai, Y., Franke, M., Ching, C., & Shih, J. (1998). Game design as an interactive learning environment for fostering students' and teachers' mathematical inquiry. *International Journal of Computers for Mathematical Learning*, *3*(2), 149–184.

Kallio, K. P., Mäyrä, F., & Kaipainen, K. (2011). At least nine ways to play: Approaching gamer mentalities. *Games and Culture*, *6*(4), 327-353.

Kirkpatrick, D. L. (1994). *Evaluating training programs: The four levels.* San Francisco: Berrett-Koehler Publishers.

Kirriemuir, J., & McFarlane, A. (2004). *Literature review in games and learning*. Futurelab series, Bristol: Futurelab. Retrieved March 1st, 2012, from: http://hal.archives-ouvertes.fr/docs/00/19/04/53/PDF/kirriemuir-j-2004-r8.pdf

Kivikangas, J. M., Ekman, I., Chanel, G., Järvelä, S., Salminen, M., Cowley, B., Henttonen, P., & Ravaja, N. (2010). Review on psychophysiological methods in game research. *Proceedings of 1st Nordic Digital Games Research Association Conference*, August 16th-17th, Stockholm.

Knowles, M. S. (1975). *Self-directed learning*. Parsippany, NJ : Globe Fearon

Ko, S. (2002). An empirical analysis of children's thinking and learning in a computer game context. *Educational Psychology*, *22*(2), 219–233.

Koster, R. (2005). *Theory of fun for game design*. Scottsdale, AZ: Paraglyph Press.

Kuutti, K. (1996). Activity Theory as a potential framework for Human-Computer interaction research. In B.A. Nardi (Ed.), *Context and consciousness* (pp. 17-44). Cambridge: MIT Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lenhart, A., Rainie, L., & Lewis, O. (2001). *Teenage life online: The rise of the instant-message generation and the Internet's impact on friendships and family relationships.* Pew Internet & American Life Project Washington, DC. Retrieved March 1st, 2012, from: http://www.immagic.com/eLibrary/ARCHIVES/GENERAL/PEW/P010620L.pdf

Lepper, M. R., & Malone, T. W. (1987). Intrinsic motivation and instructional effectiveness in computer-based education. In R. E. Snow & M. J. Farr (Ed.), *Aptitude, learning, and instruction, III: Conative and affective process analysis,* 255-286. Hillsdale, NJ: Lawrence Erlbaum Associates.

Lindley, C. A., & Sennersten, C. C. (2008). Game play schemas: From player analysis to adaptive game mechanics. *International Journal of Computer Games Technology*, *Vol. 2008*, 1-7.

Lindley, C. A., Nacke, L., & Sennersten, C. C. (2008). Dissecting play-investigating the cognitive and emotional motivations and affects of computer gameplay. *Proceedings of CGAMES 08,* Wolverhampton, 3rd-5th November, 1-9.

Livingstone, D.W. (2001). *Adults' Informal Learning: Definitions, Findings, Gaps and Future Research.* New Approaches to Adult Learning Working Paper No.21, University of Toronto, Canada.

Mackrill, T. (2008). Solicited diary studies of psychotherapy in qualitative research–pros and cons. *European Journal of Psychotherapy and Counselling*, *10*(1), 5–18.

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science*, *5*(4), 333–369.

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. *Aptitude, learning, and instruction, III: Conative and affective process analysis,* pp. 223-253. Hillsdale, NJ: Lawrence Erlbaum Associates.

Mandryk, R. L. (2005). *Modeling user emotion in interactive play environments: a fuzzy physiological approach*. Unpublished PhD thesis; Simon Fraser University, Canada.

Mandryk, R. L. (2008). Physiological measures for game evaluation. *Game usability: Advice from the experts for advancing the player experience* In K. Isbisiter & N.Schaffer (Eds.), *Game usability: Advancing the player experience* (pp. 207–235). Burlington, MA: Morgan Kaufmann.

Mandryk, R. L., & Atkins, M. S. (2007). A fuzzy physiological approach for continuously modeling emotion during interaction with play technologies. *International Journal of Human-Computer Studies*, *65*(4), 329–347.

Mandryk, R. L., & Inkpen, K. M. (2004). Physiological indicators for the evaluation of co-located collaborative play. *Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work*, November 6th-10th, Chicago, 102–111.

Mandryk, R. L., Atkins, M. S., & Inkpen, K. M. (2006). A continuous and objective evaluation of emotional experience with interactive play environments. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. April 22nd-27th, Montreal, 1027–1036).

Marsh, T., Wright, P., & Smith, S. (2001). Evaluation for the design of experience in virtual environments: modelling breakdown of interaction and illusion. *Cyberpsychology & Behavior*, *4*(2), 225–238.

Miller, D. J., & Robertson, D. P. (2010). Using a games console in the primary classroom: Effects of "Brain Training" programme on computation and self-esteem. *British Journal of Educational Technology*, *41*(2), 242–255.

Mitchell, A., & Savill-Smith, C. (2004). *The use of computer and video games for learning: A review of the literature.* Learning and Skills Development Agency, London: Ultralab. Retrieved March 1st, 2012, from http://gmedia.glos.ac.uk/docs/books/computergames4learning.pdf

Nardi, B. A., Ly, S., & Harris, J. (2007). Learning conversations in World of Warcraft. *Proceedings 40th Annual Hawaii International Conference on System Sciences.* January 2rd-6th, Waikoloa, Hawaii, 1-10.

Nintendo. (2011). *Consolidated sales transition by region*. Retrieved March 1st, 2012, from http://www.nintendo.co.jp/ir/library/historical_data/pdf/consolidated_sales_e1109.pdf

Ó Súilleabháin, G. (2008). Player transfer: How learning transfer and serious games answer serious (and transferable) questions about one another. *Proceedings of 2nd European Conference on Games Based Learning*, October 16th-17th, Barcelona, 349-356.

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods*, *32*(3), 396–402.

O'Neil, H. F., Wainess, R., & Baker, E. L. (2005). Classification of learning outcomes: Evidence from the computer games literature. *The Cirriculum Journal*, *16*(4), 455–474.

Oliver, M., & Carr, D. (2009). Learning in virtual worlds: Using communities of practice to explain how people learn from play. *British Journal of Educational Technology*, *40*(3), 444–457.

Papert, S. (1980). *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books.

Papert, S. (1998). Does easy do it? Children, games, and learning. *Game Developer Magazine,* June, 87-88.

Paras, B., & Bizzocchi, J. (2005). Game, motivation, and effective learning: An integrated model for educational game design. *Proceedings of the 4th Digital Games Research Association Conference,* September 1-5th, Brunel, London.

Pedhazur, E. J., & Schmelkin, L. P. (1991). 2nd edition. *Measurement, design, and analysis: An integrated approach*. Hillsdale, NJ: Lawrence Erlbaum.

Pelletier, C. (2009). Games and learning: What's the connection? *International Journal of Learning and Media*, 1(1), 83-101.

Pelletier, C., & Oliver, M. (2006). Learning to play in digital games. *Learning, Media and Technology*, *31*(4), 329–342.

Pillay, H., Brownlee, J., & Wilss, L. (1999). Cognition and Recreational Computer Games: Implications for Educational Technology. *Journal of Research on Computing in Education*, *32*(1), 203–16.

Pillay, H. (2002). An investigation of cognitive processes engaged in by recreational computer game players: Implications for skills of the future. *Journal of Research on Technology in Education*, *34* (3), 336-350.

Poole, S. (2004). *Trigger happy: Videogames and the entertainment revolution*. New York: Arcade Publishing.

Pratchett, R. (2005). *Gamers in the UK: Digital play, digital lifestyles*. BBC audience research, London. Retrieved March 1st, 2012, from: http://open.bbc.co.uk/newmediaresearch/files/BBC_UK_Games_Research_2005.pdf

Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.

Price, S., Sheridan, J. G., Falcao, T. P., & Roussos, G. (2008). Towards a framework for investigating tangible environments for learning. *International Journal of Arts and Technology*, *1*(3), 351–368.

Pring, R. (2000). The "false dualism"of educational research. *Journal of Philosophy of Education*, *34*(2), 247–260.

Randel, J. M., Morris, B. A., Wetzel, C. D., & Whitehill, B. V. (1992). The effectiveness of games for educational purposes: A review of recent research. *Simulation & Gaming*, *23*(3), 261.

Richardson, J. T. E. (1999). The concepts and methods of phenomenographic research. *Review of Educational Research*, *69*(1), 53-82.

Richardson, J. T. E. (2010). Conceptions of learning and approaches to studying among White and ethnic minority students in distance education. *British Journal of Educational Psychology*, *80*(4), 535–556.

Rieber, L. P., Luke, N., & Smith, J. (1998). Project KID DESIGNER: Constructivism at work through play, *Meridian*, *1*(1), 1-1.

Rogers, C. R. (1969). *Freedom to learn*. New York: Merill.

Rollings, A., & Morris, D. (2000). *Game architecture and design*. Scottsdale AZ: Coriolis Group.

Rutter, J. (2011). *Doing gaming on Twitter: Exploring 140 characters of digital gaming practice*. Keynote at the Under the Mask, June 3rd, University of Bedfordshire. Retrieved March 1st, 2012, from: http://kuleuven.academia.edu/JasonRutter/Papers/674984/Doing_gaming_on_Twitter_Exploring_140_characters_of_digital_gaming_practice

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78.

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, *30*(4), 344–360.

Ryan, W., & Siegel, M. A. (2009). Evaluating interactive entertainment using breakdown: Understanding embodied learning in video games. *Proceedings of the 4th Digital Games Research Association Conference*, September 1-5th, Brunel, London.

Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.

Schott, G. (2006). Agency in and around play. In D. Carr, D. Buckingham , A. Burn and G. Schott (Eds.) *Computer games: Text, narrative and play (*pp.133–148) Cambridge: Polity Press.

Schott, G. R., & Horrell, K. R. (2000). Girl gamers and their relationship with the gaming culture. *Convergence: The International Journal of Research into New Media Technologies*, *6*(4), 36-53.

Schott, G.R., & Kambouri, M. (2005). Social play and learning. In D. Carr, D. Buckingham , A. Burn and G. Schott (Eds.*) Computer games: Text, narrative and play* (pp. 119-132), Cambridge: Polity Press.

Sefton-Green, J. (2003). *Informal learning: substance or style?* Teaching Education, *14*(1), 37–51.

Shaffer, D. W. (2006). Epistemic frames for epistemic games. *Computers & Education*, *46*(3), 223–234.

Sharples, M. (2009). Methods for evaluating mobile learning. In G. Vavoula, N. Pachler, A. Kukulska-Hulme (Eds.) *Researching mobile learning: Frameworks, tools and research designs*, (pp. 17–39). Oxford: Peter Lang Verlag.

Siegel, S., & Castellan, N. J. (1989). 2nd edition. *Nonparametric statistics for the behavioral sciences*. New York: Mc-Graw-Hill.

Squire, K. (2002). Cultural framing of computer/video games. *Game Studies*, *2*(1).

Squire, K. (2005a). Changing the game: What happens when video games enter the classroom. *Innovate: Journal of Online Education*, *1*(6).

Squire, K. D. (2005b). Educating the fighter: buttonmashing, seeing, being. *On the Horizon*, *13*(2), 75–88.

Squire, K. (2008). Open-ended video games: A model for developing learning for the interactive age. In K. Salen (Ed.) *The ecology of games: Connecting youth, games, and learning* (pp. 167–198). Cambridge, MA: The MIT Press.

Stake, R. (1998). Case studies in Denzin, N.K., & Lincoln, Y.S. (Eds) *Strategies of Qualitative Enquiry*, (pp. 86-109). Thousand Oaks, CA: Sage.

Steinkuehler, C. A. (2004). Learning in massively multiplayer online games. *Proceedings of the 6th International Conference on Learning Sciences*, June 22nd-26th, Santa Monica, 521–528.

Stuart, K. (2011, November 18). Modern Warfare 3 smashes records: $775m in sales in five days. *Guardian*. Retrieved March 1st, 2012 from: http://www.guardian.co.uk/technology/2011/nov/18/modern-warfare-2-records-775m

Suits, B. (2005). *The grasshopper: Games, life and utopia*. Toronto, ON: Broadview Press.

Ulicsak, M., Wright, M., & Cranmer, S. (2009). *Gaming in families: A literature review* (pp. 1-34). Futurelab series, Bristol: Futurelab. Retrieved March 1st, 2012 from: http://archive.futurelab.org.uk/resources/documents/lit_reviews/Gaming_Families.pdf

Ullah, R., Richardson, J. T. E., & Hafeez, M. (2011). Approaches to studying and perceptions of the academic environment among university students in Pakistan. *Compare*, *41*(1), 113–127.

Usherwood, B., & Toyne, J. (2002). The value and impact of reading imaginative literature. *Journal of Librarianship and Information Science*, *34*(1), 33–41.

Vavoula, G. N., & Sharples, M. (2009). Meeting the challenges in evaluating mobile learning: A 3-level evaluation framework. *International Journal of Mobile and Blended Learning 1*(2), 54–75.

Vavoula, G. N., Lonsdale, P., Scanlon, E., Sharples, M., Jones, A., & Hardy, P. (2005). *Report on Mobile learning, science and collaborative acitivity.* EU Sixth Framework Programme, Information Society Technology, Kaleidoscope Network of Excellence. Deliverable D33.–2 for Jointly Executed Integrated Research Project (JEIRP), Mobile

Learning in Informal Science Settings. Retrieved from August 28th, 2012, from: http://halshs.archives-ouvertes.fr/view_by_stamp.php?&halsid=offkbt0u1u5n8roc942pav4f93&label=SHS&langue=fr&action_todo=view&id=hal-00190175&version=1

Walsh, C. (2010). Systems-based literacy practices: Digital games research, gameplay and design. *The Australian Journal of Language and Literacy*, *33*(1), 24-40.

Walsh, C., & Apperley, T. (2009). Gaming capital: Rethinking literacy. In *Proceedings of the Australian Association for Research in Education conference*, November 30th-December 4th, Brisbane.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. New York: Cambridge University Press.

Whitton, N. J. (2007). *An investigation into the potential of collaborative computer game-based learning in higher education*. Unpublished PhD thesis: Edinburgh Napier University.

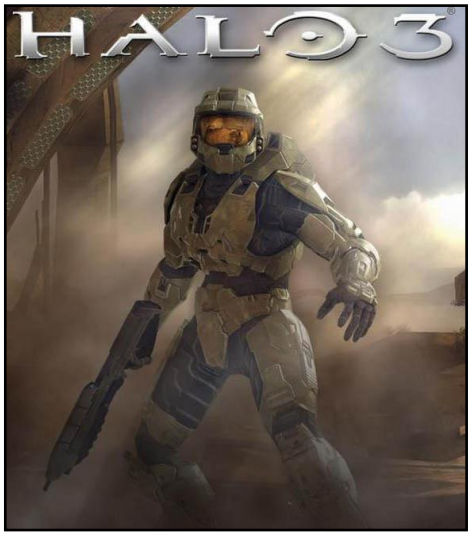
Yee, N. (2007). Motivations for play in online games. *CyberPsychology & Behavior*, *9*(6), 772–775.

Yin, R. K. (2009). *Case study research: Design and methods.* 4th edition. Thousand Oaks, CA: Sage.

Appendix 1: Recruitment poster

Do you play video games?

Whether it's half an hour on the Wii with the family or all-nighters playing Halo 3, I would like to ask some questions about your game-playing experiences.



I am PhD student from the Institute of Educational Technology who is interested in finding out more about why you play the games that you do, what factors affect these experiences and how you learn to play games. I need at least 20 adult participants to take part in a series of email interviews – with the main interview being split over two email sessions and the possibility of me following these up with a further question or two.

If you are interested in taking part please email me at: i.iacovides@open.ac.uk

Your participation would be much appreciated!

Many thanks

Jo Iacovides

Ext: 58848
Institute of Educational Technology
The Open University
Milton Keynes

Appendix 2: Sample of Gamer Profiles

First line shows where they were recruited from, age, gender, occupation and highest degree obtained.
Second line shows how often they play, when they play, for how long and platforms.
Second paragraph attempts to summarise whether the player is a gamer or not (and how much of one), what their main motivations seem to be, their feeling about violence in games, how social their game-playing is and what they think about learning within this context.

1. Henry

IET list, 38 yrs, M, Project officer, Bachelors
Frequency varies (everyday to nothing for weeks), evening/weekend and sometimes lunch/waiting (for casual), duration varies (casual 5-30mins, other 1-8hrs), multiplatform (next gen, iPhone, computer)

Gamer – self professed gamer, range of games and reasons, plays regularly, DNAprofile + playing with friends = evidence of community participation
Motivations – seems to prefer single RPGs but plays a range of games for different reason, main ones are escapism, challenge, story, affective experience, cerebral, sociala
Violence – ok if not realistic but also when playing with a friend in same room
Social – co-located, doesn't like online much
Learning – doesn't think he's learnt a lot but ranges from hand-to-eye coordination

2. Steph

PGSS list, 30 yrs, F, Student, Masters
Twice a year, holidays and travelling, 30-45mins, PC, Wii, in-flight consoles
Gamer – casual, rarely plays and not for long, not part of gaming community
Motivations – mainly plays for social reasons (even in the past when played more) and boredom
Social – no online but co-located play, some single player
Violence – doesn't like realistic violence but will play FPS for social reasons
Learning – reaction time, some knowledge, management and strategic skills

3. Tim

IET list, 53 yrs, M, Lecturer, Masters
Several times a week, evenings and weekends, 15-30mins, Xbox 360

Gamer – casual gamer even though he plays relatively regularly (though for shorter periods) as no interest in gaming community and plays only a small range of games
Motivation – main reason for playing is play with his son – adventure games mainly for fun, collaboration, helping his son develop
Violence – against it though justified in Lego games as unrealistic and humorous
Social – no online only co-located play, no single player
Learning – mentions this mainly in relation to his son – problem solving, patience, persistence, computer interface, tangential effects/transfer to real life (e.g. exploring, hitting)

4. Patrick

PGSS list (forwarded by girlfriend), 30 yrs, M, Research fellow, Doctorate
Daily, night/weekends, 2-3hrs, iPod Touch

Gamer – plays a lot and regularly and for longer sessions but iPhone platform and lack of range and social aspects imply he is more of a casual gamer, no mention of wider community
Motivations – mostly single player Fifa10 for entertainment and challenge
Violence – doesn't seem interested
Social – none, though would play if he knew others who did
Learning – brain training

5. John
IET list, 43 yrs, M, Research fellow, Masters
Once a month, 2 hrs, evening/weekends, PC mainly and Wii at friends

Gamer – states he is a casual gamer, doesn't play often (though for moderate periods of time), plays a range but doesn't mention many recent games, has friends who play and an awareness of the community, see them as a waste of time though enjoyable
Motivations –interest in strategy and casual games, mostly social though also fun, escapism and challenge
Social – some single play, mostly co-located, no online
Violence – no mention
Learning – not much

6. Adam
PGSS, 23 yrs, M, Student, Masters
Daily (but varies), 1-12hrs, evening/weekends (free time), PC and Wii mainly

Gamer – hardcore (but less so now), plays often, long periods, range of game and reasons, talk about games but not much, plays with others, awareness of community
Motivations – range of games but main interest are RPGs/shooters and also flash games with main reasons as procrastination, story, achievement and social
Social – single player, online (with friends) and co-located (though rare), not MMOGs
Violence – not mentioned
Learning – little content, more cognitive skills, hand-to-eye, teamwork

7. Sam
PGSS, 46 yrs, F, Student, Masters
Daily, evening/weekends, 2-3hrs, Sony PS2, PS3, PSP (brand loyalty)
Gamer – more serious, plays regularly, for longer intervals, range of games, and part of a (small, family) community
Motivations – preference for RPGS and Action, main reasons for play – social, story, challenge, relaxation
Social – online (WoW) with known (and presumably unknown) ppl and co-located play, little single player
Violence – not an issue but seems to prefer fantasy to realistic (though likes beat-em ups)
Learning – social (observation), tangential learning, learning about yourself

8. Kareem
Fwd, 22 yrs, M, Bartender, GNVQ
Daily, 2-24hrs, night/days off, multiplatform

Gamer – hardcore, plays often for very long periods, plays with others, talks about games often, awareness of community (ex pro-gamer)
Motivations – range of games for story, social, exploration, achievement
Social – online (known and unknown), co-located, not much single-player
Violence – no problem with it
Learning – not much, some history but a lot depends on reflexes

Appendix 3: Research protocol

For all sessions, check:

1) Batteries for controllers and encoder
2) Camera angles
3) Audio recorder backup

Session 1

1) Welcome participant and thank them for coming along
    a. Did they bring along a game and their saved progress? (as discussed via email)
2) Discuss consent form and information sheet (which has previously been emailed to participant)
    a. Any questions or concerns?
    b. Is the process clear?
3) Make sure consent form has been signed
4) Explain what will happen today
    a. Run through gaming diary, questionnaires, have a brief chat about games and what you want to play, introduce the sensors then carry out a short observation and interview to familiarise them with the process.
    b. Remind them they can take a break
5) Gaming diary
    a. Explain that this is supposed to be kept over three weeks
    b. Please try and record as many of the gaming activities (and gaming related ones) as you are involved in, whether this is on a daily, weekly or even monthly basis
    c. Idea is to record something as soon as possible after it happens, so probably a good idea to keep the diary with you during the day
    d. Run through the prompts with them to see if they all make sense
    e. They will get the voucher once the diary has been handed in
6) Fill in gaming questionnaire
7) Discuss questionnaire
    a. What sorts of games you usually like playing
    b. What sorts of games you don't like playing or don't really play
8) Refer to consent form
    a. Are there any games you won't play?
    b. Would you mind explaining your objections to these games?
9) Would you say you are a gamer or not?
    a. Please elaborate
10) What consoles do you own and regularly play? Other platforms?
    a. Is console X (what they have told you they want to play through email) your main gaming console?
    b. What game have you brought to play?
    c. How far along are you?
    d. Why did you bring this game? What do you like about it?
    e. Do you think you will bring this game to the next session or will you have finished it by then? Ok if so,
11) Explain the observation session
    a. Today, just a short version of what we'll do next week to familiarise them with the process (about half an hour in total with 15 mins game-play and up to 15 mins interview with pre and post baseline though this will be longer during next two sessions)
    b. Introduce the sensors
12) Main session

a. Set everything up (sensors and installing saved game)
b. Ask if they want someone else in the room at this point?
c. Ask them if they feel comfortable applying them – with advice (provide room if not)
d. Tell them you will be observing in a different room but if there are any problems they just need to raise their hand and I will come in
e. Take baseline readings (leave room for 3 mins)
f. Come back, start game and computer recording (leave room)
g. After 15mins, come back and stop recording, take post baseline (leave room 3 mins)
h. Come back and remove sensors
i. Ask if they would like a drink and some biscuits
j. Post-play interview
    i. Did you enjoy playing? Please elaborate
    ii. Go through game

13) Ask if they have any questions or concerns
    a. Remind them they can get in touch with you at any point
    b. Arrange a time for next week
    c. Thank them for their time and participation

Session 2

1) Welcome participant and thank them for coming along
    a. Did they bring along a game and their saved progress? (as discussed last week)
2) Explain what will happen today – similar to the latter half of last week's session but longer gaming session
    a. If they want a break at any point, please do just say
3) What game have you brought to play?
    a. How far along are you?
    b. Why did you bring this game? What do you like about it?
4) Explain the observation session
    a. This time I would like you to play for at least half an hour (up to hour) but please raise your hand if you want to stop at any point – the interview will depend on how long you play for but we will have a break before then
5) Main session
    a. Set everything up (sensors and installing saved game)
    b. Ask if they want someone else in the room at this point?
    c. Ask them if they feel comfortable applying them – with advice (provide room if not)
    d. Take baseline readings (leave room for 3 mins)
    e. Come back, start game and computer recording (leave room)
    f. After 30-60 mins, come back and stop recording, take post baseline (leave room 3 mins)
    g. Come back, remove sensors
    h. Ask if they would like a drink and some biscuits
    i. Post-play interview
        i. Did you enjoy playing? Please elaborate
        ii. Go through game
6) Ask if they have any questions or concerns
    a. Remind them they can get in touch with you at any point
    b. Arrange a time for next week for the final session
7) Thank them for their time and participation

Session 3

1) Welcome participant and thank them for coming along

2) Explain what will happen today – similar to the latter half of last week's session but this time I am going to suggest a game and console for them to play
    a. If they want a break at any point, please do just say
3) Suggest a title for the participant
    a. Have you played this before?
    b. Are you ok with this game?
    c. Provide alternatives until one they haven't played and one they are comfortable playing is found
4) Explain the observation session
    a. Again I would like you to play for at least half an hour (up to hour) but please raise your hand if you want to stop at any point – the interview will depend on how long you play for but we will have a break before then
5) Main session
    a. Set everything up (sensors)
    b. Ask if they want someone else in the room at this point?
    c. Ask them if they feel comfortable applying them – with advice (provide room if not)
    d. Take baseline readings (leave room for 3 mins)
    e. Come back, start game and computer recording (leave room)
    f. After 30-60 mins, come back and stop recording, take post baseline (leave room 3 mins)
    g. Come back and remove sensors
    h. Ask if they would like a drink and some biscuits
    i. Post-play interview
        i. Did you enjoy playing? Please elaborate
        ii. Go through game
6) Ask if they have any questions or concerns
    a. Remind them they can get in touch with you at any point
    b. Arrange a time for next week for them to hand over diary and to receive their voucher
7) Thank them for their time and participation

Appendix 4: Information sheet and consent form

Dear Participant

The main goals of this research are to explore the concepts of motivation, engagement and informal learning within the context of playing games and to develop methods for examining the process of game play.

Participating in the study will involve three separate gaming sessions within the lab. Over the three week course of the study, you will also be asked to keep a diary of your gaming and gaming related experiences outside of the lab. The process of keeping the diary will be explained to you in more detail during your first session. The gaming sessions will last between 2-3 hours and will involve filling in two mood questionnaires, being observed playing a game and then being interviewed about your game-play.

In the first two sessions you will be asked to play a game of your choice, while in the third I will ask you to play something you have not played before. You are free to refuse any suggestions but I would like to take this opportunity to ask you whether there are any specific games or types of games you would rather **not** play?

Games you won't play:	

Further, are there any health related issues you think I should be aware of? E.g. history of epilepsy.

Health issues:	

Prior to the game-play, sensors will be applied to collect physiological data such as heart rate and skin conductance. The first session will be a shorter introductory one, and will also include filling in a background questionnaire. The process of keeping a diary will be explained and the sensors will be introduced to you but please feel free to raise any questions or concerns you may have at any point. During each session you will be asked to place the sensors with the assistance of the researcher or a member of technical staff.

While you will not need to remove any clothing during the process, a private room can be provided if you would prefer it. As part of the initial session, you will be asked to play a game of your choice for 15 minutes while physiological readings are recorded. You will be asked to fill in mood questionnaire before and after the game-play episode. The session will conclude with a short post-play interview, where you will review a recording of your game-play with the researcher.

For each session, separate video recordings will be taken of the game-play and of you playing the game. Further, your physiological responses will also be recorded. In the longer sessions, you will be provided with biscuits and your choice of tea, coffee or soft drink during the break between the gaming session and the post-play interview. After the third session is complete and you have handed in your gaming diary, you will be given a £15 Amazon voucher to thank you for participating in the study.

Any personal information you provide over the course of the study will be kept confidential and will only be accessible to members of the project team. Other data from you will be anonymised and stored separately from the personal data. You are free to withdraw from the study at any time and if you chose to do so before the point of data aggregation (planned to start July 12th 2010) any data provided by you will be destroyed. Otherwise, all original research data will be stored in secure conditions. The study and findings will be reported in a thesis while summaries may be published in other forms e.g. journal articles and conference papers. This may also include presenting recorded video extracts of the games you played and of your physiological recordings at events such as conference or seminars, though again this data will be anonymised.

If you are happy to take part in this research, please confirm that your consent by printing your name and signing below:

Name:	
Signature:	
Date:	

Finally, it was mentioned earlier that video recordings will be taken of you actually playing the game within the lab. Extracts of these recordings may be used to illustrate the research in future presentations such as conferences, or for training purposes. If you consent to this use, please sign below. You are free to withdraw this consent at any time by contacting me.

Signature:	
Date:	

If you have any further questions or concerns please do not hesitate to contact me through email (i.iacovides@open.ac.uk) or telephone (ext. 58848).

If you would like to speak to another member of my supervisory team about this research study please contact James Aczel (j.c.aczel@open.ac.uk) Eileen Scanlon (e.scanlon@open.ac.uk) or Will Woods (w.i.s.woods@open.ac.uk).

Many thanks

Jo Iacovides

PhD student
Institute of Educational Technology
The Open University
Milton Keynes

Appendix 5: Gaming questionnaire

The questionnaire focuses on your experiences of playing computer and video games. All responses will be anonymised and kept confidential. We ask for your name, only so that we can match the questionnaire to other data collected.

1. Name		
2. Age		
3. Sex	Male	Female

Circle your response for each question below and please do not leave any blank.

4. What age did you start playing video games?

Under 5	5-7	8-10	11-13	14-16	16-18	18 or above

5. In an average month, how often do you play video games?

Less than once a month	Once a month	Several times a month	Weekly	Several times a week	Daily

6. On average, approximately how long does a typical gaming session last?

0 hour	½ hour	1 hour	2 hours	3 hours	4 hours	5 hours	Over 5 hours

7. Do you regularly use any of the following gaming platforms?

		Yes	No
a	PC/laptop		
b	Nintendo Wii		
c	Nintendo DS		
d	Sony Playstation 3		
e	Sony Playstation 2		
f	Sony PSP		
g	Microsoft Xbox 360		
h	Mobile phone		
j	Other – please state		

8. Which of the following types of video games do you play?

		Often	Some times	Never
a	Action & Shooter e.g. Call of Duty, Grand Theft Auto			
b	Adventure e.g. Lego Indiana Jones, Mystery Case Files			
c	Arcade & Platform e.g. Mario Party, Little Big Planet			
d	Board, Card and Casino e.g. Scrabble, Poker			
e	Children's e.g. Peppa Pig, Pokemon			
f	Education & Reference e.g. French Coach, Cooking Guide			
g	Fighting e.g. Street Fighter, Super Smash Bros Brawl			
h	Music & Dancing e.g. Just Dance, Guitar Hero			
i	Puzzle e.g. Brain Training, Bejewelled			
j	Quiz & Trivia e.g. Buzz, Who Wants to be a Millionaire?			
k	Racing e.g. Gran Turismo, Mario Kart			
l	Role Playing e.g. World of Warcraft, Mass Effect			
m	Simulation e.g. Sims, Tom Clancy's H.A.W.X.			
n	Sports e.g. Fifa 10, Wii Fit			
o	Strategy e.g. Total War, Civilization			
p	Other – please state			

9. In the space provided below could you please provide an example of each type of game you play? You can also list any games you are unsure about how to categorise here.

Appendix 6: Gaming diary booklet

The purpose of this diary is to keep track of your gaming and gaming related activities. Your responses can be as long or short as you like but do try and record as many activities that you engage in as possible. If you need more space, please use the extra sheets provided in your pack. If there are days that you do not play any games or do anything game-related, just put "no" in the space provided. All responses will be anonymised and kept confidential. We ask for your initials, only so that we can match the diaries to other data collected.

Please remember to:

Fill in your diary every day

Make a note of the date and time of each entry

Answer all questions from pages 1-4

Bring in your diary to the next session

Initials	
Date	

1. Did you play any games today?

I'd be interested in things like why you chose the game, when you played, for how long, how far you got, if you played with anyone else and how much you enjoyed playing.

2. Did you speak to anyone about games today?

I would like to know about who you talked to, what you talked about and whether this was in person or online etc.

3. When playing, did you get stuck at any point? If so what did you do?

Please describe the situation and whether you got help from someone you know or from an external source (such as a guide or walkthrough).

4. Did you use or contribute to any types of gaming resource?

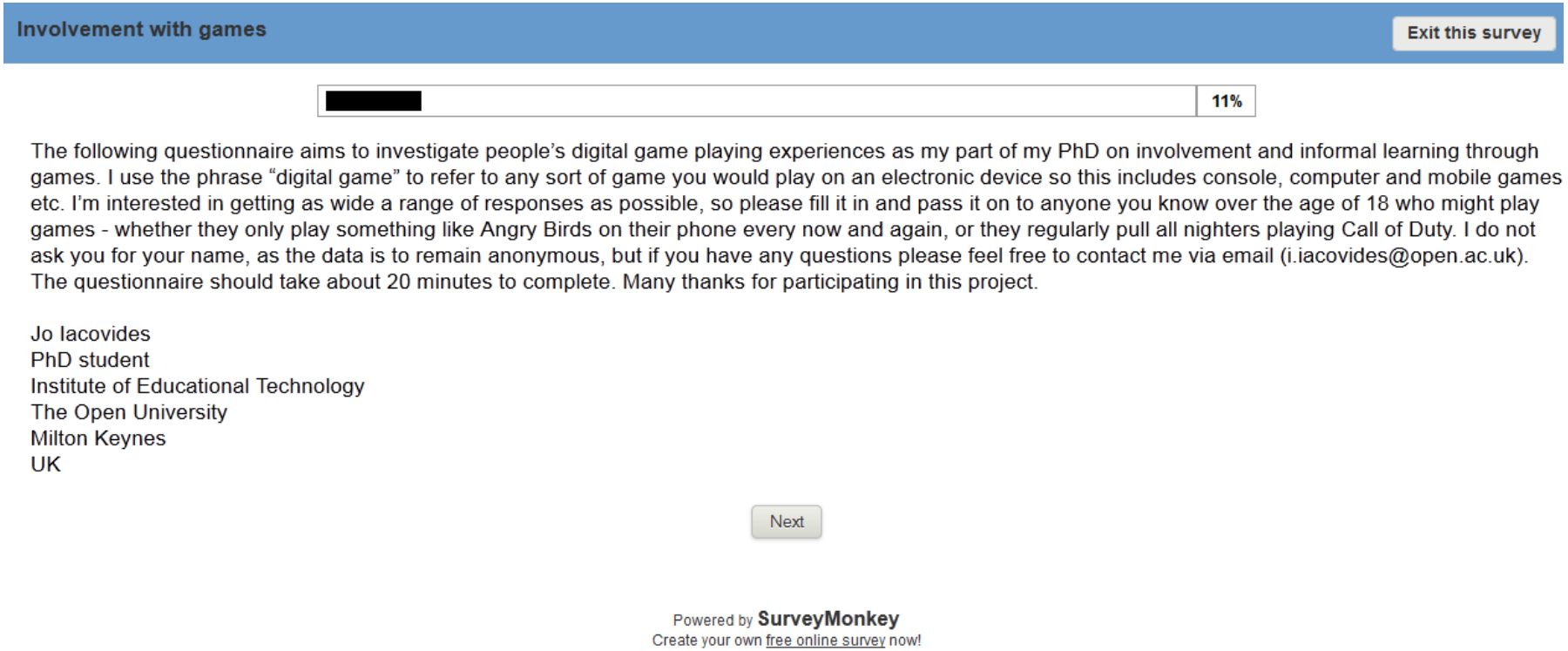
This could be in the form of blogs, magazines, forums, mods etc.

5. Do you think you have learnt anything from playing games and/or the game-related activities you engaged in today?

Please try and elaborate with specific examples.

6. Is there anything else you would like to write about that you think might be relevant to the study?

Appendix 7: Questionnaire (screenshots)



Background information

Exit this survey

22%

*1. How old are you?

*2. Please select your gender

*3. Please select the highest level of education completed so far? If your answer is not available please select the closest option.

*4. At what age did you first start playing digital games?

*5. In an average week, how much time would you say you spend on the following leisure activities:

	None	5 hours or less	6-14 hours	15 hours or more
Going to the cinema				
Reading newspapers and magazines				
Playing sports/exercising				
Reading books				
Watching DVDs				
Playing digital games				
Listening to the radio				
Listening to music on CD/iPod/other music player				
Watching TV				
Socialising with friends/family				
Surfing the internet				

Prev Next

Genres

Exit this survey

33%

*** 6. How likely are you to play:**

	Definitely not	Highly unlikely	Somewhat unlikely	Somewhat likely	Highly likely
Action/Adventure e.g. Lego Star Wars, Uncharted	○	○	○	○	○
Board & card games e.g. Solitaire, Scrabble	○	○	○	○	○
Education & Reference e.g. Brain Training, My Cooking Mama	○	○	○	○	○
Exercise games e.g. Wii Fit, EA Sports Active	○	○	○	○	○
Fighting e.g. Soul Calibur, Marvel vs. Capcom	○	○	○	○	○
Music & Dancing e.g. Guitar Hero, Just Dance	○	○	○	○	○
Party games e.g. Mario Kart, Rayman Rabbids	○	○	○	○	○
Platformers e.g. Little Big Planet, Super Mario Galaxy	○	○	○	○	○
Puzzle e.g. Bejewelled, Mystery Case Files	○	○	○	○	○
RPGs e.g. Mass Effect, World of Warcraft	○	○	○	○	○
Quiz & Trivia e.g. Buzz, Who Wants to Be a Millionaire	○	○	○	○	○
Shooter e.g. Call of Duty, Halo	○	○	○	○	○
Simulation e.g. Gran Turismo, Tom Clancy's H.A.W.X.	○	○	○	○	○
Sports e.g. Fifa, Tiger Woods PGA Tour	○	○	○	○	○
Strategy e.g. Civilization, StarCraft	○	○	○	○	○
Virtual life e.g. The Sims, Farmville	○	○	○	○	○


Are you a gamer?
Exit this survey
44%
✱7. Would describe yourself as:
A casual gamer
A moderate gamer
A hardcore gamer
I would not describe myself as a gamer
I don't understand the categories
✱8. Please explain the choice you made in the previous question:
Prev
Next
Powered by SurveyMonkey
Create your own free online survey now!

Gaming activities

Exit this survey

56%

In the following questions "console" refers to video games consoles such as the PlayStation, Wii or Xbox, and "handheld console" refers to portable game devices such as the Gameboy, DS or PSP. "PC/Mac games" refer to games that you have to install directly on to your computer to play, and so does not include "social network games" (which you play via a social network like Facebook) and "browser based games" (which you play via your internet browser).

***9. During the last 12 months, how often have you played with or against:**

	Never	Once a month or less	Several times a month	Several times a week	Daily
Partner or spouse	○	○	○	○	○
Family	○	○	○	○	○
Friends	○	○	○	○	○
People you don't know (e.g. online, or at a competition)	○	○	○	○	○

***10. During the last 12 months, how often have you played:**

	Not at all	Once a month or less	Several times a month	Several times a week	Daily
Social network games e.g. Farmville	○	○	○	○	○
Browser based games e.g. via Kongregate.com	○	○	○	○	○
PC/Mac games	○	○	○	○	○
Console games	○	○	○	○	○
Handheld console games	○	○	○	○	○
Mobile phone games	○	○	○	○	○

***11. During the last 12 months, how often have you played:**

	Not at all	Once a month or less	Several times a month	Several times a week	Daily
Single player games	○	○	○	○	○
Single player games with others (taking turns)	○	○	○	○	○
Multiplayer games (online)	○	○	○	○	○
Multiplayer games (in the same room as the people you are playing with)	○	○	○	○	○

*12. On average, how long does a session last when you play:

	N/A	Less than 30 mins	30mins-1hr	1-2hrs	2-3hrs	3-4hrs	4-5hrs	more than 5hrs
Social network games e.g. Farmville	○	○	○	○	○	○	○	○
Browser based games e.g. via Kongregate.com	○	○	○	○	○	○	○	○
PC/Mac games	○	○	○	○	○	○	○	○
Console games	○	○	○	○	○	○	○	○
Handheld console games	○	○	○	○	○	○	○	○
Mobile phone games	○	○	○	○	○	○	○	○

*13. On average, how long does a session last when you play:

	N/A	Less than 30 mins	30mins-1hr	1-2hrs	2-3hrs	3-4hrs	4-5 hrs	more than 4hrs
Single player games	○	○	○	○	○	○	○	○
Single player games with others (taking turns)	○	○	○	○	○	○	○	○
Multiplayer games (online)	○	○	○	○	○	○	○	○
Multiplayer games (in the same room as the people you are playing with)	○	○	○	○	○	○	○	○

*14. During the last 12 months, how often have you:

	Not at all	Once a month or less	Several times a month	Several times a week	Daily
Hacked a game or gaming platform	○	○	○	○	○
Listened to gaming related podcasts	○	○	○	○	○
Writen your own game related fan fiction	○	○	○	○	○
Read other people's game related fan fiction	○	○	○	○	○
Created your own user-generated content (including mods)	○	○	○	○	○
Played other people's user-generated content (including mods)	○	○	○	○	○
Contributed to a gaming forum, blog or website	○	○	○	○	○
Visited a gaming forum, blog or website	○	○	○	○	○
Read or watched game reviews/previews	○	○	○	○	○
Watched a game trailer	○	○	○	○	○

Getting stuck

Exit this survey

67%

✱15. If you get stuck during play, how likely are you to:

	Definitely not	Highly unlikely	Somewhat unlikely	Somewhat likely	Highly likely
Ask someone present for help/advice	○	○	○	○	○
Keep trying for a while	○	○	○	○	○
Consult the manual	○	○	○	○	○
Refer to a game-guide (published book)	○	○	○	○	○
Go to someone specific for help/advice	○	○	○	○	○
Look online for help/advice (forums, guides)	○	○	○	○	○
Use a written or video walkthrough	○	○	○	○	○
Take a break and come back later	○	○	○	○	○
Use a cheat code or hack	○	○	○	○	○
Give up on the game	○	○	○	○	○
Use in-game hints	○	○	○	○	○
Ask someone else to play the section of the game for you	○	○	○	○	○

Prev Next

What do you get out of games?

Exit this survey

78%

✱16. Please state how far you agree with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagre	Agree	Strongly agree	I don't know what this means
I'm not very good at a lot of games	○	○	○	○	○	○
Games have taught me to keep trying no matter what	○	○	○	○	○	○
I have picked up some general knowledge from games	○	○	○	○	○	○
I don't think games have helped me to develop my general problem solving skills	○	○	○	○	○	○
I worry that I spend too much time on games	○	○	○	○	○	○
I feel like I am part of a wider gaming community (beyond the people I tend to play with)	○	○	○	○	○	○
I have never empathised with a game character	○	○	○	○	○	○
I like to discuss different gaming strategies	○	○	○	○	○	○
I think games have helped me to develop better hand-to-eye coordination	○	○	○	○	○	○
I try to reflect on mistakes I make within a game and not to repeat them	○	○	○	○	○	○
I don't like talking about different games and genres	○	○	○	○	○	○
I have different reasons for playing different types of games	○	○	○	○	○	○
All I have ever learnt from games is how to play them	○	○	○	○	○	○

✱17. Please state how far you agree with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagre	Agree	Strongly agree	I don't know what this means
Other people ask me for help with games	○	○	○	○	○	○
Certain game-play experiences have affected who I am as a person	○	○	○	○	○	○
I don't think it is possible for games to be art	○	○	○	○	○	○
I often think games are a waste of time	○	○	○	○	○	○
If I come across interesting facts in a game I sometimes look them up to find out more	○	○	○	○	○	○
I think playing games with others has helped me develop my general collaborative skills	○	○	○	○	○	○
I regularly pwn other players	○	○	○	○	○	○
I like to consider a game from the designer's point of view	○	○	○	○	○	○
Games are usually just a bit of fun	○	○	○	○	○	○
I finish most of the games I start playing	○	○	○	○	○	○
I sometimes compare myself to the character I am playing	○	○	○	○	○	○
I'm not interested in the latest gaming news and developments	○	○	○	○	○	○
I like to watch and learn how to play from others before I try a new game in a social situation	○	○	○	○	○	○

Prev Next

Learning and games Exit this survey

89%

18. Apart from learning how to play or beat the game, do you think you have learned anything from your involvement with digital games? Please give your thoughts or an example.

Prev Next

Appendix 8: Platform invite

What exactly do people get out of playing games?

Over the last few years, video games have become increasingly popular with a variety of audiences. We still have first-person shooters and adventure games for our PCs and the latest games consoles. But there is more than that. Plenty of families can now be found in their living rooms, waggling their Wiimotes as they play together. Add that to Farmville on Facebook and Angry Birds on our mobile phones – and it seems that games have exploded into the mainstream.

There has been a lot of interest in academia about how we can harness this popularity for educational purposes, but my particular interest concerns the games we play during our leisure time. More specifically, I want to further our understanding of how and what we learn from our involvement with games and to consider exactly what it is we seem get out of our game-playing experiences.

If you'd like to help me out with my study, please click the following link to fill in my questionnaire: https://www.surveymonkey.com/s/involvement_games. It's about different kinds of game-play experiences – so whether you only play something like Angry Birds on your phone every now and again, or you regularly pull all-nighters playing Call of Duty, do please fill it in. I'm interested in getting as wide a range of responses as possible, so feel free to pass this on to anyone you know, over the age of 18 and in the UK, who might play games. It should take about 20 minutes to complete. Your participation would be much appreciated.

Jo Iacovides (i.iacovides@open.ac.uk)

PhD student
Institute of Educational Technology
The Open University

Appendix 9: List of important episodes and issues

Title	Description
Matt – Silent Hill	
1.1 Lost and confused in the nightmare world	Re-occurring issue In the nightmare realm, Matt is generally a bit confused about which direction he is supposed to go in and how he is supposed to avoid the monsters he encounters. While he develops certain strategies during the process, he leaves the area unsure about how he got out exactly.
1.2 Musical puzzle	Episode [22.15-28.29] Within the nightmare realm, he enters a closed off area where he has to solve a musical puzzle (by replaying a tune he hears on a toy in the room) before he can proceed in the game. He has some difficulty getting it right but eventually succeeds through trying out various combinations of sounds.
1.3 Side stories	Underlying issue While Matt is initially interested in investigating strange objects and finding out about what's going on in Silent Hill he loses interest by the end of the session, especially once he realises he can only be harmed in the nightmare realm sections of the game.
1.4 Observation	Episode [37.09-40.05] During psychiatrist session when being asked personal questions about how he behaved at high school, Matt became more aware that he was being observed. While he enjoyed the episode: "it got personal. And I kinda liked that as well", he also said he became aware of being watched at this point.
Matt – Sam & Max	
2.1 Tutorial	Episode [00.47-10.10] Matt chooses to play the tutorial first but soon grows bored with it as he found the instructions too obvious. This makes him apprehensive about what the main part of the game will be like.
2.2 Driving mini-game	Episode [46.03-47.53] Matt decides to get into Sam & Max's car to further explore and finds himself in some sort of driving mini-game. He is unable to work out what he is supposed to do however and after playing around a little he soon gives up and goes back to the main game.
2.3 Knocking out Whizzer	Episode [51.36-1.01.07] After realising that he need to knock out one the Soda Poppers to "unhypnotise" them, Matt goes back to Bosco's store to try and knock Whizzer out, but has some trouble trying to figure out how to do this exactly. He adopts numerous strategies, and eventually clicks on the bathroom door, starting a chain of events which lead to him being able to solve the puzzle.
Katy – Zelda	
3.1 Wiimote controller	Reoccurring issue Katy has some issues with the Wiimote controls. Given her familiarity with the game, this is more likely a sensitivity issue than her ability to use the controller. She generally keeps trying until she is able to perform the task she wants.
3.2 King Bulbin on the bridge	Episode [21.47-24.29] During bridge boss fight dies 3x and has some trouble beating the King Bulbin. She seems to know what strategy to adopt so most of the issues are around being able to successfully carry them out, which she does after repeated attempts.
3.3 Getting past the steam vent	Episode [37.36-40.40] Initially assuming she can't go past the vent, Katy tries numerous strategies, including back tracking, before eventually realising that she must have to go in that direction and that she is able to climb past the vent.
3.4 Relating to Link	Underlying issue Throughout the interview Katy refers to different Zelda storylines and characters within the game and often showing empathy towards the characters. This appears to reflect a deep involvement with the series that extends beyond game-play into Zelda related role-playing.
Katy – Kameo	

4.1 Storyline	Underlying issue While Katy is interested in the story she soon dismisses the idea that it is particularly complex.
4.2 Dealing with the flame monsters	Reoccurring issue Katy has trouble defeating the flame monsters, and mistakenly assumes they are invincible for a while. She eventually realises they can be killed and develops different strategies to defeat them.
4.3 Fighting the glass-jawed boss	Episode [35.38-38.42] Katy encounters a boss in the form of a large troll who can shoot lightning bolts along the ground. She initially has a little difficulty figuring out the correct strategy but after trying out different options, she manages to figure out an effective combination of attacks.
Linda – Lego Indiana Jones 2	
5.1 Driving vehicles	Reoccurring issue Linda has a lot of trouble driving vehicles within the game. She discusses the difficulty she has with controlling them, but also mentions her daughter having similar problems (though they have fun driving anyway): “Victoria’s, just as bad as me at steering them. When we’re both in a car, we kept smashing into each other, in the end we’re just laughing about it.”
5.2 “Oh I've been here before”	Underlying issue During the session, she keeps returning to areas she has been before. While her lack of progress was frustrating, she sometimes seemed to be more interested in collecting studs and trying to gain True Adventurer status than trying to figure out the problem. The main issue here is that she usually plays the game with her daughter (who is able to control a second character) but she doesn’t seem to know how to get the right combinations of characters to unlock more of the game.
Linda – Bayonetta	
6.1 The narrative	Reoccurring issue Though initially amused, Linda became impatient with how long it took for her to be able to get into the game and the numerous cut scenes introducing the game’s storyline. She wasn’t generally impressed with the story either.
6.2 Fighting on the plane	Episode [34.29-59.01] Linda experiences a series of breakdowns during her battle on the wing of a plane, dying nine times and re-attempting the same fight eight times before the interviewer ended the session. Though she grew frustrated at times, she also said she probably would have persisted for longer if she hadn’t been stopped.
Justin – God of War III	
7.1 Helping Pirithous?	Episode [19.09-28.01] Justin encounters an imprisoned Peirithous who tells him about being captured by Hades and how he will give Kratos his bow if he helps free him. It takes him a while to figure out how to solve the puzzle, though the solution actually involves killing Pirithous, by riding a fire-breathing Cerberus.
7.2 Gap in the wall	Episode [52.11-1.04.20] After encountering the statues of the Three Kings, Justin soon gets stuck and cannot progress when he reaches an area with a gap in the wall. Assuming he can’t get past he backtracks to see if he missed anything but has a lot of trouble performing double jumps along the way and dies several times. He eventually realises he hasn’t missed anything so returns to the initial area. Here he remembers he is able to press into walls and so is able to proceed.
7.3 What the game is really like	Episode – at the end of the post-play interview At the end of the interview, Justin makes a point of showing me the start of the game – where Kratos has all his powers and fights Gaia in order for me to appreciate: “This is more like what God of War is all about, just these big fights where, you know it’s kind of cool basically, the way it’s done.”
Justin – Little King’s Story	
8.1 Managing party members	Underlying issue It takes Justin several attempts and different times to figure out how to recruit people and direct them to carry out tasks. He is much better at it by the end of the session but is not to impressed with the games focus on micro-management.
8.2 Figuring out the	Reoccurring issue

suggestion box	This is introduced in a cut scene but from the start he is confused about it. Further, he doesn't initially know how to check suggestions and accept missions from the throne room. Instead he runs off to check the graveyard area mentioned but doesn't find anything. After trying a few things, he eventually notices the correct option after returning to the throne room.
8.3 Fighting Cow Bones	Episode [56.32-1.00.11] Once he realises how to accept quests he encounters his first boss fight in the game. He doesn't have too much trouble figuring out an effective strategy and defeating the boss but when a member of his party dies he says it made him pay more attention to what he was doing.
Alex – Super Mario Galaxy 2	
9.1 Getting through Haunty Halls	Episode [16.26 – 19.48] Alex has some difficulty getting through a section on this level, dying 3 times in the process. He especially has trouble avoiding the carpet chomping ghosts but figures out an effective strategy for getting through the level.
9.2 Jumping to the beat	Episode [22.04 – 29.00] He has real difficulty with progressing through this optional level. The platforms in the level disappear and reappear according to the beat of the music so he has to be very careful in terms of timing (and avoiding disappearing/repapering monsters). He dies 8x and eventually runs out of lives so he decides to go back and try a different level instead.
9.3 Fighting Megahammer	Episode [42.27 – 45.45] This is a boss fight he encounters at the end of a level. While there are no major issues here, Alex does not defeat the boss and decides to play something else, though he says he intends to go back later on now he's figured out what he needs to do. Part of the reason he probably does not try again at this point is because he used up his last life – so he would have to complete the whole level before reaching the boss again.
Alex – Flower	
10.1 Game issues	Reoccurring issues Alex experiences a couple of issues with respect to the automatic camera zoom and controlling the speed of the petal stream. These don't last long but he does make a point of mentioning them.
10.2 Toy vs. Game	Underlying issue This is an underlying tension here for Alex since he doesn't know whether to treat Flower as a toy (i.e. something you play around with) or a game (i.e. something with goals), and he ultimately loses interest in it, quitting the session after 30 minutes.
10.3 Navigating the canyon [29.04 – 31.13]	Episode [29.04 – 31.13] In the final section he plays, he enters a new area, first admiring it but then unsure about whether he is actually in control of the petal stream or no. He becomes more confused when he starts missing petals, mistakenly assuming the game is penalising him for this by making him repeat the section. When reaches the end of the section he is dissatisfied with experience, arguably leads to due to a reduction of agency, and soon decides to quit the session.
Nick – Fallout 3	
11.1 Minor breakdowns	Nick only experiences minor breakdowns during the session e.g. enemies surprising him, dying twice (on different occasions) and not saving the second time. Though he attempts to follow a mission, this may reflect the fact that he does not encounter any major battles or problems during the session.
11.2 Being observed	Underlying issue During the interview he states he felt he should attempt to do something with a purpose during the session i.e. attempt a mission rather than just aimlessly explore (due to being observed)
Nick – Endless Ocean 2	
12.1 Wiimote controls	Reoccurring issue Nick experienced some trouble with the Wiimote controller where he felt a bit embarrassed (due to being observed). On two occurrences, it took so long for him to dodge when he was supposed to, it wasn't clear whether he succeeded in the end through repeated attempts or whether the game took over for him. As he is an experienced player, this may have more to do with the Wii sensor bar placement

	than with his abilities.
12.2 Reading the map	Reoccurring issue He has some trouble reading the map, or possibly wasn't paying enough attention to it. When it is first introduced Nick isn't sure what the arrows represent at first, though the bigger issue is him not noticing the red circle and failing to interpret it as somewhere he is meant to head towards (especially when he is supposed to rescue Oceane). Though he eventually does notice the red circle and heads towards it, the issue appears compounded by his lack of interest in the game (see below).
12.3 "I just didn't find it interesting"	Underlying issue He makes frequent references to how slow the game is and about his lack of interest in it. Immediately after the session states that while he tried to be "open-minded" at first, the game was "very slow and, yeah, boring I guess, it wasn't stimulating and yeah, I just didn't find it interesting". He also states this made it harder for him to pay more attention to things in the game. At one point he looks at the camera like as he was thinking of quitting but thought he'd keep playing till he runs out of air again, after which he quit the session.
Amy – Mario Kart	
13.1 Gaining and losing race positions	Reoccurring issue Amy would sometimes seem confused about how quickly she would to drop (and occasionally gain) places within the race. Her main goal wasn't so much about becoming first in each one but about getting on the grand prix podium at the end. She is conscious of the points she is getting after each race, where she quickly figures out her final position and score. She was happier when she placed in the final three than when she doesn't.
13.2 Manual cornering	Reoccurring issue This came up during the introductory session, and is also mentioned in the diaries. Amy chose manual cornering for one of the Grand Prix sets but doesn't to do as well as she'd like, so goes back to automatic. While she initially remembers to use manual cornering, as the tracks get harder, she uses it less often.
13.3 Rainbow Road	Episode [55.43 – 1.00.50] Amy experiences multiple difficulties here, where she keeps falling off the track (9 times). She has tried it before but with smaller engine and it seems to be harder on a bike, especially as the track has no edges and she is playing with at 100cc, which is harder to handle. She also feels that she gets put back even further after she falls off. While she is occasionally irritated, she also smiles sometimes too (see below). Because she places 3rd overall, she is happier at the end of the race than other sessions (see Gaining and losing race positions above).
13.4 Observation	Underlying issue Amy laughed frequently after she fell off or lost position – she explains this as being an alternative emotional response to getting annoyed with the game, especially since she is aware of being watched. She also mentions that she probably played for longer than she might have done while at home, and was getting a little bored by the end of the session.
Amy – LocoRoco	
14.1 Learning the controls	Underlying issue While the controls initially seemed simple, the tutorial became more complicated and it became overwhelming to Amy (also she's not too familiar with a PS3 controller), though she did say they made more sense when she started playing. There was also some confusion over following the instructions which would appear on screen, and she does not figure out all the ways in which she can interact with the world during the session.
14.2 Trying to figure out whether the bubbles are useful	Episode [31.02 – 32.45] This is an interesting episode where she tried to work out if the bubbles in the water pool could be helpful in anyway. She tries out several different strategies but a lack of result means she soon decides to gives up on the game (see below).
14.3 "How am I going to find the rest of them?"	Underlying issue After proceeding past the first gate, Amy realises she needs to collect 40 Loco Rocos (LRs) to be able to pass the next one but has difficulty doing so. This is compounded by controller issues, the fact she confused by the spatial layout of the game and finds things in the environment, like the big flowers, distracting. Being unable to

	figure out where the remaining LRs are, she ultimately becomes frustrated and decides to quit the game after playing for about half an hour.
Natasha & William – Big Brain Academy	
15.1 Controller issues	Reoccurring issue Natasha and William are occasionally a little confused about the controls as some games required one Wiimote which they would have to swap and others required they each have their own. Not helped by the fact that they don't play Big Brain Academy very often and haven't had to set it up themselves before, but the problems they encounter don't have a significant impact.
15.2 Winning and enjoyment	Underlying issue William likes the competitive aspects of the game (though the game makes him feel stupid and he implies that N is better at it) more than Natasha, who is sometimes more concerned with W's enjoyment, rather than with winning herself. Further, they are used to playing the game in a more social context for shorter periods of time (see below). They were also particularly irritated by instances when the pace was very slow e.g. when the teacher was talking.
15.2 Context	Underlying issue They usually play the game in a more social situation (as they don't have a Wii) with larger group of people, where you "dip in and out" of play (W).
15.3 Unfair bonuses	Reoccurring issue This is a reoccurring issue in that William seems to receive more bonuses in the Brain Quiz rounds than Natasha. While he is happy about this, she calls it "unfair".
15.4 Helping each other out	Reoccurring issue This mainly happened during the Mental Marathon rounds because they are cooperative but occasionally during the competitive ones as well. William initially doesn't want Natasha's help but after getting some answers wrong he concedes "it turns out that winning as a trained monkey is better losing on your own <laughs>"
15.5 Observation	Underlying issue They would not have played for so long if they were not part of a study. Both were very bored by the end, and they only played as long as they did because they thought I wanted them too.
Natasha & William – Little Big Planet	
16.1 Different playing styles	Underlying issue Natasha would have liked to customise her character and collect as much as possible through exploring each level whereas William was more concerned with reaching the next level and was more competitive about their individual scores.
16.2 Camera perspective	Reoccurring issue This is a reoccurring issue for both of them, but especially Natasha. Particular instances include the swinging sponges, seesaws and giraffes. Though each problem is eventually overcome, Natasha admits to the issue being "annoying" at times.
16.3 Raising the drawbridge	Episode [31.57-34.46] In the Skate to Victory level they have a little trouble with lowering the drawbridge though they eventually figure it out by trying out different things. This is interesting because William actions help Natasha realise the solution to the problem and they are able to progress within the game.
16.4 Checkpoints and infinite lives?	Underlying issue It isn't until near the end of the session after running out of lives (see below) that both realise that they do not have an infinite number of lives, though this didn't seem to impede their progress. Despite thie realisation, they do not figure out how the checkpoints represent the number of attempts they actually do have left.
16.5 Swinging Safari coals	Episode [first attempt 51.09-52.12, second at 58.12-59.02] They have trouble getting past a specific section of the Swinging Safari level where they have to pass through some hot coals and stamping monkeys. Both die multiple times, eventually having to restart the level. They have to try it a few more times before they get it right but they eventually succeed, after helping each other figure out the correct strategy.