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The Psychology of Immersion and Development of a Quantitative Measure of Immersive Response in Games

Dissertation submitted in candidacy for the degree of Doctor of Philosophy at the
School of Applied Psychology, College of Arts, Celtic Studies, and Social Sciences,
National University of Ireland, Cork, by

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Under the supervision of

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Submitted April 2013

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This thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. It has not been submitted for a degree or award, at University College Cork or elsewhere.

Abstract

This study sets out to investigate the psychology of immersion and the immersive response of individuals in relation to video and computer games. Initially, an exhaustive review of literature is presented, including research into games, player demographics, personality and identity. Play in traditional psychology is also reviewed, as well as previous research into immersion and attempts to define and measure this construct.

An online qualitative study was carried out (N=38), and data was analysed using content analysis. A definition of immersion emerged, as well as a classification of two separate types of immersion, namely, vicarious immersion and visceral immersion. A survey study (N=217) verified the discrete nature of these categories and rejected the null hypothesis that there was no difference between individuals' interpretations of vicarious and visceral immersion.

The primary aim of this research was to create a quantitative instrument which measures the immersive response as experienced by the player in a single game session. The IMX Questionnaire was developed using data from the initial qualitative study and quantitative survey. Exploratory Factor Analysis was carried out on data from 300 participants for the IMX Version 1, and Confirmatory Factor Analysis was conducted on data from 380 participants on the IMX Version 2. IMX Version 3 was developed from the results of these analyses. This questionnaire was found to have high internal consistency reliability and validity.

Section 1: Introduction

1.1 Research Focus & Objectives

The aims and focus of this study on immersion in games are outlined in this section.

Immersion is a subjective state of intense involvement in a setting, and has been defined by one group as a feeling of being deeply engaged where people "enter a make-believe world as if it is real" (Coomans & Timmermans, 1997, p. 6).

Considered by some to be "key to a good gaming experience" (Jennett et al., 2008, p. 644), immersion has increasingly been discussed and researched in relation to games in recent years. Games have expanded widely over the last four decades in terms of availability, variety, sophistication and participation. This study explores immersion as it pertains to games, focussing primarily on experience of immersion, also termed the *immersive response*, rather than the inherent aspects of a game that can lead to an immersive experience.

The primary aim of this study is to create and develop a quantitative method of measuring the strength of an immersive response, following a detailed investigation into previous attempts to quantify immersion. This research also aims to create a definition of immersion, with consideration given to existing definitions, and with particular focus on immersive response. The emerging definition will describe immersion as it applies to the gaming population who experience immersion on a regular basis.

Alongside the principal aims of this thesis, this research also aims to investigate the nature of immersion by carrying out a qualitative study among the gaming

population. To facilitate these aims, this study also aims to carry out research into literature pertaining to immersion and to games and game players.

1.2 Boundaries of Research

A considerable amount of immersion research concerns itself with all aspects of immersion, including immersion, system immersion and immersive response. The focus of the current research is on the individual's immersive response and on the nature of this experience, and this section outlines the boundaries of that research.

One of the necessary limitations of this research is that it focusses on immersion as it pertains to computer and video games. This is a broad area in itself, but of necessity not covering immersion in other media types for which immersion has relevance, for example film, television, books, and immersion for more serious pursuits such as education.

As such, the instrument which emerges is not generalisable to other forms of media, and it would be problematic to make comparison between immersion in games and immersion in other pursuits. Such research, although invaluable, is not the focus of this study.

Likewise, in reviewing the literature, there has been little research carried out on the physiological effects of immersion such as eye-tracking, galvanic skin response or heart rate, an area which would warrant extensive study in its own right. This type of

research would be of great interest and very useful for use alongside the IMX Questionnaire which is developed as part of this research.

Immersion, as a concept, fits within a body of research on levels of involvement. Besides immersion, the most commonly cited types of involvement are *flow*, *presence*, *engagement* and *cognitive absorption*. These terms are often incorrectly used interchangeably by the media when discussing games. Although equally fascinating, it is not within the scope of this research to carry out an investigation into these other, somewhat related, levels of involvement. The development of a taxonomy of levels of involvement is still at an early stage. What emerges is that when the levels of involvement in a game are considered along a continuum, immersion is regarded as the deepest level of involvement. This concept of *depth* will be discussed within this section. A comparison is also drawn between the concept of immersion and similar concepts of levels of involvement, namely, flow, presence and cognitive absorption.

Flow is a concept developed by Csíkszentmihályi (1990) which encompasses online applications as well as sports and artistic pursuits and involves emotions of enjoyment caused by a sense of "balance between skill and challenge...in the process of performing an intrinsically rewarding activity" (Brockmyer et al., 2009, p. 625). In this case, challenge refers to the perceived challenge that the activity presents. Flow, or the Flow State, is defined as "the state in which people are so involved in an activity that nothing else seems to matter" (Csíkszentmihályi, p.4), and is a level of involvement in which distractions and a clear sense of time passing are left behind and the player is left with a sense of satisfaction or gratification. From this

description, flow appears to be quite interchangeable with immersion, yet while flow seems to have some of the features of immersion, it does not equate exactly.

According to the research, flow is "an optimal and therefore extreme experience" (Jennett et al., 2008 p. 642). However, Jennett et al. also pointed out that "immersion is not always so extreme". Although it has been described as "pleasurable" (Murray, 1997, p. 98), immersion is not necessarily always a positive, optimal experience, as an individual could equally be immersed in a negative experience as part of role-play. It has been shown that "negative emotions and uneasiness...run high" (Jennett et al., 2008, p.657). The phenomenon of flow, however, could relate to child's play, where following the rules can bring about some pleasure, even if the game experience involved intrinsically negative emotions (Vygotsky, 1978).

There is some relationship between flow and immersion, given that a player can experience flow while immersed. Flow, however, is not a precondition for immersion (Csíkszentmihályi, 1975). Much research has recently focussed on the experience of flow in games, or *gameflow* as it is sometimes termed, including the development of the Flow State Scale (Jackson & Marsh, 1996) and the Dispositional Flow Scale (DFS), an instrument which measures the flow experience. The usefulness of the DFS in its use to measure *game flow*, has been called into question (Procci et al., 2012). The connection between flow and immersion is suggested in Brockmyer et al.'s Game Engagement Questionnaire (2009). However, it can be seen from his questionnaire, that flow and immersion are measured as separate constructs, as are absorption and presence.

Presence is defined as a "subjective experience of being in one place or environment, even when one is physically situated in another" (Witmer & Singer, 1998, p. 225).

Described as such, presence is clearly a concept which could be vastly useful for games research, although it is undoubtedly more applicable to virtual reality technology. In the theory of presence, immersion is depicted as being merely one aspect of presence: immersion is only one of the forms that presence takes.

Involvement and immersion are considered to be necessary for experiencing presence (Witmer & Singer, 1998) and while presence can aid the occurrence of immersion, it alone will not give rise to an immersive experience. In Slater's research (Slater, 1999; Slater et al. 1994), he defines immersion in terms of being an objectively measurable concept, while it is suggested that presence is subjective and non-quantifiable besides from being experienced by a user. Slater's definition of immersion as objectively measurable and the immersive response as being created by the technology's *system immersion* appears to be over-simplified, yet it is interesting that he notes the differences considered to exist between immersion and presence during this work.

Cognitive absorption is described as experiencing a "state of deep involvement with technology" (Zhang et al., 2006, p.2). The term cognitive absorption is used in reference to all of information technology and, as such, it is too broad to be applied to games. Five dimensions of absorption have been outlined, namely, "temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity" (Agarwal & Karahana, 2000, p. 665), with playfulness and personal innovativeness also considered to be important determinants of absorption. As is also the case in presence theory, immersion is described as being merely a single aspect of

absorption, and has been termed *focussed immersion*. Focused immersion, in this instance, is defined as "the experience of total engagement where other attentional demands are, in essence, ignored" (p. 673).

Engagement, a concept likened to *deep play*, has been described as "something that draws us in, that attracts and holds our attention" (Chapman, 1997, p.3) and "a desirable even essential human response to computer-mediated activities" (Laurel, 1993, p.112). When compared with immersion, engagement is described as "a more deliberate, critical mode of participation" (Carr et al., 2006, p. 54). Hargadon and Douglas (2000) compare immersion and engagement in terms of familiar and unfamiliar schemas, explaining that immersion involves the deep absorption in a narrative schema which is familiar to us, while engagement is absorption in "a work's overturning or conjoining conflicting schemas from a perspective outside the text, our perspective removed from any single schema." (p. 154). It is also explained that immersion and engagement are not mutually exclusive concepts but neither are they "polar opposites" (p. 158).

Becoming involved in a pursuit through flow, presence, engagement or cognitive absorption is considered to be a positive experience for the individuals involved. In the case of immersion, however, this is not necessarily true. While immersed, the player might feel negative emotions connected with the loss of somebody who was close with their character, or the disappointment which comes from failing to surmount a challenge or complete a goal. According to Professor Reeves, of Stanford University, "People respond to interactive technology on social and emotional levels much more than we ever thought...People feel bad when something bad happens to

their avatar, and they feel quite good when something good happens" (in Alter, 2007, p. 2).

Although, from this review of literature, it is clear that all of these concepts appear to be relevant to the study of immersion at varying degrees, it is not within the scope of this research to carry out further examination into the individual concepts.

1.3 Thesis Outline

This PhD thesis is comprised of eight sections, of which this is the first.

Section 1, the *Introduction*, outlines the focus and objectives of the research, as well as the boundaries of this research. It also outlines the structure of the thesis.

Section 2, *Games and Play*, gives a review of literature in the area of games, game players, and games and play in traditional psychology.

Section 3, *Immersion*, provides a review of the immersion literature. It outlines existing definitions of immersion and previous attempts to quantify immersion. The effects of immersion and applications of immersive play are considered. Also, the important distinction between system immersion and immersive response is outlined. The research which situates immersion on varying continuums is summarised.

Finally, previous attempts to measure immersion are explored.

Section 4, *Qualitative Analysis & Definition of Immersion*, describes the preliminary study which was carried out online as part of this research. The methodology, qualitative analysis, results and conclusions of this study are outlined in this section.

As well as describing intrinsic and extrinsic influences on game immersion, this section delineates the emergence of a definition of immersion and a distinction

between two discrete types of immersive response in games, vicarious immersion and visceral immersion.

Having considered in detail the existing literature on types of immersion, Section 5, *An Experimental Analysis of Different Types of Immersion*, looks at the new emerging classification of types of immersive response: vicarious immersion and visceral immersion. It describes the online survey-based study which was carried out with the aim of rejecting the null hypothesis that there was no difference between individuals' interpretations of vicarious and visceral immersion. The methodology, statistical analysis and results are outlined here.

Section 6, *Development of the Immersive Response Questionnaire*, describes the development of the Immersive Response Questionnaire (IMX Questionnaire). It outlines the stages of questionnaire development for summated rating scales using classical test theory, as described by Spector (1992). The design of the IMX Questionnaire Version 1 is illustrated, as well as the full administration of the questionnaire and item analysis using exploratory factor analysis. The development of the IMX Questionnaire Version 2, based on the initial analysis, is described in detail, followed by the full administration of Version 2, and the confirmatory factor analysis. The reliability studies carried out using the data from the IMX Questionnaire Versions 1 and 2 are also outlined.

Section 7, *Validation of the IMX Questionnaire*, describes the validation study carried out on the IMX Questionnaire Version 3.

Section 8, *Conclusion*, explores possible avenues for future studies in this area.

There are 26 technical appendices.

Section 2: Games and Play

Firstly, this section considers the nature of games and the gaming industry.

Secondly, children's play and games are characterised with respect to their role in traditional psychology, and the benefits of play are outlined. Within this section, the similarities between children's play and adults' play are examined. Thirdly, and finally, with the aim of identifying an appropriate sample population for gaming research, this section outlines the research that has been carried out on the demographics, interests, and personality of gamers.

2.1 What is a Game?

“To play a game is to engage in activity directed toward bringing about a specific state of affairs, using only means permitted by specific rules, where the means permitted by the rules are more limited in scope than they would be in the absence of the rules, and where the sole limitation for accepting such limitation is to make possible such activity” (Suits, 1967, p. 148).

A game is a type of play that is constrained by a set of rules which are often fully outlined, but sometimes unspoken. Enjoyment is generally the aim of playing games; however, this is usually enjoyment which is inherent in the action of playing the game rather than as a goal at the end of the action. Games are also used for educational purposes, and there are many other goals that motivate individuals to become involved in games. Apart from their enjoyment and entertainment function, games, particularly role-playing games, are also used for training and educational purposes, skills and strategy development, and to build and enhance teamwork and

collaboration (Press, 2009; Tychsen et al., 2007; White, 2007). As their purpose has expanded, games have also evolved, from the original tabletop format into sophisticated graphically and auditorily enhanced formats.

Today, there are a great number of different types of games, on numerous different platforms: some games are exclusive to a single platform, while others span many; some games can be played by a single player, while others are designed to be enjoyed by a group. The genres of games in existence today are so diverse and varied that it would not be feasible to make an adequate summary of them here, and, in fact, it appears that the majority of game genres are derived from game journalism, rather than any type of systematic research (Järvinen, 2002). However, the current gamut of computer and video games are based on a small number of traditional game types: role-playing games, wargames, puzzle games, card games and board games.

Role-playing games (RPGs) are a genre of games in which the player takes on the role of a character and controls that character within a setting. RPGs came into being in the 1970s, emerging from a background of strategy-based war-games and works of fantasy-based fiction such as *Lord of the Rings* (King & Borland, 2003; Mackay, 2001; Schick, 1991). The "world's first role-playing game" (Mackay, 2001, p.15) was Gygax & Arneson's *Dungeons & Dragons* (1974), a tabletop, pen-and-paper based game involving dice (henceforth, D&D). In the years since it was first published, D&D has inspired the release of numerous other RPGs which vary widely in scope, setting and theme. An indication of the success of D&D is the fact that the original game itself is still going strong and currently (in 2012) in its fourth edition. Despite their undeniable popularity and despite attempts in the academic community

to produce a formal definition of the role-playing game (Hitchens & Drachen, 2009), there has yet to emerge an agreed classification. This is due, in no small part, to the plethora of types of games and systems that have evolved. The layman's definition of a role-playing game is "a game in which players take on the roles of imaginary characters who engage in adventures, typically in a particular fantasy setting overseen by a referee." (Role-Playing Game, 2012).

Wargaming is a genre of games which simulates the strategy and tactics used in military operations. Typically, each player takes on the role of the military commander in charge of an army and makes decisions that impact on the battlefield. According to Perla (1994), a wargame is a game which simulates a war in which players representing opposing sides affect the outcome by making decisions and moving models rather than manoeuvring real forces.

Puzzle games are those where puzzle-solving is at their core, often with a storyline or characters included as part of the gameplay. A board game is any game which takes place on a marked board, where the participants move and place game pieces on the board depending on their progression in the game. A card game involves traditional playing cards or game-specific cards with some variation on the theme. It is common to find board games which involve cards, or vice versa, and there are also role-playing games or wargames which involve cards, boards, or puzzles.

Most modern computer and video games have evolved from these traditional game types and encompass a variety of genres.

While games have advanced onto computers as both purely text based programs and MMORPGS (Massively Multiplayer Online Role-Playing Games) with intricately designed Graphical User Interfaces, and into other non-tabletop formats such as Live Action Role-playing (LARP), many people still play the original tabletop format RPG. One recent study found that the tabletop format still outranked its more digital descendants in terms of enjoyment (Tychsen et al., 2007).

Computer games and the infrastructure based around the production and sale of these games are a multi-billion dollar industry. According to the NPD Group (2011) the industry generated between \$15.4 and \$15.6 billion from games in 2010. Figures from the Entertainment Software Association show that a total of \$24.75 billion was spent in 2011 (ESA, 2012), a twofold increase on the \$11.7 billion generated from the sale of games in 2008 (ESA, 2009). On average, 9 games were purchased every second of every day in America in 2008, a quadrupling of sales since 1996 (ESA, 2010). It is clear that the industry is growing rapidly, as indicated by the fact the 67% of households in the United States of America have either a console or a personal computer (PC), or both, for games usage (ESA, 2009). 49% of these households have at least one dedicated game console, and those that do have an average of two consoles (ESA, 2012).

Similarly, internet use has increased exponentially in recent times. By the year 2002, 600 million people had access to the internet (Manasian, 2003), and today, a decade later, this number has grown to over 2.2 billion internet users worldwide (Internet Usage Statistics, 2012). 32.7% of the world's population has internet access, and

with the advent of such widespread internet access, games have expanded further than ever before.

Games are presently played by millions of people worldwide every day. With a multitude of games available to choose from, Blizzard Entertainment (2010) claim that, in 2010, an estimated 12 million individuals were involved in playing the most popular online RPG, *World of Warcraft*.

2.2 The Psychology of Play

The subject of play has been widely discussed in psychology. Theories of play generally focus on child's play, rather than the types of play in which adults engage, although there are many similarities between the two. Play is considered to be "understood universally, by adults as much as by children, to whom it is instinctive" (Taylor & Walford, 1972, p. 16).

Role-playing games are the genre of games which are generally considered to bear the closest resemblance to child's play, although parallels can also be drawn between child's play and many other game genres.

Over the years, varying benefits have been attributed to child's play. One description stresses the importance of play, stating that "the most significant psychological achievements of early childhood age occur when children engage in play" (Verenikina & Herrington, 2008, p. 198). Play has been described as one of the most significant 'leading' activities in the childhood years (Bodrova & Leong, 1996;

Vygotsky, 1977, 1978) and it can be seen from much of the research on child's play that it is essential to the child's development and beneficial to the child in many different ways.

Verenikina & Harrington's review of research (2008) summarises the benefits of computer games for children as improved "memory capacity, attention span, and problem solving strategies" (p. 197). Imaginary play is considered to be important for children's development, one description insisting that it contains all of the child's developmental tendencies "in a condensed form" (Vygotsky, 1978, p. 102). It has been made clear from the research on child's play that it is very important for various aspects of the child's development: a rehearsal and refining of present roles (Verenikina et al., 2003), the development of a sense of self and identity (Mead & Morris, 1934), cognitive development (Piaget, 1962; Vygotsky, 1978) and self-control (Vygotsky, 1978), catharsis, a sense of control (Erikson, 1963; Freud, A., 1968; Freud, S., 1959), restoration of energy (Lazarus, 1883: from Dockett and Flear, 1998; Patrick, 1916) and a preparation for roles in adulthood (Groos, 1898, 1901), amongst others.

What is not yet established, however, is whether play - in the form of games - is beneficial for adults in any similar fashion. The majority of discussion about the affect of role-playing games on adults revolves around the idea of identity and identity development. The idea of identity development is also touched on in Vygotsky's research on child's play, and the development of the basis of self-reflection can be seen in children when they engage in this type of play (Verenikina et al., 2003). By assuming a role, a child can discover new ideas and develop new

skills, and consequently the child may incorporate these ideas and their newly discovered social norms into her identity. An example of this is the concept of heroism as experienced by the player in the case of a superhero saving somebody's life, or loyalty in the case of playing a good friend (Vygotsky, 1978).

It can be seen that there are similarities between adult games and children's pretend play in that "players, regardless of their age, enjoy enacting multiple layers of representations without inferring much of actual forms or functions of objects in both cases" (Jung et al., 2007, p. 2). In Jung's study, play in online MUDs, multiplayer online games and fantasy blogs are all seen as increasingly advanced forms of a child's pretend play. As far back as 1976, Bruner wrote about immersion not just child's play, but play in general: "We find in play, and especially that of children..." there is a possibility of being so immersed in a game that the player forgets reality:

"...absorption and self-forgetfulness so complete that no room is left for the idea of oscillation...they can no more be said to see through the illusion than to alternate between it and reality" (Groos, 1901, p. 81).

2.3 Who plays Games?

Following the discussion on children's play and its similarities with adult play, this section focuses on the individuals who play games. While demographics are discussed later, the majority of games research concerns itself with adult participants, which is particularly relevant as recent studies show the average age of computer gamers to be 30 years (ESA, 2012).

With the aim of identifying potential participants for the current study, this section outlines the stereotypes of gamers, the demographic information which frequently runs contrary to these stereotypes, and gives a review of the literature on interests and personality of game players.

2.3.1 Stereotypes

A number of persistent stereotypes exist about the type of people who play games. The implication of any stereotype is that there are specific attributes which define all individuals as part of that group. Stereotypically, a game player is described as a 'nerd' (Lægran & Stewart, 2003; Ruzychi-Shinabarger, 2002; Tocci, 2007) and therefore assumed to have the characteristics of being victimised by non-nerds, being interested in technology and in other topics which are not of interest to non-nerds, and being uninterested in personal appearance and therefore *unsexy* (Anderegg, 2007).

This description of gamers is regarded as fallacious by those with experience of that group, and as this view has persisted through the years, much research has been carried out with the aim of challenging it.

The clichéd image of a gamer is one of an intelligent teenager, with extremely detailed knowledge about specific unusual hobbies or topics, poor social skills, who still lives at home beyond an age which is considered to be socially acceptable: "mostly male, mostly young and mostly white and middle class" (King & Borland, 2003, p. 5).

In addition to this stereotype of ‘nerdiness’, game players are often depicted in an unflattering light in the media (Branch, 1998; Chick, 1984; Schnoebelen, n.d.). From a trait as harmless as having poor social skills to something as dangerous as being violent or involved in cultish activity, many conclusions have been reached without supporting evidence. Despite the strength of these enduring stereotypes, this section examines the research on those who play games, and the extent to which the common perception of game-players as being different to the general population stands up under investigation.

2.3.2 Demographics

A gamer is, in the simplest description, any person who plays games. There are, however, different classifications of gamers. Casual gamers and hardcore gamers are differentiated by the amount of time, energy and other resources that they put into the game. The casual gamer is a rapidly increasing demographic of gamers, owing to the ubiquity of mobile devices with games such as smart phones and tablets.

However, casual games can also be played on a PC, handheld gaming device, or gaming console, or even on platforms such as *Facebook* or other social networking websites. Casual games are typically very simple format games, such as *Angry Birds*, that do not require a commitment from players in terms of time or energy. Hardcore gamers, or "power gamers" (Taylor, 2006, p. 70) on the other hand, are those who dedicate all of their free time to games, often to one favoured game, and these games tend to be far more complex in nature than the casual games (Bossler & Nakatsu, 2006).

The stereotypical demographic of a gamer is of a teenage boy, a young male (Williams, 2003). Chaika (1996), in discussing the marketing bias of computer games, states that the electronics industry typically markets products towards males. Herz (1997) and Provenzo (1991) point out that a number of game marketing campaigns have indeed been aimed at the age groups of children and adolescents. An example of this was an advertising campaign carried out on cereal boxes by the video game company *Nintendo*. One study based on a particular online fantasy role-playing MUD called BlueSky found that the majority of players were male, young, white, middle-class and heterosexual (Kendall, 1999). Douse & McManus (1993) found that players of a particular traditional fantasy play-by-mail game were more likely to be male and educated. However since Douse & McManus' study focused on two very specific, traditional-style games, it is not possible to generalise the result to the general population. However, Williams et al. (2008) carried out an in-depth study into players of the game *EverQuest 2*, and found that the majority of players of this particular game were “adult, male, white and middle class” (p. 1007).

Youn & Lee (2002, in Youn et al., 2003) found that gamers were more likely to be young and well-educated, with an above-average income and level of education. Youn et al. (2003) used the annual mail study DDB Needham Life Style Survey, from the year 2001, in order to examine the lifestyles of online gamers. It was found that online gamers, as well as internet users, tend to be younger, better educated and in a better financial situation than non-gamers. When compared to non-gaming internet users, online gamers were found to be younger. Online gamers were found to have a higher impulsiveness, an increased use of word-of-mouth communication, when compared to non-gamers. No significant difference was found as regards gender.

Recent reports from the Entertainment Software Association (ESA), however, paint a very different picture of the gaming community. Today, the average age of those who play games is 30 years (ESA, 2012), significantly higher than the stereotypical teenager. It is worth pointing out, however, that a teenager of the 1980s when computer games were first developed is, at this juncture, middle-aged, so studies which cite demographics must be treated carefully. Although it is perceived as a hobby that is almost entirely dominated by male youths, research shows that the majority of gamers are indeed male, although not by a significant margin, as almost 47% of all game players are women. In fact, the aforementioned stereotypical 'teenage male' makes up only 18% of the gaming market, with non-teenage females making up a significantly greater portion: 30% (ESA, 2012). Griffiths et al. (2004) discovered that the adolescent sample has a higher proportion of male gamers (93.2%) than the adult sample (79.6%).

2.3.3 *Interests*

An investigation into the interests of gamers, specifically of traditional fantasy games, (Douse & McManus, 1993) showed that these individuals were more likely than non-gamers to describe themselves as being "scientific" (p. 3), and list interests such as reading and "playing with computers" (p. 1). Gamers were found to be less likely to list going to the cinema, theatre, concerts or parties in their interests, which corresponds with the findings that gamers have a higher level of *cultural estrangement*, a lower awareness of popular entertainment, than others (DeRenard & Kline, 1990, p. 7). This is perhaps due to the fact that they have very specific niche areas of interest which differ from the general population. There was a small

difference in personality between the groups yet this difference could be said to be of the same magnitude as the difference between any groups involved in different hobbies.

In a non-experimental study of adolescent video game play, it was suggested that game players spend less time reading and dedicate less time to doing homework than their non-gaming counterparts (Cummings & Vandewater, 2007). A study by Williams et al., (2008) of players of the popular, well-subscribed online game, *EverQuest 2*, indicated that players spend significantly less time watching television than the general population, and that they also read newspapers less frequently.

The stereotypical image of gamers shows them as shy and introverted. On the contrary, Hall (1998) found that playing fantasy RPGs actually increased socialisation of some shy students as an incidental result of improved writing ability and vocabulary as caused by the games. A more recent study found that socialising online, as opposed to offline, was the preference of 21% of gamers; however, this is from a study with significantly more male participants than females in the sample (Hussain & Griffiths, 2008).

2.3.4 Personality

Personality is defined as "the dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations and behaviours in various situations" (Ryckman, 2000, p.4). There are many different

questionnaires currently used to create a personality profile, and the research into personality in gamers has employed a wide variety of these over the years.

2.3.4.1 General Personality Traits

Although often depicted as lacking in social skills (Williams, 2003), it has been found that games can in fact lead to increased socialisation of gamers, attributed, as mentioned earlier, to improved writing skill and vocabulary as caused by the games (Hall, 1988). It should be noted that this study was carried out in an era of text-based online MUDs rather than the more modern graphically based games. However, much of the MMO-style gameplay is characterised by the necessity for efficient and effective communication with other players through text and it can be extrapolated that these games could have a similar effect.

Many studies into games have used Cattell's 16 Personality Factor Questionnaire (16PF) to create a personality profile of gamers. The 16PF is a multiple choice questionnaire designed to measure where an individual's score lies in relation to fundamental traits of the human personality which include inter alia Openness to Change, Emotional Stability, Warmth, Perfection and Dominance. Originally, Cattell had 16 primary traits that were developed through factor analysis of everyday behaviour. However further factor analysis was carried out on these 16 traits to develop five global factors known as the *Big Five* model – Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. Nonetheless, the 16PF has been utilised in many studies of gamers with relatively enduring results.

Simon (1987) was one of the first to attempt to disprove the harmfulness of games such as *D&D* to their players. His study, using 16PF, was carried out with 68 participants, all of them game players with no control group. Simon's aim in this study was to pay particular attention to *Factor C: Emotional Stability* and yielded perfectly healthy personality profiles with an increased level of '*Experimenting; Liberal; Freethinking*' as the only unusual result.

Following his original study on the emotional stability of those involved with *D&D*, Simon (1998) employed Cattell's 16PF with 24 participants who played the game *Vampire: The Masquerade*, expecting to see a difference in the *Emotional Stability* factor. However, in this study the increased level of '*Experimenting; Liberal; Freethinking*' was not replicated. The reason for this is unclear, but perhaps it is because of the more modern world setting in the game, or because such a small sample did not adequately represent the vast population of game players.

Carroll and Carolin's study (1989) employed the 16PF with 75 university students involved in a variety of game genres. They found gamers to be *normal* but also demonstrated that the traditional fantasy role-playing gamers scored higher on Cattell's factor Q1 – '*Experimenting; Liberal; Freethinking*'.

Yee (1999) carried out an online survey with 100 participants with the common trait of involvement in a variety of game types, and a control group. This survey included an approximation of three of Goldberg's Big Five five-factor domain scales – namely Extraversion, Agreeableness and Openness. A significantly higher rating for *Openness to Experience* was found for gamers, in comparison with the control group. Yee's findings correspond to a considerable degree with Simon and with

Carroll & Carolin's findings cited above. A comparable result was also found by Teng (2008), in his research into student online game players (N=130), where he found that online game players scored higher on Openness, Conscientiousness and Extraversion than non-game players. Also, it is important to note that there is a similarity between Cattell's 16PF Factor Q1 'Experimenting; Liberal; Freethinking' and Goldberg's Big-5 Factor *Openness to Experience*, bearing in mind that Goldberg's Big-5 were derived from Cattell's 16PF, so the fact that gamers scored high on both of these is to be expected.

Douse & McManus (1993) investigated the personality of fantasy game players using the Bem Sex Role Inventory, Decision-Making Questionnaire, Eysenck Personality Inventory and Davis' Empathy Questionnaire. With 35 participants, 92% of which were male, this study involved players from a fantasy role-playing play-by-mail style game and a matched control group of 35 participants, matched for age, gender and educational level. Douse & McManus found any analysis of sex difference to be impossible due to the gender imbalance within the group studied. It was found that game players were involved in *playing* 11.4 hours per week on average: almost five times as long as the control group who played for 2.5 hours per week. The study also showed that players were less feminine and less androgynous than the control group. Players were found to display significantly lower scores of *empathic concern* on Davis' Empathy scale. Interestingly, high scorers of *empathic concern* would report as being *prone to anxiety and shyness*, which would have been predicted if the social ineptitude of gamers was a real phenomenon. No significant difference was found in scores for fantasy, perspective-taking or personal distress.

Yee (1999) points out that this study may be biased owing to the fact that computer and email preference is, here, confused with games.

In 1990, DeRenard & Kline conducted a study of 35 gamers who played *D&D* with a control group of 35 who did not play this game. A questionnaire with the Anomia scale was employed. More individuals in the control group reported having feelings of ‘meaninglessness’ and the researchers speculated whether involvement with the game gave players a sense of purpose. It was also noted that those participants who were more involved in the game, who, for example, spent more money on materials, and more time playing, had higher reported feelings of alienation. As mentioned earlier, game players were found to have a slightly higher score in *cultural estrangement* than the control group – implying a lower awareness of popular entertainment.

2.3.4.2 Mental Health

In a study undertaken by Carter & Lester (1998), using the Eysenck Personality Inventory and Beck Depression Inventory, involving participants who played *D&D* (N=20), they found no significant difference between the gamers and the control group of male undergraduates. No difference in mean scores on depression, suicidal ideation, psychoticism, extraversion or neuroticism between the two groups was found.

Rosenthal et al. (1998) compared a group of gamers (N=54) to a group of national guardsmen (N=64), non-gamers, and found that both groups had comparable

numbers of close friends, which suggests that they have similar levels of social skills. The study failed to confirm the stereotype of gamers as "withdrawn, emotionally immature adolescents" although gamers reported slightly longer time spent sleeping and daydreaming than the guardsmen (Rosenthal et al., 1998, p. 1). No difference was found in the measure of neuroticism between the two using a separate neuroticism scale.

In the study mentioned earlier, Douse & McManus (1993) showed, using the Eysenck Personality Questionnaire, that players were likely to be more introverted than the control group but no difference was found for neuroticism or social acquiescence.

It was found that players of the MMORPG *EverQuest 2* has slightly lower levels of mental health when compared to the general population, with a higher level of players having been diagnosed with depression and substance addiction. However, it was found that these players had lower levels of anxiety than the general population (Williams et al., 2008).

2.3.4.3 Crime, Violence & Cultic Practices

Implications regarding gamers supposed tendency to extreme deviation from the norm as regards crime, violence and cultic practices are outlined here.

For many years, the stigma that gamers have a higher tendency towards violence or criminal activities has been perpetuated by the media, particularly since the *Columbine High School Massacre* in which two American students used computer

games to rehearse the killing of staff and students in their school before carrying out the tragic act (King & Borland, 2003).

Abyeta & Forest (1991) began their research on the then-popular belief that games caused players to be unable to distinguish between fantasy and reality and that individuals who played regularly became involved in criminal behaviour. They found virtually no difference between role-players ($n=20$) and non-role-players ($n=25$), beyond that psychoticism had a higher incidence in the non-role-players than in role-players, although it has been commented that this finding may not be reliable because of the small sample size.

As regards the claims that gamers are involved in satanic practice and demonic rituals, Leeds (1995) used the Eysenck Personality Questionnaire on 217 adult male participants to measure levels of psychoticism, extraversion and neuroticism. There were three groups of participants, those who played fantasy RPGs ($n=66$), those who were involved in satanic dabbling, yet not fully committed to Satanism ($n=26$), and a control group of non-involved college undergraduates ($n=125$). The participants were also asked to complete the Belief in the Paranormal Scale (Tobacyk & Milford, 1983) and the Satanic and Fantasy Envelopment Scale (SAFE). After carrying out a series of one-way ANOVAs and Pearson Correlations, it was found that there was a significant difference between fantasy gamers and satanic dabblers in all of the measures used. This evidence suggests that either the popular hypothesis that games are a precursor to players becoming involved in satanic practices is incorrect, or that role-players who do become engaged in satanic practices undergo personality change before doing so.

Schnoebelen (n.d.) lists 11 murders and suicides claimed to be caused by involvement with *D&D*. One study (Carter & Lester, 1998) showed no difference in level of suicide ideation, depression, neuroticism or psychoticism between gamers and a control group. Stackpole (1989) investigated suicide rates of those involved with RPGs by calculating the expected suicide rates per the gamer population, at that time, an estimated 4 million players worldwide. The estimated suicide rate for this population was 500 individuals, on average. However, in his study, he had documented only 7 suicides of game players per year, and inferred that playing *D&D* appeared to cause a lower suicide rate amongst those involved. He also suggested that RPGs could even be used as a public health measure on the basis of these findings.

It should be noted that confirmation bias may play a part in the tenacity of the media when it comes to the detrimental effect of games on the players. Confirmation bias (Klayton, 1995), or confirmatory bias, is a prejudiced way of looking at information, which causes an individual “to seek and interpret information in ways that are partial towards existing beliefs” (Ask & Granhag, 2005, p. 45). Individuals have this inclination towards favouring information which stands to confirm a pre-existing ideas and hypotheses, and interpreting information in a prejudiced way, regardless of the truth of the information in question.

Another example of this was seen in the media in 2001, where Microsoft’s Flight Simulator software, designed for amateur enthusiasts, was depicted in playing a major role in the 9/11 terrorist attacks in New York, as the perpetrators were said to

have used this software to practice their attack. The fact that a small number of terrorists used this software does not, by any stretch of the imagination, imply that use of the software causes individuals to have a tendency towards such crimes.

2.3.5 *Summary: Who Plays Games?*

In respect to personality, little to no evidence has been found for a difference between gamers and the general population. The few differences that have been found may be due to small sample size in some cases and therefore are not conclusive. In other cases, further studies are required in order to fully confirm these findings. In summary, gamers have rarely been found to deviate from the general population as regards personality.

Gamers have been found to have marginally higher scores for Q1 'Experimenting; Liberal; Freethinking' and *Openness to Experience* (Carroll & Carolin, 1989; Simon, 1987; Yee 1999). It is unsurprising that gamers score higher in *Openness to Experience*, as a feature of high levels of *Openness* is having a vivid imagination, unusual ideas, and a tendency towards fantasy, all of which are important for games, particularly role-playing games.

Players were shown to be more likely to be introverted, yet also more likely to have a significantly lower score of empathic concern although high scores report as *prone to anxiety and shyness*.

The claims that players are more likely to become involved in cults, or carry out crime or violence towards the self or others have been investigated and there is some evidence to the contrary for each of these claims. It has been shown that players also have no higher scores than the general population in neuroticism, psychoticism, depression, suicidal ideation, extraversion, perspective-taking or personal distress. The control group in one study (DeRenard & Kline, 1990) reported having feelings of 'meaninglessness' and it is suggested that the advent of the fantasy Role-Playing Games in the lives of gamers stands to give extra meaning to the individuals involved. Participation in games may, indeed, serve a developmental function in terms of personality growth and development of social identity (Taylor, 2006; Taylor & Walford, 1972; Turkle, 1995; Turkle, 2005; Wallace, 1999). It has also been suggested (Stackpole, 1989) that owing to the low rates of suicide amongst role-playing gamers in comparison to that of non-gamers, that games could have some benefit if used as a public health measure.

In conclusion, from this detailed investigation of gamer stereotypes, demographics, interests and personality, gamers have not been found to differ significantly from the general population. As a result, the target sample for this research is individuals within the general population who have an interest in playing games.

Section 3: Immersion

In this section, a comprehensive overview of the immersion literature is provided. Historical and modern perspectives on immersion are considered. A section on the nature and importance of immersion includes discussion of motivations to immerse, vehicles for immersion and realism as it pertains to immersion. A comparison is also drawn between immersive gaming and method acting. Types of immersion are discussed and applications of immersive role-play in non-gaming situations are outlined, with particular focus on immersion in education. The effects of the immersive response are also considered, and, finally, the existing definitions of immersion are examined, alongside previous attempts to measure immersion.

3.1 Historical and Modern Perspectives of Immersion

Herodotus, a Greek historian from the fifth century BC, wrote a story about the origin of dice games in their invention by the Lydians. The Lydians had suffered a terrible famine for a time and decided on a plan to help combat the hunger of their citizens. Their plan was such that the citizens would eat during the first day, and the next day they would become so deeply engaged in games that they would not feel hunger and so would not need to eat. They planned to continue in this pattern until the famine ended. Even in this story of the origin of dice games, there is a mention of players being so engaged in a game that they almost forget themselves, and not only that, but immersion is seen as being the aim of the game.

In modern times, in the portrayal of role-playing games in popular media, particularly in television, film and comics, game players are regularly depicted as being entirely immersed within the game. That is, the original characters of the series become involved in a role-playing game and for the remainder of the action, the onscreen scene cuts ‘into’ the game, where the players are depicted dressed as their game characters and existing purely in the imaginary world of the game. This popular perception of role-playing games is inaccurate, as in reality the experience of immersion does not continue over a long period of time, but is fleeting, lasting for "short, intense periods" (Cairns, 2008, para. 2).

It can be seen from this that immersion, as a concept, has been considered for centuries, although in recent times a more scientific approach has been employed in order to dispel the misconceptions that have arisen over the nature of immersion. The application of an empirical approach in order to understand the concept is imperative.

3.2 The Nature and Importance of Immersion

Immersion is a complex concept, with many facets to be explored. As such, this section explores a number of facets that pertain to immersion and the immersive response. These include player motivations to immerse, the vehicles available for immersion and the theories of role-playing games which reference immersion. Also discussed are the considerations given to realism in immersion, and the connection between immersive gaming, and method acting, with a mention of metacommunication.

A group of European Live Action Role-Players (n=40) were asked the question: "*Do you believe it is possible to identify so strongly with one's character that it becomes one's primary identity (i.e. does, in your opinion, 'character immersion' exist)?*" (Harviainen, 2007, p. 25). 82.9% of answers were positive, with 93.8% of these stating that they had experienced immersion themselves. It can be seen from this that immersion is a prevalent concept in gaming.

3.2.1 Motivation to Immerse

The Oxford Dictionary Online defines a game as "an activity that one engages in for amusement" (2012), however amusement, or fun, is but one of the many potential motivations for playing games. For some, immersion is the primary motivation for engaging in game play. However, immersion, as an outcome, can be separated from the intrinsic outcome of a game. Individuals do not always play a game with the intention of becoming immersed; it can occur as an incidental outcome of playing the game (Jennett et al., 2008). It is possible, however, for an individual to play a game with the primary aim of becoming immersed in the experience. 'Character Uniqueness' and 'Discovery & Immersion' were ranked as the highest motivating factors for playing a game (Tychsen et al., 2008), which shows the importance of immersion even before the commencement of play.

Research has shown that violence in a game does not add much to player's motivations for engaging in that game (Przybylski et al., 2009).

Sherry et al. (2006) outline six motivations for players to become engaged in games, namely, Arousal, Challenge, Competition, Diversion, Social Interaction and Fantasy. The gratification which most closely resembles immersion, here, is Fantasy, including responses such as “You’re in it”, “It’s like you’re in another world”, “He puts himself into the picture” and “It takes you away from reality” (Sherry et al., 2006, p. 15). Arousal, however, is also applicable to the experience of immersion in more exciting, action-based pursuits, and includes items such as “I find that playing video games raises my level of adrenaline” or “Video games keep me on the edge of my seat” (p. 19).

During a cross-format analysis of multiplayer game experience (Tychsen et al., 2007), *Focused Immersion* is mentioned as one of the five factors that determine the gaming experience along with *Temporal Dissociation*, *Narrative Engagement*, *Heightened Enjoyment*, and *Intention to Revisit*. Focused Immersion is described as the measure of immersion and focus that the player felt while playing the game. Temporal Dissociation refers to the speed at which the player felt time passing as they played, and a higher level of temporal dissociation implies a high level of engagement in the game. Narrative Engagement is defined as the level of active engagement with the game. Heightened Enjoyment is the extent to which an individual enjoyed the gaming experience, and Intention to Revisit refers to, given the opportunity, whether the player would be likely to wish to revisit the experience. Focused Immersion, Temporal Dissociation and Narrative Engagement are interesting in that they are all concerned with different levels of engagement with a game and so they are relevant for this study on immersion.

Yee (2006), in his work on the motivations for playing MMORPGs, found *Immersion* to be one of the most common motivational factors for players, the other independent motivations being Relationship, Escapism, Achievement and Manipulation.

Bartle (1996), created a model of player 'types', specifically based on MUDs, which included four types of game-players: achievers, explorers, socialisers and killers. As part of his study, Yee created a questionnaire which included 40 factors based on Bartle's 'types' and of the Big-5 inventory items (N=6700). Yee performed a factor analysis on this data, and the items which were found to relate to Immersion are shown in Table 3.1.

From Yee's work, it was concluded that immersion is not a separate player *type* (Bartle, 1996), and so an individual can be a specific player type and also be immersed. Yee (2007) also noted that Bartle's player 'types', which were developed in relation to online MUDs, have never been tested empirically or demonstrated to be independent of each other. A player can also have high scores in more than one of the motivational factors at the same time, indicating that if immersion is a primary aim for a particular player, it is not necessarily his only motivation. Motivation to immerse, in this instance, is described as measuring "the desire to become immersed in a make-believe construct" (Yee, 2002, para. 2). Those who score highly in this factor tend to enjoy engaging in role-play, will think up a personal story for their character, and often use their character to "try out new personalities and roles".

Table 3.1

Items relating to Immersion, Yee (2002)

Factor: Immersion	Facet
I like to be immersed in a fantasy world.	Immersion
I like wandering and exploring the world.	Immersion
I like to try out new roles and personalities with my characters.	Role-Playing
People who role-play extensively bother me.	Role-Playing
I like the feeling of being part of a story.	Role-Playing
I make up stories and histories for my characters.	Role-Playing

As Yee's research progressed, he expanded his components of game motivation to include ten items, and through factor analysis found that these could be grouped into three main components - namely Immersion, Achievement and Social (Yee, 2007).

Focussing on the component of Immersion, Yee described the four subcomponents which make up this component - *Discovery*, *Role-playing*, *Customisation* and *Escapism*. The subcomponent, *Discovery*, echoes the work of Tychsen and his colleagues (2008) which showed Discovery & Immersion to be one of the primary motivating factors for gaming, and this involves exploring and discovering things within the game that the majority of other players do not know. The subcomponent, *Role-playing*, involves the construction of a character and this character's background story, creating an improvised narrative through interaction with the game's other players. The subcomponent, *Customisation*, is related to the *Role-playing* subcomponent as it entails interest in the creation and customisation, not

only of the character's story, but of the avatar's physical appearance. *Escapism*, the final subcomponent of Immersion, involves using immersion in a game as a method to avoid thoughts of real life issues. Yee's factor analysis noted that the three primary motivation components, Immersion, Achievement and Social, do not suppress each other. Therefore, it is possible to have more than one motivation for playing a game, and thus immersion is not necessarily the sole motivating factor.

3.2.2 *Vehicles for Immersion*

Total immersion has been described as the stage at which an individual playing a game feels entirely "cut off from reality" (Brown and Cairns, 2004, p. 1299). This concept is not a new one. While it is increasingly mentioned in the context of online games in recent years (Brown & Cairns, 2004), immersion can also apply when reading a particularly engrossing book or watching a movie in which the individual identifies with a character. "When identifying with a character in a book or movie, individuals tend to put themselves in the character's place, and in a sense, experience what that character experiences" (Witmer & Singer, 1998, p. 227). The experience of being immersed in a book or a film may be significantly different to being immersed in a game. In a game, the participant has control over the character and his actions, while in other media the character with which he identifies will follow the plot regardless of outside input – the role is already predetermined by the writer or director.

As Bartle commented in an interview (Jones, 2003), there is a difference between traditional tabletop games and online games, as regards player interaction, and thus

immersion. In a tabletop game, the players see each other first, and as the game progresses, they can experience the character through the actions of the player. In contrast, in online games, players initially experience the character, and they get to know the player through that character's actions.

The desirability of immersion by consumers and developers may also be taken for granted in some settings. Stam (2000) investigates 20th century critiques of the different popular media at the time, for example, theatre or film, and how immersion has not always been seen as a positive experience, regardless of the vehicle.

Although immersion occurs in other media besides games, it is beyond the scope of the current study to investigate these.

3.2.3 Immersion & Realism

Immersion, when described as being "transported to an elaborately simulated place", is considered to be a pleasurable experience (Murray, 1997, p. 98), and therefore has implications for the level of realism within the 'place'. It does not follow on, however, that total visual and auditory realism in a game is desirable, although this is a widely held misconception concerning immersion in games. According to Bartle (2003, para. 14), "If you introduce reality into a virtual world, it's no longer a virtual world, it's just an adjunct to the real world. It ceases to be a place, and reverts to being a medium." The level of realism can, at times, detract from an immersive experience rather than add to it (Grimshaw, 2007; Mori, 1970). Bartle (2003, para. 15) agrees, believing that introducing reality to a virtual environment can make it

less compelling, "it takes away that which is different between virtual worlds and the real world: the fact that they are *not* the real world." In this vein, the addition of voice chat to an online game may negatively affect immersion and the immersive response. Bartle concedes that it is possible for immersion to be enhanced by closeness to reality, stating, however, that immersion is "thwarted by isomorphism with it". This reflects the phenomenon introduced by the roboticist Masahiro Mori (1970) which he termed the *uncanny valley*: the idea that a greater level of realism does not necessarily equate with immersion and that overly lifelike avatars can, in fact, come across as being creepy or scary to a player.

There is an existing and common belief that the ability of a virtual environment to deliver an immersive response is related to the ability of the environment to simulate an illusory reality. However, according to Salen & Zimmerman (2004), this belief, termed the *immersive fallacy*, is inaccurate. "According to the immersive fallacy, this reality is so complete that...the player truly believes that he or she is part of an imaginary world" (p. 451).

While developers strive to create a sense of realism within games, perhaps the desirability of this goal has often been taken for granted, as there is a possibility that such an approach could hinder the immersive response rather than enhancing it.

3.2.4 Meta-gaming & Method Acting

'Meta-gaming', 'metacommunication', or 'meta' for short, is a term that is widely used in conjunction with games. In an online game, just as in a traditional tabletop game,

it is not entirely necessary for an individual to play the role of the character they are portraying. When a player decides on an action for his character, but uses information and an understanding of knowledge that comes from outside the game to inform his decisions and communicates with other players using Out-Of-Character speech, this is a manifestation of metacommunication and meta-gaming.

Metacommunication could be described as the opposite of immersion.

Although, metacommunication is an important aspect of children's play and development (Bateson, 1976; Verenikina et al., 2003), and it can be necessary in order to set up a framework of rules for a game, it is not conducive to immersion during game play, in most instances.

Immersion and meta-gaming are opposite approaches to a role-playing game, where a player makes decisions from the character's perspective or makes decisions from outside the stance of the character, respectively. The Big Model, a model occasionally criticised for overlooking immersion, theorises about character stance (Edwards, 2001) and describes four different stances of participants in a role-playing game: The Actor Stance, The Author Stance, The Pawn Stance and The Director Stance. The *Actor Stance* is where an individual uses only what the character knows and their personality factors to determine the character's actions. This is the closest stance to immersion that exists in the Big Model.

In Laws' (2002) book on advice for Games Masters (based on an original theory by Blacow, 1980), he attempts to classify different player types, the one which corresponds the closest with the immersionist approach is called *the Method Actor*.

It may be suggested, from the terms *Actor Stance* and *the Method Actor*, that the idea of immersion in a role is not one which applies only to role-playing games. There is a certain similarity between immersion of players in role-playing games and actors in their portrayal of a role. Immersion has wider applications in certain acting techniques, particularly in the use of method acting. In method acting, a system influenced by Stanislavski, actors are taught to immerse themselves in the emotions and thoughts of the role they are portraying, the goal being a very lifelike and realistic performance (Strasberg & Morphos, 1987). Even so, there are different levels to which actors choose to immerse themselves in a role. Some actors become immersed merely as a preparation for playing a role and use the exact process taught in method acting, while others go beyond what they are taught, and immerse themselves entirely in a character. In extreme cases, actors insist that others refer to them by their character name even while they are not filming. The actor Daniel Day-Lewis is the most often cited case of immersive method acting, having, for example, trained as a boxer for eighteen months, lived in the wild for six months, lived in solitary confinement in a disused prison, broken two ribs, refused to leave a wheelchair and even etched tattoos onto his body for various different roles during his career.

While an actor must follow, as far as possible, the script that a writer has written for him, some actors continue to play the part of their character even while not filming in order to get a better sense of their role. As such, during filming, the actor does not have control over most of the actions and plot of the story, but has an immense

creative input into the portrayal of the role and this can involve a deeply immersive experience.

From the research outlined in this section, it can be seen that immersion, as a concept, has a very complex nature, both in its ability to motivate players and how it is affected by game dynamics such as realism and communication between players.

3.3 Types of Immersion

Immersion research has often involved splitting the concept into different components. In the main, this research generally consists of a taxonomy of levels of immersion, placed upon a continuum that spans from the lowest to the highest level of immersion. However, a number of studies have attempted to split immersion into distinct *types* which do not necessarily lie along a continuum, for example, Diegetic and Non-Diegetic immersion (McMahan, 2003), Diegetic and Situated immersion (Taylor, 2002) Mental and Physical immersion (Sherman & Craig, 2003), Sensory, Challenge-Based and Imaginative immersion (Ermi & Mäyrä, 2005), Perceptual and Psychological immersion (Carr et al., 2006; Lombard et al., 2000) and Sensory-Motoric, Cognitive and Emotional immersion (Björk & Holopainen, 2005). These types of immersion do not necessarily encompass a higher level of immersive response than the other, and may be discrete categories of immersion. This is examined in this section, and an overview of each of these types is given.

3.3.1 *Diegetic & Non-Diegetic Immersion*

A concept that may be compared to this distinction of *Vicarious Immersion* and *Visceral Immersion* is *Diegetic immersion* and *Non-Diegetic immersion* (McMahan, 2003). Diegesis is often mentioned in relation to games, although diegesis in games is generally considered in terms of features: diegetic or non-diegetic music, diegetic or non-diegetic interfaces and other features of a game which may affect the user's level of immersion, rather than the immersion itself being categorised as diegetic or non-diegetic. Diegesis is considered important enough to be represented when designing features for a game.

In order for something to be described as 'diegetic' in a game, this implies that it is intrinsic to the game-world. Game music is a good example of this. If the music is diegetic, characters within the game may be standing in a shop where the music is playing over the PA system or attending a concert where both the characters and the players can experience this audio. In the study of film, this music is sometimes referred to as *source music*. Non-diegetic music, on the other hand, is music which is included in order to add to the game experience for the player, but is not accessible to the character. This music can also be referred to as *underscore*.

Diegesis is the telling of a story through narration, as opposed to a story being shown and enacted. In Pohjola's (2004) definition of immersion, a diegetic aspect is mentioned in: "assuming the identity of the character by pretending to believe her identity only consists of the diegetic roles" (p. 84). Others disagree with this definition on the grounds that using a diegetic framework is not suitable to describe a role-playing game as a whole (Montola, 2008).

McMahan (2003) initially describes immersion as containing a diegetic aspect and a non-diegetic aspect. She then splits immersion into two levels – the diegetic level of immersion and the non-diegetic level. In her description, the diegetic level of immersion involves the player being immersed in the "world of the game's story" (McMahan, 2003, p. 68), while the non-diegetic level involves being immersed in strategy of the game. Subsequently, McMahan calls non-diegetic immersion 'engagement' and the diegetic aspect alone becomes 'immersion'. Both of these concepts are part of the continuum of immersion as developed by Brown & Cairns (2004). In ascending order of strength of immersive response, Brown & Cairns' continuum contains three levels: engagement, engrossment and total immersion. From the description, on the continuum of immersion, diegetic immersion corresponds with total immersion and non-diegetic immersion is at the same level as engagement, a lesser level of immersion. McMahan describes deep play as a measure of the "player's level of engagement" (2003, p. 69).

As the use of the term diegesis in games usually pertains to diegetic or non-diegetic interfaces or audio, and their influence on immersion, it is difficult to place McMahan's classification vis-à-vis other researchers in the field.

If McMahan's classification refers to two levels of immersion which could be placed on a continuum of immersive response, then this new distinction involving vicarious immersion and visceral immersion differs in this way, as it refers to two distinct types of immersion. As such, vicarious immersion and visceral immersion do not fit on a continuum of strength of immersive response as neither type of immersion is necessarily stronger than the other.

3.3.2 *Diegetic and Situated Immersion*

Taylor (2002), in her master's thesis which investigates the concepts of perspective and point-of-view in relation to immersion, proposes another set of immersive types. In this case, the representation of space and the perspective of the player and character towards the game space are deemed to be the important factors, and the player's sense of immersion is defined as the extent to which "the player feels integrated with the game space" (Taylor, p. 12). The emergence of these types or levels of immersion does not appear to be grounded in empirical research.

Taylor proposes two types of immersion, diegetic immersion and situated immersion. *Diegetic immersion* refers to "immersion in the game" (2002, p. vii), and implies immersion in the act of playing a game. *Situated (or intra-diegetic) immersion* describes "immersion within the created virtual space of the game" (p. viii), or immersion that occurs in the game's *virtual* space, as opposed to a material, physically experienced space, and is "situated through both a character's perspective and an embodied point-of-view" (p. viii). This type of immersion occurs when the player is immersed in playing the game *and* in the "experience of the game space as a spatial and narrated space" (p. 12). For the player to feel as if they are in the game space, it is important that the game has a "clearly identified or demarcated position within that game space" (p.9).

Taylor states that diegetic immersion and situated immersion are not, in fact, exclusive types of immersion, but that they exist along "an xy axis" (p. 13). It is explained that games provide different combinations of these types of immersion, while some games will provide solely diegetic forms. There are not "exclusive forms" of immersion, but levels upon a continuum (p. 13).

Arguably, as individuals do not get immersed in the act of playing the video-game without being at least somewhat immersed in the game, diegetic immersion cannot occur without the presence at least some situated immersion. Otherwise, it would be highly unlikely for an individual to get immersed in hitting buttons on a keyboard without taking any aspects of the game itself into consideration. According to McMahan, “in order for intra-diegetic immersion to occur, the player must first be diegetically immersed in the game” (2003, p. 14).

3.3.3 *Mental and Physical Immersion*

Another possible division of immersion is *Mental immersion* and *Physical immersion* (Sherman & Craig, 2003). The mental and physical divide of immersion was developed specifically in relation to the experience of virtual reality, and as such, this must be kept in mind in interpreting the relevance of these types for game immersion.

Mental immersion is described as being “engaged to the point of suspending disbelief in what they are experiencing” (p.384) and also as “having ‘a sense of presence’ within an environment” (p. 9). Physical, or sensory, immersion, is described as “bodily entering into a medium” (p.9) and is clearly more applicable to Virtual Reality technology than to online games and other pursuits. VR research often discusses immersion in these physical terms. Civitarese (2008, p. 281), for example, describes immersion as “the possibility of ‘entering’ a computer-simulated VR environment and of interacting ‘physically’, with the objects inside it, of receiving their responses in real time, thanks to an interface adapted to the characteristics of the human body.” Another description of physical immersion, as a

“synthetic stimulus of the body’s senses via the use of technology” (p.9) is immediately more easily applicable to the experience of games.

While other definitions of immersion speak of being 'in' the game, for example Bartle's (2005, p.8) definition of immersion as "the sense that a player has of being in a virtual world" and Murray's (1997, p. 98) description of the concept as "the experience of being transported to an elaborately simulated place", they generally refer to this in the metaphorical sense. Murray follows on to explain that immersion is "a metaphorical term derived from the physical experience of being submerged in water". A sense of *presence* in the game is increasingly spoken of in reference to general computer games, and this appears to correspond with Sherman & Craig's mental immersion (2003). It appears that their description of physical immersion is not easily generalisable outside VR games, although with the advent of devices such as the *Kinect*, the gaming industry is approaching overlap with VR research.

3.3.4 Sensory, Challenge-Based and Imaginative Immersion

The SCI model of gameplay, a heuristic gameplay experience model, emerged from observations and self-evaluation questionnaires of children playing games, and their non-gaming parents (Ermi & Mäyrä, 2005). This model outlines three types of immersion. *Sensory immersion* is concerned with the audiovisual presentation of a game, utilised in such a way as to overpower any external, real-world sensory information. The optimum vehicle for this would be VR environments, for example CAVEs (Cave automatic virtual environments). *Challenge-based immersion* occurs

when game developers create a good balance between game-based challenges and the player's ability. Ability, in this case, is categorised as involving motor skills or mental skills, or both. *Imaginative immersion* involves imagination, character empathy and enjoyment of the story and world elements, and therefore has the closest parallel with vicarious immersion.

Although sensory immersion appears to be immersion created through the “audiovisual execution” of the game, the paper also describes the game’s ability to overpower the senses alongside the experience of becoming focussed on the game, so it is unclear whether sensory immersion is an aspect of system immersion or the immersive response (Ermi & Mäyrä, 2005, p. 7). Challenge-based immersion, the “feeling” of being able to “achieve a satisfying balance of challenges and abilities” (p. 7), and imaginative immersion, becoming “absorbed with the stories and the world” and the game character, are clearly aspects of the immersive response. Imaginative immersion, here, has parallels with vicarious immersion, while challenge-based immersion is different, in that it appears to focus on matching a game to the player’s mental or motor skills.

The SCI model was empirically tested using a questionnaire administered to gamers (N=193), who were asked to evaluate their experiences of popular games. Through exploratory factor analysis, the SCI model was replicated in the questionnaire structure, and further research and development of the questionnaire was planned. The intended objective of the SCI model was to create a model of gameplay experiences, and Mäyrä (2007) stated that the SCI model was not sufficient to cover this purpose, as it had focussed exclusively on immersive experiences of play, to the

exclusion of other types of experiences. Although he has developed an updated version of this model, which includes non-immersive gameplay experiences, these aspects are not directly relevant to the current study and so will not be discussed here.

3.3.5 Perceptual and Psychological Immersion

Carr (Carr et al., 2006) proposes that definitions of immersion are divided into two types, *Perceptual immersion* and *Psychological immersion*. Perceptual and psychological immersion had been mentioned previously by a number of sources (Lombard et al., 2000; McMahan, 2003).

Perceptual immersion is the extent to which the game experience "monopolizes" the player's senses (Carr et al., 2006, p. 69). Ermi & Mäyrä's (2005) classification of sensory immersion appears to fit within this category. Perceptual immersion is described by McMahan (2003) as being accomplished by "blocking as many of the senses as possible to the outside world and making it possible for the user to perceive only the artificial world, by the use of goggles, headphones, gloves, and so on." (p. 77). From this description, it is clear that perceptual immersion is more easily achieved through VR technology than through games. "Sensory or perceptual immersion implies a relationship between player and avatar that is more immediate but less negotiable" (Carr et al., 2006, p. 70).

In contrast to this, psychological immersion does not involve the sensory aspects of the game, but rather the player's engagement in the game using their imagination or their sense of "mental absorption" (McMahan, 2003, p.77).

Perceptual immersion is described as the perceptual system of the user being submerged in the virtual environment (Biocca & Delaney, 1995), while psychological immersion refers to the extent that players feel involved in the environment. This brings to mind the definition by Slater (1999), of system immersion and immersive response. System immersion is the extent to which a technology system provides features which can give rise to an immersive response, and it could be considered that a parallel exists in perceptual immersion, this being the extent that the game system provides features which could facilitate psychological immersion.

3.3.6 Spatial, Emotional, Cognitive and Sensory-Motoric Immersion

Björk and Holopainen (2005) explain that there can be many forms of immersion, and as such, propose four types of immersion, *Spatial immersion*, *Emotional immersion*, *Cognitive immersion* and *Sensory-Motoric immersion*. They also mention a fifth type, *Psychological immersion*, as one which has been unfounded after rigorous research.

Spatial immersion occurs when navigating and manoeuvring within a simulated setting such as a virtual game environment. This type occurs when players feel as if they are actually "there" and the world feels "real" (Rice, 2008, p. 14), and is more likely in first-person perspective games (Björk & Holopainen, 2005). According to

Björk & Holopainen, spatial immersion is most common in real-time games and, to a lesser extent, in films. Some parallel could be drawn between this type of immersion and presence, the "subjective experience of being in one place or environment, even when one is physically situated in another" (Witmer & Singer, 1998, p. 225).

Emotional immersion is described as a response to character-based events, and this type of immersion is more prevalent in books, films and theatre than in games, although this depends on the game genre. Game aspects such as a "positive empathic link toward the Avatar" can improve emotional immersion (Björk & Holopainen, 2005, p. 78). Cognitive immersion occurs when deeply involved in reasoning, problem-solving and complex intellectual challenges. Sensory-motoric immersion occurs when carrying out repetitive, tactile movements which map to actions in the game.

Psychological immersion is also mentioned by Björk & Holopainen. Described as a sense of "confusion of the *Game World* and the real world" (p. 206), it is stated that despite rigorous research, psychological immersion remains unsupported. This type of immersion echoes the concerns of participants in the current qualitative study (Section 4) where they discussed that losing track of reality or believing that the game world was reality could be construed as a form of mental illness.

3.3.7 Summary: Types of Immersion

In summary, a number of these divisions of types of immersion do not appear to classify distinct categories of immersion, but instead outline different levels of immersion which exist along a continuum. This appears to be true in the cases of Diegetic & Non-Diegetic immersion and Diegetic & Situated immersion. The

classification of Diegetic and Situated Immersion, also, does not appear to be grounded in empirical data.

Mental and Physical immersion describe two discrete categories of immersion, however, as they were developed in respect to Virtual Reality, they are not necessarily generalisable to all games. However, as technology advances, there are intersections between games and virtual reality, and so descriptions of immersion which currently appear to be relevant primarily for VR applications may become increasingly relevant for games.

The fact that Ermi & Mäyrä's SCI model of immersion was assessed using questionnaires lends it more weight than a number of the other classifications. It would be interesting to examine any further work on these classifications, although it appears that Mäyrä's research changed direction and instead of focussing on immersion, the model was expanded to include other aspects of the gameplay experience which are not immediately relevant to the research at hand.

Perceptual and Psychological immersion are described by Carr (Carr et al., 2006) as two categories of definitions of immersion, and, from the discussion of these by a number of researchers, it appears as if perceptual immersion occurs most readily in Virtual Reality environments where advanced technology enables the game to overtake the perceptual system. Perceptual immersion could be likened to Slater's description of System Immersion. Psychological immersion, however, involves the use of imagination and mental absorption, which allows it to fit more clearly within the banner of immersive response. This description differs from Björk &

Holopainen's description of Psychological Immersion as occurring when the player develops a sense of confusion between the real world and the virtual world, although Björk & Holopainen's psychological immersion has not stood up under rigorous testing.

3.4 Applications of Immersion

Although immersion is considered to be an important element of games, it is also a factor in many other settings, *inter alia* for the exercise of role-playing in its use for education, therapy, job training and for actors playing roles in theatre or on screen. In this section, some applications of immersion are discussed with particular emphasis on immersion in education.

Role-play has been used by the University of Indiana (Press, 2009), to test the viability of 'FutureFirm', a fictional law firm which is hypothetically in trouble. Judges, members of big law firms, clients and students immersed themselves in a weekend-long role-play exercise in which they dealt with various scenarios and considered whether the troubled law firm could survive for another decade.

Computer programs are used in order to allow colleagues who are separated by long distances to work in the same immersive work environment.

Role-play is used in the medical field as a psychotherapeutic technique, with the aim of decreasing social conflict. In this technique, clients attempt to increase their understanding of other points of view by taking on and acting out behavioural roles

(The American Heritage Stedman's Medical Dictionary, 1995). Immersive role-play was also used by Moreno in his pioneering of *psychodrama*, (described by Moreno as an early form of group psychotherapy) a process in which individuals acted out problems and conflicts within a group with an emphasis on role-playing, creativity, spontaneity and catharsis.

3.4.1 Immersion in Education

As e-learning platforms and technology-based learning become increasingly common in schools and universities, a lot of research has been carried out into immersive environments and how to maintain these in this style of teaching (Kickmeier-Rust et al., 2007).

Immersive role-playing is also widely used in classrooms for TEFL Courses (Teaching English as a Foreign Language) (White, 2007). Language immersion - a prominent application of immersion education - is a method whereby students are immersed in a second language, and all of the teaching is carried out through the language they are attempting to learn. All subjects are taught through this language. This method of learning can be seen in the Gaeltacht (Irish-speaking) areas in Ireland, or in areas of Canada where students move to a French-speaking region in order to learn the language.

In many cases of immersion learning in TEFL, the student is given a role and must take on that role as far as possible for the duration of the class. The student is instructed to take their roles seriously and not to break out of character. The idea

behind this is to give the student the opportunity to use English, as the language being taught, in as real a situation as possible without having to go to another country to use it in real-life situations. This method is not used merely as an exercise for one part of the class, but can comprise the entire class, and while in the classroom, the student becomes the character he is playing.

Research into immersion in education suggests that learning while immersed in a virtual environment can have a positive effect on memory (Bowman et al., 2009). In many skill-based educational environments, immersive technology is applied in order to allow students to learn and practice important skills such as surgery, driving, and piloting a plane.

Virtual flight simulator programs have been used for many years in order to teach pilots the skills necessary for airplane flight, many using a real model of a cockpit along with the virtual program in order to train the pilots using the real controls (Brooks, 1999). Teleoperation programs such as *Tele-Immersion* allow surgical students to virtually learn new skills without the inherent risks involved in actual surgery.

It is suggested from theory that immersion is not inherently transformative (Carr & Oliver, 2009). In other words, immersion does not necessarily involve "becoming critically aware of one's own tacit assumptions and expectations and those of others and assessing their relevance for making an interpretation" (Mezirow, 2009, p. 4).

There is no clear-cut idea of what immersion stands to bring to education and indeed, it may hinder learning. If students have expectations before they engage in a whole-

class online immersive experience such as *Second Life*, they may look at their immersive experience from a stance of dual consciousness, in which they are not fully immersed but always thinking about grades for the class or how they will be marked depending on their online behaviour or what the other students are like in *real life* (Carr & Oliver, 2009). Salen and Zimmerman (2004) believe that there is a dual nature and a double consciousness to play. In this state of dual consciousness, the player manipulates her avatar, yet she is constantly aware that the character is merely an artificial construct. The dual consciousness is not necessarily a negative experience; it allows for a *multi-layered* experience and makes for richer play.

Boocock and Schild (1968, p. 89) disagree with the possibility that role-playing and strategic analysis can be compatible behaviours, stating that instead of complimentary behaviours, these "turn out to be incompatible behaviours, one requires immersion and loss of perspective, the other requires stepping back and objectivity."

If a user has to take a step back from an immersive experience in order to critically evaluate something, and in order to pay another type of attention, then immersion could, in some cases, play a negative role in education, as without critical thought and the possibility of *stepping back*, the student may lose some of the educational benefits.

Frasca (2004) also makes a differentiation between the passive pleasures of immersion and conscious, active participation, and this echoes the work of Pine and Gillmore (1999) concerning experiences which involve either active or passive participation, and levels of connection which range from absorption to immersion.

According to Pine & Gillmore, immersion is defined as “becoming physically (or virtually) a part of the experience itself” (p. 31), while absorption is described as “occupying a person’s attention by bringing the experience into the mind from a distance” (p. 31). Frasca compares the two in terms of whether the player goes into the experience, immersion, or whether the experience goes into the player, absorption of the experience. Sanford and Madill (2007, p. 451) agree and maintain that academics should "problematize the seamless qualities of video game play and creation and create spaces where players can step back from the powerful, immersive qualities of game play and examine values."

Immersion occurs when one is fully absorbed but sometimes when it is necessary to take a step back and consciously pay attention, this is termed engagement. Game playing can involve many such shifts in attention, and one level of attention is not necessarily claimed to be *better* than the other for the purposes of education. In this context, Carr (Carr et al., 2006, p. 55) cautions against placing a higher value on either engagement or immersion: "the two states are complementary" and she believes that games are compelling "because it allows the player to constantly move between the two."

While immersion is used in some educational contexts, it may be wrong to assume that immersion, in itself, is beneficial for learning purposes. However, there is evidence that there is a causal link between time spent learning and student achievement, and when more immersed, students may be likely to spend more time learning (Berliner, 1991).

It is worth noting that much of this research into immersion in education has been carried out specifically in relation to *Second Life*.

3.5 Effects of Immersion

As immersion has yet to be definitively described, there is, as yet, little research on its effects, physical, physiological or emotional, on the individual player. This section outlines a number of studies which have dealt with the effects of immersion.

A recent study found that total immersion may incur positive or negative effects, stating that "immersion is not only viewed as a positive experience: negative emotions and uneasiness (i.e. anxiety) also run high" (Jennett, et al., 2008, p.658). Some of the positive effects may concern excitement with the role, enjoyment on completing tasks, collaboration with other players, whereas the negative effects may involve obsession with the game, neglecting real world tasks or relationships, detachment from the real world, and this could hinder a player's progress in real life situations.

Other effects could be viewed as *both* positive and negative depending on the particular situation. Immersion in a game might provide escapism (Yee, 2007), a healthy diversion from the strains and stresses of everyday life, such as when adolescents "are temporarily transported from life's problems by their playing" (Provenzo, 1991, p. 64). When this behaviour is taken to an extreme, however, as in addictive behaviour, it can impact negatively on the individual's quality of life.

In more sedentary games which may involve a more intellectual exercise, a player's health could be jeopardised by over-indulging in the game and neglecting physical activity (Rideout et al., 2010). On the other hand, individuals who engage in physical games on the Wii gaming console or Live Action Role-playing (LARPs) may have the opposite experience as participation in the game can involve much higher levels of physical activity, exercise and consequent fitness. Interestingly, when compared with the general population, it was found that players of the game *EverQuest 2* were, on average, less overweight than the rest of the American population, and they self-reported as engaging in vigorous exercise once or twice per week (Williams et al., 2008). This is a striking finding considering that *EverQuest 2* is a sedentary game.

During immersive play, it stands to be seen whether or not physiological effects – changes in heartbeat, respiration for example – may be observed during periods of intense activity. The effects of immersion on eye movement have been observed (Jennett et al., 2008) and this will be discussed further in Section 3.8 *Measuring Immersion*.

The issue of addiction as an effect of immersion has been considered. Addiction, as a factor in the psychology of video games, has been mentioned as far back as 1983 (Loftus & Loftus, 1983), as a product of the reinforcement effect produced by "beating a previous high score or winning a free game or shooting down enemy spaceships" (p. 14). Game addiction has become a heavily discussed topic in recent years. The degree of immersion while playing a MMORPG (Seah & Cairns, 2008) was discovered to be highly correlated with the addiction score ($r=0.763$) and addiction was described as "an extreme form of engagement and immersion" (p. 55).

This seems to be too simple an explanation, as immersive response is a state of being and the experience of playing, while addiction and engagement are both traits (Seah & Cairns, 2008). It has yet to be conclusively found if there is any causation between immersion and addiction to games.

There can be negative effects on individuals who get overly immersed in the imaginary world of a game. While there is currently no inclusion of game or online game addiction in the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (American Psychiatric Association, 2000), or in the DSM-V which is due for publication in 2013, it has been suggested that such is becoming increasingly necessary (Block, 2008). In South Korea, there are worries that approximately 210,000 individuals have cases of MMORPG addiction, some of these being such serious cases as to require hospitalization (Choi, 2007). However, some research has indicated that the prevalence of game addiction in Korea may not be as high as commonly perceived (Seok & DaCosta, 2012). A study was carried out in Korea which involved administering the drug *Bupropion* in a sustained release program, a drug which has been used to treat patients with substance dependence, to 11 individuals with Internet video game addiction (>30 hours/week) (Han et al., 2010). During the six-week course of treatment, it was found that cravings for play, gameplay time and cue-induced brain activity were decreased. This is, however, a study with a very small sample size and with no placebo based control group and so their results cannot be generalised.

A model which is often used in order to 'diagnose' game addiction (Griffiths, 1995) is Brown's addiction model (1997), which includes the criteria salience, euphoria, tolerance, withdrawal symptoms, relapse and reinstatement. Interestingly, recent

research (Charlton & Danforth, 2007), suggests that the more peripheral of these criteria (salience, tolerance and euphoria) occur when an individual is engaged, and occur before the more extreme criteria arise (conflict, behavioural salience, withdrawal symptoms, relapse and reinstatement). This may indicate that individuals experience a period of high engagement, which is non-pathological, before becoming 'addicted', and so addiction should only be diagnosed using the more extreme of Brown's criteria. It may also suggest that engagement or immersion in a game may be a potential starting point for problematic game use. Although there is no consensus on the addictive personality, it may be considered that some individuals could be more prone to addiction owing to a number of internal or external factors.

One psychiatrist, most well-known for his position as chairman for the National Coalition of Television Violence and for his controversial views, Dr. Thomas Radecki, is quoted as saying:

"I've found multiple instances of attitudes, values and perceptions of reality that were strongly influenced by an immersion in these games. When someone spends 15 to 30 hours a week dreaming of how to go out and kill your opponents and steal treasure, it's not surprising that the desire to act it out in real life occurs" (Branch, 1998, para. 4).

The most extreme cases of negative effects that the media has portrayed were cases of severe bodily deprivation and even death in some cases (Miller & Stanley, 2002). A number of murders (Horowitz, 2007) and suicides have been attributed to online games by the media, but the evidence in the majority of these cases is inconclusive.

The majority of these contentious claims have been discounted by serious commentators, and no evidence has so far been forwarded to substantiate them.

3.6 Descriptions & Definitions of Immersion

Earlier, in Section 1.2 *Boundaries of Research*, there is a brief discussion of existing definitions of immersion, and these are examined in greater detail in this section.

Immersion is a subjective state of intense involvement. Much of the research on the concept of immersion applies directly to computer and video games, although it is also applicable to other forms of media. Games designers have, of late, begun to characterise their games as *immersive*, this despite there being, as yet, no accepted definition of the concept. Immersion is seen as important and is often spoken about in online gaming circles, yet exactly what immersion is, remains elusive. Jennett et al. speak for many when they characterise immersion as being "key to a good gaming experience" (2008, p.644).

The dictionary defines immersion as a "state of being deeply engaged or involved" or as "concentrating on one course of instruction, subject, or project to the exclusion of all others for several days or weeks; intensive" (Immersion, 2012). The first dictionary definition can easily be applied to many genres of game, while the second definition is more characteristic of games such as MMORPGs, or MMOGs, where individuals become intensely involved for an extended period of time, although it can, on occasion, also apply to other types of games.

Brown & Cairns (2004) define immersion, simply, as "the degree of involvement with a game" (p. 1298). In their description of immersion, Coomans & Timmermans outline immersion as being a feeling of being deeply engaged where people "enter a make-believe world as if it is real" (1997, p. 6). While these are broad definitions, they are acceptable and because of their nature they are more universally applicable.

In the quest for a more detailed description of the concept, Grimshaw (2007) describes the possibility that immersion is "primarily perceptual and is manifested by a shift of perceptual focus, from an awareness of 'being in and part of' reality to 'being in and part of' virtuality such that, in the ideal case, virtuality becomes substituted for reality" (p. 119). In *The Experience Economy* (1999), Pine & Gilmore describe immersion as "becoming physically (or virtually) a part of the experience itself" (p. 31). These latter definitions attempt to delve deeper into the nature of immersion and what actually occurs during the immersive response and are consequently much closer to the core of the concept.

Occasionally, when deeply immersed in a game, individuals fail to notice the world around them, becoming unaware of people talking to them, or of the passage of time, and this has been described as becoming "cut off from reality" (Brown & Cairns, 2004, p. 1299). The characteristics of the immersive response are considered to be, among others, a lack of awareness of time and of the real world around you, and a sense of actually being present within the task environment – immersion gives a sense of real-world disassociation (Haywood & Cairns, 2005; Jennett et al., 2008). While immersed, a player may feel instant gratification when their character completes a challenge of some type, but conversely, experience negative feelings

such as guilt or remorse if their character's action brought about an undesirable outcome.

Although there are many varying definitions of immersion, all of which come from different perspectives, there is a clear dichotomy of immersion which considers it from the position of the system, system immersion, and that of the individual, immersive response.

Witmer and Singer (1998) view immersion from the standpoint that while investigating immersion, it is important to look not only at the characteristics of an immersive technology system, but also at the individual differences which may affect the immersive response in any given situation. Their research defines immersion as "a psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences" (Witmer & Singer, 1998, p. 227). This view depicts immersion as the effect that the use of an immersive system has on an individual user, paying attention to the user's individuality. Witmer & Singer have also developed the Immersive Tendencies Questionnaire, a measure of the level of presence experienced by the user when in the game environment. A more recent instrument which was adapted from the Witmer & Singer instruments and developed to measure the individual's immersive capacity is the ImmersAbility of Individuals Questionnaire (Norman, 2010).

Slater (1999) disagrees with Witmer & Singer's (1998) definition of immersion, characterising the concept instead as "the extent to which the actual system delivers a

surrounding environment, one which shuts out sensations from the 'real world' which accommodates many sensory modalities, has rich representational capability, and so on” (p. 1). This depiction of immersion involves the technology of the system in question and does not focus on the response of the user to the system. Immersive features are "obviously measurable” according to Slater (p. 1). He is of the opinion that it is possible to objectively judge the level of immersion of a technology, the degree to which it provides an immersive response to the participant. Later, Slater describes immersion as the objective level of fidelity of the sensory stimuli produced by a technological system (2003), again emphasizing the idea that immersion, for him, comes from the technological system.

Immersion is split into two facets, namely, *system immersion* and *immersive response*. Slater (1999) differentiates between these facets. The term ‘Immersion’, as a whole, includes all aspects of the experience of being immersed, while *system immersion* is the part of this construct which causes the *immersive response*. This is based on Slater's theory of immersion as the degree to which the system can provide an immersive experience, which seems an over-simplification.

It is not expected that *immersive response* is directly proportional to the *system immersion*, but that there are other factors which can cause a change in an individual's *immersive response* in relation to a given system. Factors other than system immersion, such as distractions, individual differences, even the time spent and conscious effort that the user contributes towards an immersive response could easily contribute to, or detract from, the individual's immersive response. The possibility that *Openness to Experience* may also contribute to the *immersive*

response has been suggested (Jennett et al., 2008). When split up into *system immersion* and *immersive response*, the current study is concerned with the *immersive response*.

Immersion is mentioned in many facets of different computer games, and notably in Virtual Reality (VR) related research also. Information Intensity, Interactivity and Immersion (Heim, 1998) are very important terms in the study of VR, where Immersion is described as the capability of a VR system to deliver an environment which shuts out real world sensations (Slater & Wilbur, 1997). As this study is focusing on the individual's level of immersion while playing a role, the immersive response as opposed to system immersion, this definition of immersion does not apply.

3.7 Situating Immersion

In recent years, research has attempted to quantitatively measure immersion in online and offline computer games. Often, immersion is depicted as existing on a continuum of engagement with a game, and this section includes a review of attempts to characterise this continuum.

Prominent immersion researchers (Carr et al., 2006; Hargadon & Douglas, 2000) represent *immersion* and *engagement* as phenomena which exist along a continuum which depicts the stance of the individual towards the game at any given moment. *Immersion* and *engagement*, however, are concepts which are seen, by some, to apply separately to different aspects of computer games (McMahan, 2003). In McMahan's research, *immersion* itself is believed to apply to the fantasy and

narrative aspects of a game, while *engagement* is seen as relating to the game play and challenges which arise within this play yet outside the narrative.

Just as the *immersion-engagement* continuum, Newman, in his work on play sequences (2002, para. 11), depicts two types of engagement as sitting on an "ergodic continuum", with online engagement and offline engagement at opposite ends of the line. Ergodic is defined as "of or relating to a process in which every sequence or sizeable sample is equally representative of the whole" (Ergodic, 2012) 'On-line', in this instance, refers to direct input from the player to the game, while 'off-line' can refer to anything which does not involve player input, such as viewing video cut-scenes and score screens at the end of a level. In this regard, Newman sees videogames as being non-ergodic, purely because of the existence of game sequences in which a player has no direct input. Calleja (2007), however, disagrees with this view, stating that there are plenty of occasions where a player does not engage in a direct input into the system, yet they are stepping back and considering actions, for example, in a strategy game, or waiting in readiness, for example, playing as a sniper in a First-Person Shooter. There may not be a direct input at every given moment, but the player still has "potential and readiness" (p. 239).

Brown and Cairns (2004) interviewed gamers with the aim of investigating online game experience. Subsequently, they analysed the data using grounded theory on and there emerged a division of immersion into three levels on a continuum – *engagement*, *engrossment* and *total immersion*. The only games that were found to have an experience of *total immersion* were first-person perspective games and games in which the player assumes the role of a character. With each of these levels

of immersion, the immersive experience could be constrained by a series of barriers. The lowest level of immersion, and the first level to be achieved before becoming immersed, was found to be *engagement*, where the player needed to overcome the barriers of *Access* and *Investment*. The barrier to *Access* has two aspects: *Player Preference*, which refers to the fact that an individual will not try to access the game if they do not like this style of game, and *Game Controls*, where it is necessary for the controls to correspond with the action appropriately so as not to be difficult for the user to grasp. The second barrier to *engagement* is *Investment*. In order to achieve *engagement*, the player must "invest time, effort, and attention" in the game (Jennett et al., 2008, p. 642).

The next level of immersion is termed *engrossment*, and in order to achieve this level, the player must have already become engaged with the game by *accessing* and *investing* in it. The barrier that must be overcome in order to be engrossed in the game is called *Game Construction*. *Game Construction* is where the features of the game unite so as to cause the player's emotions to be affected merely by playing the game. At the level of *engrossment*, there is a high level of emotional investment in the game which can be a positive, but may also be negative in that when an individual stops playing he may feel "emotionally drained" (Brown & Cairns, 2004, p. 1299). In this stage of *engrossment*, it has been found that the player is less self-aware and less aware of their surroundings than in the *engagement* level.

For Brown & Cairns, *Total immersion* is the highest level of immersion on this continuum. This level is described by one of the participants in their grounded theory study as "When you stop thinking about the fact that you're playing a computer game and you're just in a computer" (p. 1299). According to this study, *Total*

immersion is a level at which the game exclusively has an effect on the player's thoughts and emotions. As with *engagement* and *engrossment*, there are barriers to *total immersion*, namely, *Empathy* and *Atmosphere*. *Empathy*, here, refers to attachment to the game, and *Atmosphere* is the "development of game construction" (Brown & Cairns, 2004, p. 1299). Within this phenomenon of *total immersion*, it was found to be important to pay attention to different aspects of a game, namely, visual, auditory and mental attention. If a player must attend to more sources of information, more effort is required for playing the game, and because of this he will increasingly feel as if he is within the game. Immersion correlates with the number of attentional *types* as well as the number of attentional *sources*, for example, more than one source of sound or visuals requires that more attention be paid.

In a study which dealt solely with MMORPG development (Alexander, 2005), four levels of immersion were proposed: Un-immersed, Avatar, Character and Persona. An *un-immersive* experience requires that a player regards their character as merely an object that he does not relate to. The next level of immersion, termed *avatar*, is the level at which a player regards the character and their avatar, as being their representative in the imaginary online world. The *character* level of immersion is where a player extends his own personality onto the character, and the final level, *persona*, involves the player believing that he is actually part of the virtual world.

Bartle (2010, p. 211) describes the level of immersion termed *persona* in a very clear way:

"A persona is a player, in a world. Any separate distinction of character has gone – the player is the character. You're not role-playing a being, you are that being; you're not assuming an identity, you are that identity. If you lose a fight, you don't

feel that your character has died, you feel that you have died. There's no level of indirection: you are there." This is the level which corresponds with full immersion.

3.8 Measuring Immersion

As the principal aim of the current study is to develop an instrument to quantitatively measure immersion, previous attempts to measure immersion are considered here.

Lombard et al. (2000) suggest that self-report is the most effective method of measuring the psychological state of immersion.

In a study by Cairns et al. (2006), participants were asked to either carry out an immersive computer game or a non-immersive, computer-based task. Cairns used savings on *time-on-task* as a measure for immersion in a game. As part of this research, participants filled in a questionnaire to determine their subjective level of immersion, completed a tangram task and then were involved in either an immersive or a non-immersive task and were finally required to complete a similar tangram task as before. It was found that the experimental group, who were involved in the immersive experience, did not improve their task times as much as the control group. This suggests that immersion may hinder learning or the ability to switch between in-game and real-world situations in rapid succession. Time-on-task, however, is clearly not an adequate measure of immersion per se, but merely demonstrates the *effect* of trying to carry out a task in rapid succession to being immersed.

Jennett et al. (2008) aimed to create an immersion questionnaire which combined elements of flow, presence and cognitive absorption. The effects of immersion on eye-movement were also observed (Jennett et al., 2008) by comparing the number and duration of fixations during immersive gameplay with eye-movement during a non-immersive task. Their hypothesis, that there would be a difference in eye movement for the participants in the immersion condition when compared to the non-immersive condition, was supported, as investigation of the fixation data indicated that immersed participants showed decreased eye-movement over time. Throughout this experiment, they also attempted to refine an immersion questionnaire with factors based on cognitive involvement, control, challenge, real world dissociation and emotional involvement. The results of a Principal Components Analysis showed that this questionnaire was made of up of factors which were related both to the individual and the game itself.

The Game Engagement Questionnaire (GEQ – Brockmyer et al., 2009, p. 624) is a "theoretically based measure of engagement in playing video games". In this case, Brockmyer et al. use *engagement* as a "generic indicator of game involvement", explaining that immersion, flow, presence, absorption and disassociation are more technical terms for the same phenomenon. As such, the GEQ measure is primarily based on existing theory of these concepts. During Brockmyer et al.'s work, the participants were asked to respond to statements with either 'Yes', 'No' or 'Maybe', and the single item which related to immersion is the very general: "*I really get into the game*" (p. 627). A somewhat simplistic description of immersion is given, however, as "the experience of becoming engaged in the game-playing experience while retaining some awareness of one's surroundings" (p. 624). Also, as Brockmyer

et al. quoted studies which found significant correlations between Absorption and Dissociation (Gow et al., 2004; Murray et al., 2007), and no significant correlation between Absorption and Presence (Murray et al., 2007), no study has yet shown correlations between any of these concepts and immersion, so there is no reason to assume that the score obtained from the Game Engagement Questionnaire will relate to immersion.

The Immersive Tendencies Questionnaire (ITQ, Witmer & Singer, 1998) is a tool which is used “to measure the capability or tendency of individuals to be involved or immersed” (p. 230). The ITQ is a high quality, internally consistent measure, based on the idea that involvement, as well as immersion, is necessary in order to gain a sense of presence, and it is thought that more involvement in an activity can lead to greater immersion. ITQ factors include Involvement (tendency to become involved), Focus (tendency to maintain focus on current activity) and Games (tendency to play games). There are 29 questionnaire items in total, the answers to which take the form of a 7-point scale, and questionnaire items measure immersive tendencies, fitness or alertness and ability to focus attention, amongst others.

While Witmer & Singer proposed their instrument to be used for military purposes, Norman (2010) adapted their work and developed two scales, one which measures the ImmersAbility of Individuals (IAI), and one which measures the ImmersiveNess of Games (ING). These also follow the format of a 7–point Likert scale. Both of these instruments are “reliable and ... have external validity” (Norman, 2010, p. 7) The ImmersAbility of Individuals Questionnaire, as in the Immersive Tendencies Questionnaire, is a measure of the individual’s tendency to become immersed in a

pursuit. The ImmersiveNess of Games Questionnaire, in contrast, measures the extent to which a particular game can create an immersive experience or sense of presence.



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Please note that Chapters 4-7 (pp. 74-277) are currently unavailable due to a restriction requested by the author.

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Section 8: Conclusion

This section provides a summary of the current research study. Following this, it outlines the practical implications of this research, including the limitations and boundaries of the current study and the potential future avenues for research. Finally, the contribution to knowledge, as made by this research, is outlined.

8.1 Summary of Research

There were two stated aims for the present study.

Firstly, this research aimed to carry out a qualitative investigation into the nature of immersion and set out to create a comprehensive definition of the concept of immersion, using the language of immersion as it pertains to the gaming population. The aim was to create a definition which put emphasis on the immersive response, with the exclusion of those features within the game system which could facilitate the immersive response, in other words, system immersion.

An investigation was performed on the online discussion forum RPG.Net, a forum regularly frequented by game players. Many categories emerged from qualitative analysis of the participants' responses and discussions, including the potential influence of intrinsic and extrinsic game aspects on participants' immersive response, the potential influences of other game players on immersive response, the difference between belief and suspense of disbelief in game aspects for immersion,

and, most importantly, the emergence of a classification into two discrete types of immersion, namely vicarious immersion and visceral immersion.

The following definition of immersion also emerged from this analysis:

Immersion is a subjective state of intense involvement in an imaginary setting, where an individual may either identify with or adopt a character or a setting (or both). If the individual identifies with a character they may adopt some, or all, of the character's attributes. If an individual identifies with a setting some or all of the demands of the setting become the attentional focus. An immersive response can vary in strength and duration, at its most extreme, causing loss of a sense of self or reality and feeling as if one is the character or is "in" the setting.

The second, and primary, aim of this research was to create a quantitative measure of the immersive response in games. The IMX Questionnaire was developed from data collected during the initial online discussion forum study which was analysed qualitatively, and also from qualitative data collected as part of the online situations survey (See Sections 4 & 5). The initial version of the IMX Questionnaire, Version 1 (IMX V1) consisted of 60 items, and exploratory factor analysis suggested five factors, Vicarious Immersion, Action Visceral Immersion, Mental Visceral Immersion, General Immersion and Group Immersion. The IMX Questionnaire Version 2 (IMX V2) was developed from the results of this exploratory factor analysis, and consisted of 58 items. The Confirmatory Factor Analysis confirmed the existing five factors, although it suggested that a number of items should be removed. The IMX Questionnaire Version 3 (IMX V3), which consists of 35 items, has been demonstrated to have high internal consistency reliability and validity.

Overall, 893 participants were involved in this research. As is often the case with games research, the majority of participants were male ($n \approx 708$), although a significant number of female gamers participated ($n \approx 182$). This is a representation of 25% females and compares well with the 30% of gamers who are adult females, as cited in Section 2.3.2: Demographics. Three participants declined to give a gender specification in the original forum-based study.

The majority of participants were from Ireland and the United Kingdom, and besides these, the participants were from a variety of locations, from the continents of Africa, America, Australia, Asia and Europe. Participants from 26 countries took part, namely, Australia, Austria, Belgium, Bulgaria, Canada, China, Columbia, Denmark, Finland, France, Germany, Ireland, Korea, Mexico, Netherlands, New Zealand, Norway, Portugal, Russian Federation, Singapore, South Africa, Sweden, United Arab Emirates, the United Kingdom, the United States of America and Viet Nam.

8.2 Practical Implications

8.2.1 *Limitations and Boundaries*

It is important, in any research, to note the limitations and boundaries inherent in it. Many of these have been outlined in the introduction, and the three major limitations of the current research, with their ameliorations, are outlined in this section.

Firstly, the initial qualitative, forum-based study, carried out as part of this research has the limitation of a lack of generalisability, as can often be the case with qualitative research. This implies extension of the results from this small population

to the broader population on which this research focuses may not be acceptable. Two primary findings emerged from this qualitative study - the definition of immersion and the classification into vicarious and visceral immersion. In an attempt to offset the lack of generalisability, a subsequent survey study was carried out which clarified the discreteness of vicarious and visceral immersion. These findings have support from the literature, as is outlined in the literature review, specifically in Section 3: Immersion and in Section 4: Qualitative Analysis and Definition of Immersion.

A second limitation of the current research was its focus on computer and video games, to the exclusion of other types of games such as traditional table-top games. Participants in the initial qualitative study frequently mentioned the traditional table-top games alongside computer games, but for the purposes of this research, it was necessary to focus on one category of games, and so it was decided that such traditional games were beyond its scope. It was necessary, also, to focus on games, to the exclusion of other media types, such as film, television and books, for which immersion can also have significance (McCarthy & Wright, 2004; Schubert & Crusius, 2002).

Thirdly, in the course of this study, it became apparent that different types and levels of immersive response can be facilitated depending on the game genre. This can be seen in the idea that games with characters can create a different kind of immersive response than games without. There is a wide variety of game genres, and most games do not belong to a single distinct genre and instead combine a number of these (Järvinen, 2002). It was necessary, therefore, for the purposes of this study, to

look at computer games in general, as it would not have been feasible to differentiate by genre. In an attempt to control for this, as far as is practicable, the IMX Questionnaire incorporates a feature by which participants can complete the questionnaire based on whether their game includes characters, other players, both of these, or neither.

8.2.2 Future Directions for Research

The current study suggests a number of potential avenues for further research. Some of these arose from the review of literature outlined in the initial sections of this thesis, while other, more specific, directions for research suggest themselves from the development of the IMX Questionnaire and the classification of vicarious and visceral immersion during this study.

It may be worthwhile to investigate the possible linkage between immersion and addiction. As outlined in Section 3.4, addiction in games has been increasingly researched in recent years. In academic discussions of immersion and the immersive response, the issue of addiction is often considered. However, it remains to be seen whether strong links exist between immersion and addiction.

An unexpected finding emerged in Section 7.4.5, in which neuroticism, as measured by the NEO-FFI, obtained a high negative correlation with immersive response, as measured by the IMX Questionnaire. This is contrary to the findings of Rosenthal et al. (1998) and Carter & Lester (1998), which found no difference between

neuroticism in gamers and the general population. This finding warrants further investigation.

Another area worthy of further investigation, as outlined in Section 4.2.5.5 *Immersed Memories*, is whether a link exists between immersive gameplay and memories. As mentioned in the same section, the link between gameplay and lucid dreaming also leaves room for further research. The possibility of using immersive gameplay situations as an aid to recover lost or repressed memories, or for the treatment of conditions such as Post Traumatic Stress Disorder, warrants further research. Immersive play may have potential in use as part of a therapeutic regime, such as Moreno's psychodrama, "a form of psychotherapy in which patients act out events from their past" (Psychodrama, 2012).

A number of future directions for research are centred on the IMX Questionnaire. The demographic differences between individuals in relation to their levels of immersive response, as measured by the IMX Questionnaire, could provide an interesting avenue for research. This could be investigated using the data collected from the current study, as well as new data collected using the IMX Questionnaire Version 3. In doing so, it would also be possible to broaden the scale validation, with bigger samples, using Norman's ImmersAbility of Individuals Questionnaire and ImmersiveNess of Games Questionnaires (2010) along with other validated measures.

The link between immersion and familiarity with a game has been suggested by Grodal (2003). The qualitative study carried out as part of this research, suggested

that there was a link between immersive response and familiarity with the game, including characters, roles, game location and game setting (See Section 4.2.3). This is an area that warrants further investigation.

It would be interesting to carry out a further examination with regards to participants whose scores habitually rate at the extreme opposite ends of the IMX Questionnaire. This could be achieved by carrying out a series of interviews with those participants, focussing on their experience of the immersive response and what occurred during that experience. It may also be valuable to broaden the interview to other aspects of their lives, investigating how games fit into the participant's own life, and whether being able to immerse has any benefits or consequences outside the game, in the participant's *real life*.

As mentioned in the introduction, Section 1, little research has been carried out in relation to the physiological effects of the immersive response. An investigation of physiological measures in combination with the IMX questionnaire would be interesting. It would be invaluable to investigate the connection between immersive response, using the IMX Questionnaire, and physiological measures as measured by EEG (Electroencephalogram), GSR (Galvanic Skin Response), HRV (Heart Rate Variability) or ECG (Electrocardiogram). Physiological measures in themselves indicate the extent of a reaction, however the psychology of this – the type of reaction – requires more information, such as that obtained from the IMX Questionnaire.

There is scope for further investigation of types of immersion, such as vicarious and visceral immersion. Firstly, research which examines the aspects of system immersion that may facilitate these types of immersion would be valuable. It would be useful to carry this type of research out using instruments such as Norman's ImmersiveNess of Games scales, as this has a greater focus on aspects of system immersion. Secondly, as discussed in Section 6, the factor analysis indicated that visceral immersion may be comprised of two types: action visceral immersion and mental visceral immersion. Additional research is warranted to investigate this further. Thirdly, vicarious and visceral immersion, even with the addition of mental visceral immersion and action visceral immersion, may not necessarily represent a fully comprehensive model of immersion, and it is possible that other types of immersion exist. As mentioned earlier, McCarthy & Wright (2004) discussed technology as experience with reference to Boorstin's (1990) vicarious eye, visceral eye and voyeuristic eye. It would be interesting to investigate whether any connection exists between the voyeuristic eye, the concept of *newness* and immersion, or indeed whether it represents another type of immersion. This is another avenue for potential research.

As in most research, the potential for replication of the study is important. It must be noted, however, that replication is endless for this style of research. A firm factor structure has emerged from the analyses and this indicates that this is a good resting point. It is important to note, also, that increased usage of the IMX Questionnaire will continue to strengthen the estimation base. Therefore, usage of this instrument will be encouraged, on the part of the researcher, as a service from which data can be saved to continue strengthening the scale.

Although a validation study has been carried out on the IMX Questionnaire, and it has been found to have high validity, validation is an ongoing process. As outlined in Section 7, validation of the IMX Questionnaire will continue after this study is concluded, including creating a network to test the questionnaire's nomological validity.

8.3 Contribution to Knowledge

As addressed during the introduction, immersion has been regarded as "key to a good gaming experience" (Jennett et al., 2008, p. 644). As a concept, it is undoubtedly important in the study and development of games and gaming. It has become common for game developers and designers to classify their games as being *immersive*, but such claims are invariably made without any evidential basis; neither has it been clear how such evidence could be collected. This omission was one of the primary motivations to conduct this study into the nature of immersion and the immersive response. As an advertising strategy, it appears to be effective, perhaps reflecting the motivating influence of immersion for gaming.

Considering that immersive experiences can provide a sense of escapism from the stresses of everyday life, can provide a unique opportunity for learning or development, and can give a sense of enjoyment, amongst other benefits, it is fair to say that immersion can be a very valuable experience.

The IMX Questionnaire, along with the emergent definition of immersion, and the classification of vicarious and visceral immersion is offered as a contribution to knowledge in this area.

A unique contribution that these offerings make is their focus on the “actual perceptions and experiences of the people we plan to study”, the gamers (DeVellis, 2003). These outcomes give consideration to the accounts of individuals who regularly experience immersion, something which is lacking in a high proportion of existing immersion research.

A large number of the definitions of immersion and classifications of immersion into 'types', in the existing literature, do not have any empirical grounding. Both the definition of immersion and classification of Vicarious immersion and Visceral immersion, emerging from the current research, have an empirical grounding, and this is another aspect which differentiates them from many prior studies in this area. Furthermore, the emergence of the classification of two discrete categories of immersion, Vicarious immersion and Visceral immersion, provide unique contributions to knowledge of the nature of immersion.

The IMX Questionnaire, while also focussing on the perceptions and experiences of gamers and having an empirical grounding, provides a unique contribution in its measurement of the immersive response. Existing questionnaires draw on levels of involvement such as engagement, presence, virtual reality immersion, and flow, or focus on system immersion and the ImmersiveNess of the Game, while the IMX questionnaire is unique in that it focuses purely on the immersive response.

All of these have implications for future research in the area of immersion and games, and also for use, alongside traditional usability measures and existing immersion-based measures such as Norman's ImmersiveNess of Games (2010), in the development of games both for recreational and for educational uses.

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