

Motivation of Extrovert and Introvert Gamer's using Different Screen Sizes

Noor Fardela Zainal Abidin, Auckland University of Technology, Auckland New Zealand

Robert Wellington, Auckland University of Technology, Auckland New Zealand

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Abstract

The use of games as educational activities have been widely discussed and studied, and more recently it has been suggested that the use of handheld game consoles inside classrooms could be beneficial. However, little has been done to study the role of screen sizes when playing educational or positive games in these environments. This study focused upon the influence of screen size when playing educational/positive games on the gamers' behaviour. Thus, being able to conclude which screen size would impact a gamer more effectively when playing an educational game. An ethnographic study and inductive analysis were undertaken to compare two screen sizes (40 inch TV screen playing the Nintendo Wii and 3.12 inch dual screen on the Nintendo DS). The games that were used in the study were the Big Brain Academy™ and Mario Kart™. The results showed a distinct difference in behaviour based on the gamers personalities (Extrovert and Introvert gamers), and the preference of screen size are different for these two type of gamers.

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Noor Fardela Zainal Abidin and Dr Robert Wellington
Auckland University of Technology, Auckland New Zealand

Introduction

Combining games and education has been widely discussed as an option to introduce fun in learning. There are a wide range of games platforms that could be researched that include computer games and video consoles. Common video console choices are the Nintendo Wii, Sony© PlayStation, and Microsoft© Xbox that are usually played on a monitor or television. They can also include portable consoles such as Nintendo Ds and the PlayStation Portables. Studies have been done in learning the potential of using these small screen portable consoles in classroom and for education (Bunce, 2010, Morgan et al., 2007, Shirali-Shahreza, 2008). However, there is little research on the impact of these consoles in term of their screen size to the gamer. This research compared two screen sizes; a 40 inch TV screen playing the Nintendo Wii, and a 3.12 inch dual screen on the Nintendo DS, to find how these two types of game console and screen size impact gamers. The games chosen for the study were the Big Brain Academy™ and Mario Kart™. This paper will begin with a discussion of the literature related to the research, and then it will continue with the research design. The paper continues with a discussion of the results that show that the preferences of screen size are connected to the personality type (extrovert and introvert) of the gamers.

Screen size and Gaming.

Media and sales have promoted the use of big screens in entertainment and gaming to the public, claiming that the bigger the better. However, the popularity of small screen portable gaming devices is also undeniable, in 2012 the sales of Nintendo Ds and the Sony PSP was up to 153 million units and 62.2 million units respectively, worldwide (Nintendo Co., 2013, Inc, 2013). Although research into the screen size of gaming environments is inconsistent, the preference of the screen size may be subject to the social context of the viewing experience. Small screens might be preferable in personal settings whereas large screens may be preferred in a shared public environment (Grabe et al., 1999). Since then, there have been mixed reviews on user experience and their preferences of screen sizes. Larger screen could give the advantage of increasing user productivity, aid user recognition memory, and are preferable in a daily work environment (Czerwinski et al., 2006, Bi and Balakrishnan, 2009). There is also research evidence that for certain tasks there is no advantage in using a large display. Tasks such as reading comprehension do not profit from large displays but users did perform better during spatial orientation tasks or path integration on large displays (Gibbs, 2007, Boeije, 2010).

In the gaming experience, there is varied evidence of the effect of screen size. (Sabri et al., 2007) concluded that using a large high resolution screen (9 monitors, 2400x1800) does enhance gaming experience when playing a real-time strategy game. Some (Laarni et al., 2005) claim that participants experience a higher sense of

presence when a game is projected on a large screen but intentional engagement is at the same level when playing with either a PC or a PDA. A quantitative study done by (Hou et al., 2012) comparing a 12.7 inch and an 81 inch display showed that “*playing in front of a large screen led to a more favourable impression on the game character, a more positive mood and significant higher self-presence*”(p.617). However, their hypothesis on gamer’s enjoyment and immersion tendencies in favouring the larger screen size was unsupported.

Even though there might be an understanding that large screen size could be a better choice for a better gaming experience, there has been an increased interest in the use of small screen consoles. A study has already revealed that playing a Nintendo DS (a small screen device) provided more control in terms of portability, privacy, and players are more immersed in the game (Evans, 2006 as cited by Pulman, 2006). It is undeniable that the advantage of having handheld devices are their portability. Gamers also reported that their gaming goals in using a Nintendo Ds are “*to pass time, to learn to keep one’s mind sharp, to be social and to engage in competitive play.*” (Szentgyorgyi et al., 2008).

In education, there has been increased interest in using video games and handheld consoles as learning devices in classrooms. (Bunce, 2010) reflected that “*the Nintendo Ds has great potential for collaborative and inquiry based learning in schools, increased student motivation and implication for staff training and support.*”(p.172). Other researchers have also implied that handheld consoles have a high potential in learning environments (Bunce, 2010, Rubin and Rubin, 2005, Braun and Clark, 2006).

Understanding the potential of gaming for education and its use in classrooms, this study was conducted using an ethnographic method by comparing two screen sizes (40 inch TV screen playing the Nintendo Wii and 3.12 inch dual screen on the Nintendo DS) in an effort to understand the influences on the gamer’s behaviour.

Research Design

A simulated gaming environment (SGE) was created as a natural environment to conduct the participant observation and ethnographic interviews. The environment was envisioned to be focussed on comfort and to be ‘homelike’. A pilot study was conducted to provide insight into the suitability of using the simulated environment for the ethnographic research. The result of the study found that the gamers was comfortable and felt “like at home or at a friend’s house” when playing in the SGE. The gamers stated that once playing the game, the surrounding environment did not impact their gaming experiences (Zainal Abidin and Wellington, 2011). Furthermore, (Murchison, 2010) stated that “*Talking about ‘the field’ in ethnography is no longer easy to do as it once was. In a way, the field is everywhere and nowhere at the same time. A field site can be referred to as a location of doing research but avoids referring it as a monolithic place of research*” (p.14).

In this SGE, there was a sofa and an easy chair, a book shelf where the DVD games, comics and miniature characters were displayed, a coffee table, and a television stand that would fit a 40 inch television as well as video consoles. A few cushions, some gaming and comics posters on the wall were used for aesthetics purposes. The room was carpeted, and the gamers would had the option to play in a dimmed or bright room. Refer to figure 1 for a 3D model of the simulated environment. Evidence suggested that the lighting of the room was a significant contributor to the mood.



Figure 1: The simulated gaming environment

The equipment that was used in the research was, a Sony Bravia 40 inch television, a Nintendo Wii, a Nintendo DS, Sony Digital HD Video Camera Recorder and a Sony IC (Integrated Circuit) Recorder.

Two particular game genres that were chosen for this research were, an educational puzzle genre game (the Big Brain Academy) and racing genre game (MarioKart). The study tried to first choose a game that was available to be played on a big screen display (40 inch) using the Nintendo Wii and a small screen display (3 inch) using the Nintendo DS. Then, the game needed to use the same input method and have similar game play on both screen sizes. This; however, is difficult because of the different devices, and therefore the different controls used. Even the game stages in the game themselves have been created to suit the game consoles. The different characteristics of the controllers do emerge as significant data in the study and is discussed later here.

Data Collection Process

In ethnographic research, the researcher (ethnographer) has the unique position of being the primary research instrument (human instrument) in collecting and analysing the data. Relying on all his or her senses, thoughts and feelings, the human instrument is the most sensitive and perceptive data gathering tool (Murchison, 2010, pp. 12-15). The data gathered for this research would be collected using two ethnographic data gathering methods, which are participant observation and ethnographic interviews. Based on literature these data collection methods are widely used in ethnographic research (Angrosino, 2007, Creswell, 2009, Murchison, 2010) and they relate to the *“Principle of interaction between researchers and the subject for interpretive field research where data is constructed through the interaction between the researchers and participants”* (Klein and Myers, 1999) for interpretive research.

The sampling method was purposive sampling or judgemental sampling where participants are selected based on the researcher’s judgement that the participant would be the most suitable candidate to provide the information required for the study (Fetterman, 2010). Creswell (2009) states that *“purposefully select participants or sites (or documents or visual material) that will best help the researcher understand the problem and the research question”* (p.178). Moreover the use of purposeful sampling is to make sure that the researcher will learn, discover and gain insight from the most suitable sample that would provide the most information on the research topic (Merriam, 2009).

The criteria for the selection of the gamers are the participant must have sufficient knowledge and skill on how to play video games (i.e. has ample knowledge in game play or using certain controllers). Secondly, that the gamers are from the age 18 to 40 years old. Lastly, that the participants are gamers that include gaming in their daily activity whether it is computer gaming, playing game on their mobile or consoles games. As this study was expected to be a longitudinal one, the participants were expected to attend more than one session. In this research 609 minutes of video data containing observation of gameplay sessions and informal interviews were collected from 18 gamers. In conducting participant observation the total length, the scope and the frequency of time spent in the “field” is also important in the collection of data (Murchison, 2010). (Morse, 2000) also adds that there are four factors to be considered when determining sample sizes, which are *“the scope of the study, the nature of the topic, the quality of data and the use of shadowed data”*. In addition to this, in qualitative studies the sample size usually follows the concept of saturation. *“Data saturation usually means that the collection of new data does not shed any further light on the issue under investigation.”* (Mason, 2010). However, Morse (1995) states that *“the quantity of data in a category is not theoretical important to the process of saturation. Richness of data is derived from detailed description, not the number of times something is stated”*. Therefore, the sample size was adequate to provide in-depth and saturated data for this research.

Analysis

The data analysis of this research was done inductively, which begins with close reading of data, then identifying important sections of data that contain meaning and creating codes/ nodes for a new category which the data can be assigned (Thomas,

2006). (Braun and Clarke, 2006) states that an inductive analysis is “*a process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher’s analytic preconceptions. In this sense, this form of analysis is data driven. However, it is important to note, that researchers cannot free themselves of their theoretical and epistemological commitments, and data are not coded in an epistemological vacuum.*” (p. 12)

When creating the process to follow in analysing the data, the study referred to Thomas’s (2006) general procedure for inductive data analysis and the generic qualitative theoretical thematic analysis processes summarized by Braun and Clark (2006). The analysis process was to allow the theme to emerge from the data.

The next step of the analysis was identifying which categories are most relevant to the research study. Codes were organised in accordance to game genre, screen size and single player or multiplayer to find the relationship between them. Codes also were colour coded in accordance with observations or comments made by participants. This is to identify in which scenario a certain category is more prominent. The analytical process of data interpretation starts here where choices were made on which code or category was important to the research study. An analytical interpretation of the codes and themes were then carefully discussed as the results of this study.

Results

It was clear in the observation data that there were two types of distinctive gamers, the extroverts and the introvert gamers. The outcome of this study was then, on the effect / relationship that the screen size has on the extrovert and introvert gamers and their screen size preference.

Extrovert Gamers

The term extrovert was used by C.G Jung that indicates extroverts are characterized by their interest in people and things, a relationship with them and a dependence on them. (2009), Brownfield (1993) defined that “*people who prefer extraversion tend to focus on the outer world of people and things.* (p. 8)” During his study, exploring the interplay between player and “character selves” in role-playing games Yee (1999) found that extrovert gamers are “*energized by social interactions. They are active and feel at home in crowds or busy places*”(p 11). Table 1 below shows the characteristic of an extrovert person. The Big-Five Personality Model adds that extraversion personality traits would also include being talkative, lively and outgoing (Fang and Zhu, 2011) . Fang & Zhu (2011) further conclude that computer game players that have extraversion personality traits will likely prefer a game that requires extensive social interaction.

Table 1 shows the different characteristics of an extrovert person based on literature.

C.G Jung (2009)	Myers and Briggs Indicator for Extrovert in Learners (Brownfield, 1993)	Yee (1999) Character of RPG gamers relation with the Extrovert Player
Motivated by outside factors and greatly influence by the environment	Focus on outer world of people and things. Think and learn best when talking, like cooperative learning groups, and they rely more on trial and error than on forethought when solving problems.	The main appeal for RPG's for extroverts is the social aspect. The opportunity to interact with other people
Sociable and confident in unfamiliar surroundings, less cautious, less fearful	Get bored with long slow jobs and do not do as well when forced to keep everyone else pace.	Easy to role-play character with different personalities and experiences. Thus do not have a preference for one character class over another.
Like organizations, parties, and tends to be optimistic and enthusiastic	Like action and variety. (classroom full of group discussion, hand-on activity and active breaks from the solitary tasks of reading and writing)	Enjoy the hack-and slash aspect of role – playing but rather be playing in a system that does not base characters on numbers and fixed classes.

Introvert Gamers

C.G Jung then characterized introverts as an inward flowing of personal energy, a withdrawal concentrating on subjective factors, introverts prefer reflections to activity (2009). Brownfield (1993) state in her research that “*people who are introvert are motivated by their inner worlds not needing a lot of outside energy to drive their interest*” (p.8). Yee (1999) found that “*introverts are people who usually appear reserved and shy in social situations*” (p10). Table 2 describes the characteristic of an introvert.

Table 2 shows the different characteristics of an introvert person based on literature.

C.G Jung (2009)	Myers and Briggs Indicator for Introvert in Learners (Brownfield, 1993)	Yee (1999) Character of RPG gamers relation with the Introvert Player
Happy alone with a rich imagination, Prefers reflection to activity	More interested in having quiet learning environments where they can think things out and concentrate on the task at hand.	People who appear reserved and shy in social situations. They are taxed by interactions thus prefer to be alone or with a small group of friends
Not interested in facts per se but are interested in abstract ideas. Facts are not collected for their own value. Give little attention to their relationship with the world	Would rather work alone than in groups because do not want to be interrupted	Put aside time for reflection and introspection. Often hide their personality in real life and put up a façade for the world
Sensitive and imaginative	More comfortable in the lecture-based teaching format. Schools are usually structured in favor of introvert with student sitting quietly in rows while teachers lecture to them.	In RPG, they allow their real identities to be expressed in their characters. This allows them to feel more secure in the hidden self. They like the systems of classes and types appeal to them rather than the hack-and-slash aspect of RPG.

The participant observation examples in the next sections are excerpts of the sessions conducted with an introvert and extrovert gamer. The observation of all behaviour and comments were written down and video recorded.

An Example of Participant Observation Sessions with Brian (synonyms) (Extrovert Gamers)

Single player session playing Mariokart Wii and Mariokart Ds. [Brian]

Brian entered the SGE with a big smile on his face. He was excited to be starting off the session. Brian loved playing games and was thrilled on seeing the 40 inch television for him to try with the Nintendo Wii. Brian is a really jovial guy, laughing and likes making jokes. He has around 15 years of gaming experience. He has tried most of the consoles and particularly likes the PlayStation 3 where he likes to play football and First person shooter games. He is also familiar with the Nintendo Ds; however he has never tried the Nintendo Wii.

He started the session by trying out the single player game on the big screen using the Nintendo Wii. He did ask for some basic instructions on how to play the game and

how to use the Wii Mote. John another gamer was also there watching, John was not a quiet audience though, he give instructions, laughed and joked around with Brian on some occasions. Brian was not annoyed by this. He showed that he liked having a friend there to watch him play.

Brian is a very expressive gamer, he stomped his foot and laughed loudly when he made a mistake or got overtaken by another (computer) player. He was shouting and screaming at the game. He would follow the action in the game, for example when the car is bouncing on a mushroom, he would be jumping and nodding his head as if he was bouncing as well. He would hum and sing out the sound effects or music in the game and truly immersed himself in the environment. Comments were made by Brian during gameplay sessions, were mostly about his dissatisfaction on the Wii Mote controller.

Once Brian was satisfied playing the Nintendo Wii on the big screen, he tried playing MarioKart on the Nintendo Ds (Small screen). Here, he was more comfortable with the controller as he commented *“I’m an old school gamer, I’m used to using joy stick and arrow pads”*. It was observed that even on the small screen, he was still the same talkative gamer, and motivated to try again until he won. However, he was quieter and did not scream or laugh much, but he did smile throughout the game. Even using a handheld console he still sat up on the sofa, while concentrating and focusing on the screen. Brian did find that when playing on the Nintendo Ds it was easier to win the race. However, Brian concluded at the end of the game that he preferred playing this game on the big screen. *“The bigger the screen the better it is. Usually game created for the big screen has better features and better screen view”*. Brian was among the gamers that came to the SGE more than 7 times to play and try out games.

Education Game (Big Brain Academy Wii and Big Brain Academy DS) Single Player [Brian]

During another session, Brian came again to the SGE to try the Big Brain Academy game. He was really familiar and comfortable with the environment since this was his fourth visit. Once the game was set up, and instruction was given on how to use the Wii Mote for this particular game. Brian sat comfortably but still leaning forward. He began the game by being a bit annoyed with the professor character of the game taking too long to introduce the game without offering a skip option. After the instruction and settings were given, Brian tried the question. During playing the game and answering the questions he was quieter than he usually was. He did laugh and bite his fingers when he made mistakes in answering the questions. Brian showed full concentration during the quiz sessions. After finishing all of the questions in the game, he was really anticipating the grade that he would get and laughed when he got a C. He asked to try again stating that the first time was only a trial run and to get familiar with the game. He started the next session with ease. He did not find any problem with the Wii Mote for this game. He did comment that the game was a bit boring and he would not play the game at home or buy it for himself.

The next session was using the Nintendo Ds. Here, Brian was really serious, focusing hard on the screen. Not making a noise, just small “ish” and “aah” when he made mistakes. Some of the questions in this game were a bit difficult to understand therefore he did make a few confused facial expressions. He was happy with the grade

that he got especially when it was higher than what he got playing the Nintendo Wii in the first sessions which was a C+. He commented that the game was more challenging on the Ds because it had a timer so he needed to think fast. He is more familiar with the controllers on the DS, which use a stylus and touch screen. He requested to try again for another session to try to improve the grade; however, he remained on the same grade.

Reflection on the Extrovert Gamers playing Mario Kart Wii and Ds

It is important to point out that Mario Kart was a game created for fun and competition. After observing the playing scenario of Alan, Brian and John as well as the other gamers that came to play the game, most extrovert gamers have the similar behaviour, and it really shows when playing on the big screen. Characteristics that made Mariokart Wii more enjoyable on the **big screen** from an Extrovert gamers perspective.

- 1) An extrovert gamer prefers to play a game that provides a lot of social interaction.
- 2) During a single player game, an extrovert gamer shows more excitement when there is an audience watching him/her play the game.
- 3) During a single player game, an extrovert gamer is encouraged by cheers, or even heckling during the gameplay sessions.
- 4) During a single player game, an extrovert gamer feels more satisfied when he/she is able to express his/her emotion, talk and laugh.
- 5) During multiplayer gaming, an extrovert gamer would prefer to see his/her opponent's screen to increase the competition and social interaction.

Reflection on the Extrovert Gamers playing Education Game Big Brain Academy Wii and Ds

After observing Brian (extrovert gamer), there was not much difference in the preference of playing the game on the big screen or small screen. Brian was not affected by the screen in terms of his enjoyment of playing this game. He had the same motivation in playing the game to improve himself and his reaction to the gameplay was the same. However, he did comment that it was a bit more fun playing on the big screen, if there is a friend around. He also said that the game was more challenging on the small screen because of the timer feature in the game. He also preferred the multiplayer sessions of the game; however a comparison with a small screen could not be assessed due to some technical issues with playing multiplayer using the DS for this game.

Based on the observation of Brian and a few other extrovert gamers that tried Big Brain Academy on the Wii and the DS, the conclusion of playing educational games on the Wii and the DS are;

- 1) As long as the level of challenge is appropriate, the screen size does not give a big impact to an extrovert gamer.
- 2) The interactivity of the big screen in terms of graphics and controller can make the game session more fun for an extrovert gamer.
- 3) Having an audience and competing with another player is more enjoyable and motivating to an extrovert gamer when playing educational game. This is more feasible on the big screen.

An Example Participant Observation Sessions with Fred (Introvert Gamers)

Single player session playing Mariokart Wii and Mariokart Ds.

Fred is used to playing computer games and the PS3. He usually prefers playing games alone and games that require a lot of thinking, such as strategy games.

The session started as usual by introducing the players to the process, reading the information sheet and signing the consent form. Fred mentioned that he would prefer the room to be darker, thus the lights were switched off in the gaming section of the room. He commented that when playing games, the darker the room was the better, as you get more immersed in the game. We started the session by playing Mario Kart Wii. Fred was not familiar with the Wii so some instruction needed to be given. There were a few traits and behaviours that would differentiate Fred as an introvert gamer compared to the other gamers who were extroverts. He was really quiet throughout the game, mainly concentrating on the game. Expression of emotion was minimal and conversation with the researcher was more about asking for instructions. During the game, he was also very serious, analysing and thinking about how to play the game and what strategy to use to win, he mumbled to himself a lot. He did however still have an occasional sigh and curse during gameplay when mistakes were made. He commented that he was still not used to the Wii; however, that the controller was comfortable.

The next session was while playing the MariokartDS, he seemed more comfortable playing on the DS and more focussed on the gameplay. He seemed satisfied, that he could concentrate better on the Nintendo DS. He was in his own world. *“It is also easier to win when playing on the Nintendo DS because you tend to focus on the screen and not get distracted by other elements”*. Again, during gameplay, his expression was serious and constant during gameplay.

Single player sessions playing the education game (Big Brain Academy Wii and Big Brain Academy DS)

When Fred began the Big Brain Academy game session he calmly answered the questions in the game. He sat forward at the edge of the seat, fully concentrating on answering the questions. He was very serious and quite. His facial expression seemed to indicate deep thought. He had no change in expression and no comments or sound

throughout the session; however, at the end of the session he laughed a bit about the results of the test, which was a C.

He tried another session of the game. He still sat at the same position and had the same reaction to the game. Fred appeared to be thinking and made no reaction to mistakes that he made during the game. Sometimes, he mumbled to himself while calculating. He had no reaction to other gamers watching him play the game. He did shake his head once when he made one wrong answer. He was concentrating on the game. He laughed when he got the C grade again.

Reflection on Introvert gamers and screen sizes.

During the observations, a few gamers can be categorized as introvert gamers. They were more reserved and quiet during gameplay and rather enjoy their own space. They prefer to think and construct their gaming strategy. During the observation and conversation with these gamers, a few results were derived that indicated that introvert gamers prefer the use of a small screen device, or at least a personal screen, when they are playing a game. Introvert gamers prefer playing games that allows them to learn the story, perfect the achievement rather than socialise. The reasons why introverts would prefer a smaller screen size are;

- 1) Introverts prefer their own personal space when playing game, this is usually provided when playing on their own screen or having a smaller screen.
- 2) Introverts might feel uncomfortable when people are looking at them playing the game.

I would prefer my own personal screen and playing the game without an audience. In this scenario, only playing the Nintendo Ds provided that. [Fred]

- 3) When playing an educational game, a small screen could be better for the introverts because it allows more concentration and focus as well providing no further distraction.

If I was to learn using an education game, I would prefer to do it on a smaller screen, having privacy and learning on my own personal screen. [Fred]

In my opinion, It would be better playing education on the smaller screen being that it have the advantage of small screen like being able to concentrate more and the touch screen. [Carl]

Conclusion

In this paper we studied the effect of screen size on gamer's behaviour when playing education and positive games. The results show that the preference of these screen sizes can depend on whether the gamer is an extrovert or an introvert. It was further indicated that positive and educational gaming for extroverts are preferred on a big screen whereas introvert gamers prefer a more private and personal space which can be provided on a smaller screen size. This research suggests that in using games as a

learning tool or in a classroom environment, it could be important to consider the type of games, games consoles and screen size that would support both extroverts and introverts learning and also their gaming styles.

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