CERTIFICATION OF APPROVAL

Immersive Concept from The Visually Impaired

Point of View

By

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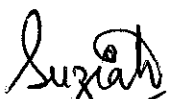

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CERTIFICATE OF CONFIDIANALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

Nur Hanis Meor Shaharuddin

ABSTRACT

A computer game is an indoor activity that required less physical movement. The games become more interesting with the help from graphical and audio presentation of the games. However, for the blind user they only depend on the audio instruction in order to play computer games. Besides that, they need to be provided with the sufficient information on the rules and regulation of the game so that the blind user will be well informed on how to play the games. Insufficient information and poor audio instruction will make the blind user reluctant to play the computer games. Therefore, if the blind user is uninterested to continue playing with the games, it will be hard for them to enter the immersive state. This paper will study about how the immersive concept in blind user point of view. The objective of this paper is to determine the attributes of immersion and group the user into level of immersion based on the criteria of immersion present while playing computer games. The three levels of immersion used to group the user are engagement, engrossment and total immersion. To get into these three levels, the user may need to experience one or more of these three attributes of immersion which are unawareness about the environment, unnoticed on the time passing and emotional involvement toward the games. All these three attributes will be used to be monitored during the testing process. The games for the testing are only a tool used to measure the immersiveness of the user. The focus of this study is to measure the criteria of immersion while playing computer games. The first testing was conducted to measure the presence of immersion's attribute while playing computer games. The outcome of this testing is to get the definite definition of immersion in blind user point of view. It used to determine the presence of unaware of time passing, unnoticed about the environment and emotional involvement toward the games. Based on the survey, the final result for this project had shown that the users are immersed by unaware of time passing and unnoticed about the environment. Therefore, this group of users had been group into first level of immersion which is engagement. The further details on how the users being grouped will be discuss in the discussion part.

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CHAPTER 1

INTRODUCTION

1.1. Background

Based on the updated report on April 2011, World health Organization (WHO) stated that about 284 million people are visually impaired worldwide. From this number, 39 million of them are blind and 245 million people experience low vision. For human, visual can be divided into 4 different categories which are normal vision, moderate visual impairment, severe visual impairment and blindness. The term blindness according to Colenbrander (2002) point of view is people who are actually blind (total vision loss) or near blind (near-total vision loss) and need to rely on vision substation skill. Besides that, WHO had defined visual impairment by categorizing an individual who had visual insight less than 3/60 meters. For individual who encounter low vision, they experiencing reduction in vision that cannot be corrected using surgery, spectacle, contact lenses or any other ways that can be used to improve the vision. Therefore, this group of people need assistant from other people or technology in order to read and play like normal people do.

One of the limitations for the blind user is playing the computer games. The games itself need to be well designed so that it can attract the blind user to play with it. Without proper instruction and good audio assistant, there will be hard for the blind user to accept and feel immerse while playing the games. This is quite true as D Archambault, R Ossmann,et al (2007) state that the process of developing the computer games for blind or visually impaired people is somewhat challenging because usually the main feedback for the computer games is visual. Compared to the normal user, they can feel immersed while playing computer games with the

help of good visual impact however to measure the immersiveness for the blind user is not as significant as the normal people. Therefore, the game developer need to find a way so that the visually impaired user can feel immersed while playing the computer games.

Immersion is one of the measurement to identify either the user really favor the games or not. According to Ralph Schroeder (2002) he proposed that immersion is a psychological state where people characterized themselves to be develop by, included in and interacting with the environment that can provide with the continuous stream of stimuli and experience. Another definition of immersion given by Sanders T. & Cairns P. (2010) is the sense of being in the games where the person though, attention and goal are all focus in and around the games. Besides that, the user will feel unaware toward what happen around them as they are really unconcern toward the environment surrounding them. Hence, the immersion is a great indicator to distinguish either the visually impaired people is really going into the games or not

The attributed used to identify how the blind folded user were immersed is based on the literature review from the study conducted by Jennett. C. & Cairns. P et al, (2008). Therefore, this project are using the criteria of immersion which are unaware of time passing, unnoticed about the environment and emotional involvement toward the games as attribute to measure the immersiveness of blind user while playing computer games.

Based from these three attributes, then the user can be classified into 3 different groups which are engagement, engrossment and total immersion. The blind folded user will be tested on how the games can affect them based on the attributed that shown during the testing. The purposed of this test is to identify either the games can actually satisfied the user or not. The result from the test will be included in the later part of this report.

The second testing of this study will be focusing on how the user interacting with the sample games. For the second testing, the sample user comes from the real blind people. Compared to the first testing that used blind folded user, the second testing used blind user to experience the games because the main purposed of the second testing is to test the suitability of the games toward the blind user. Based on the feedback, some modification will be made. After the changes being made, the blind folded user from the first testing will be asked to try the games and being observed while playing with it. Therefore, the games for the third testing will be used as a tool to measure the immersiveness of the blind folded or blind user while playing the computer games. Based on the result, the level of immersion will be classified according to their feedback on the survey provided. Consequently, a well-defined of immersion can be constructed based on the blind user point of view.

1.2. Problem Statement

Blind user need assistance from the technology to read like normal people do. Due to that limitation, the blind user usually did not have a chance to play the latest games application like normal people do. One ways to measure the excitement of user while playing computer games by using the concept of immersion. However, it

is unclear on how to measure the level of immersion for blind user while playing computer games.

Immersion is an important element for the any games application as it will allows the player to play games for an hour or more without realizing what happen to their surroundings. Sanders T. & Cairns P. (2010) state that immersion as understood here is the sense of being "in a game" where a person thoughts, attention and goals are all focused in and around the game as opposed to attending to being concerned with anything else, such as what is going on in the room around them. However the definition of immersion suggested by Sanders T. and Cairns P. is more focusing on the normal user or non-visual impaired user. Based on the study and research conducted, there is no exact definition of immersion in blind user point of view. The definition of immersion given by the scholar is too general because it not specifically defines the immersion in blind user point of view

Therefore, this study is conducted to identify the criteria of immersion while playing computer games. Based on Sanders T. & Cairns P. (2010) immersion in games is cognitive experience constructed within the mind of player because it does not need to be an extreme experience and whilst about being "in a game" but rather about a player thoughts and feelings being more involved in the game than anything else. Thus, from the literature conducted, this study will used three attributes of immersion that will be tested in order to measure the immersiveness of user while playing computer games. The attributes are unaware of time passing, unconcern of the environment around them and emotional involvement toward the games.

Many experiments had been conducted to estimate the level of immersive for normal user while playing computer games. Brown. E. & Cairns P. (2004) stated in their study that immersion for normal user can be group into three levels which are engagement, engrossment and total immersion. The question that may arise is either the level of immersion for normal user such as engagement, engrossment and total immersion is same as the blind people. Hence, by the end of this study, one conclusion will be made on how to determine the level of immersion of the blind user.

Based on the study, it can give a clear picture about the immersion concept in blind user point of view. Furthermore, this study helps the games developer to build a good games application specifically for blind user. Therefore, the present of immersion is an important as it used as indicator to ensure that the computer games that have been develop is actually up to the user; which is blind user expectation.

1.3. Objective

The objectives of this project are:

I. To identify how the blind user feel immersed while playing computer games.
II. To determine the level of immersion for the blind user based on the group classified; engagement, engrossment and total immersion
III. To determine the relationship between behavior and immersion in computer games based on the survey conducted.

1.4. Scope of Study

This research is using blind user as the subject of study. It is focusing about the immersive concept in blind user point of view. Moreover, this study will cover about the gaming experience for normal people and blind user. Using the result of the study, then one can identify the differences or similarities of gaming experience for blind user and normal user. This project are using blind folded user instead of blind user to undergo the testing phase because of time constrain to find the blind user who not only can used computer but also had experience playing with the computer games. Thus, in term of the feasibility of the project within the scope of the study, this project unable to get more feedback from the real blind user because of time constrain to find the user who can actually use computer and had experience playing the computer games. Therefore, this project is using blind folded users as a subject to test the games and consecutively find the attribute of immersion presence while they playing the computer games.

Even though this project did not using real blind user as the subject for the testing, but the project had asking the real blind people to test the suitability of the games during the second testing. Based on the result from the second testing, some modification had been made to cater the requirement from the blind people point of view. Only after the modification, then the third testing will be conducted toward the blind folded user. Therefore, this method is relevance as the real blind user had given the opinion for the modification during the second testing. The games itself will be suitable to be played by the blind user.

Based on the study from the literature review, several criteria of immersion in normal user which are time passing, emotional involvement and awareness toward the environment will be used as the research element in this study. At the end of the study, one can determine either the criteria of immersion in normal user are similar or different with the blind user. Besides that, this study also tried to group the immersion into three levels which are engagement, engrossment and total immersion. This can be done through testing that will be conducted toward the blind folded user. This closed experiment was targeted to 5 people playing the computer games specially made for the blind user.

Due to the lack of understanding about how immersion affect blind user while playing computer games, a survey and interview will be conducted in order to get a better picture on immersive concept in blind user point of view. This second testing was tested toward real blind people. The purposed to use blind people is because they are the main target user of this study. Besides that, one assumption that blind user rarely played computer games was made. Therefore the opinions from them are really needed in order to identify good games that will be used to test the immersiveness while playing computer games.

The result from this interview and testing will be review and compared with the existing study that have been made. Moreover, this result will be used to further improve the games so that it can provide a good measurement to identify the presence of immersive while playing computer games during the third testing conducted toward 10 blind folded users.

CHAPTER 2

LITERATURE REVIEW

2.1 Dimension of Immersion

In the first part of this study is more focusing on the definition of immersion. However, on the second part of the study is emphasizing on how to define the immersion based on the attributes that have been highlight in the study. Therefore, this literature review will be focusing more on how to define immersion, attribute of immersion and level of immersion. At the end of the research, the attributed of immersion will be used as the guideline in order to define the concept of immersion in visually impaired user point of view. In other word, the hypothesis in the study is, immersion can be defined if there is a present of unawareness about the environment, unnoticed on the time passing and emotional involvement toward the games.

Immersion is always being perceived as indicator to evaluate either the games could provide the good gaming experience or not. An entertaining game is the one that can provide the user especially blind people a sense of being engage in the games. In order to get better understanding of immersion, it can be achieve by distinguishing the concept of immersion from the concept of flow, cognitive absorption and presence. According to Jennett. C., Cairns. P et al, (2008), there are three main ideas used widely to describe engaging experiences which are flow, cognitive absorption, and presence. However, the concept of immersion is absolutely diverse from these three concepts.

Flow theory is based on a relationship between challenges and the skills needed to meet those challenges Admiraal W., Huizenga J.et al (2011). The Cognitive absorption suggested by Argarwal.R & Karahanna E. (2000) is a state of deep involvement with software and it is theorize as being exhibit through five dimensions of temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity. On the other hand, Brown. E. & Cairns. P. (2004) stated that presence is the extent to which person's cognitive and perceptual systems are tricked into believing they are somewhere other than their physical environment. In other word, the sense of presence is result from a person being located at the virtual reality environment.

All these concepts which are flow, cognitive absorption and presence are different with immersion. In comparison between flow and immersion, flow is an extreme experience where goal, challenge and skill converge and by contrast immersion is much more prosaic experience and graded with low and high level of immersion, Sanders T. & Cairns P. (2010). In comparison with cognitive absorption, this concept required software. Based on Jennett. C. & Cairns. P et al, (2008), cognitive absorption is an attitude toward information technology in general whereas immersion is the actual experience of playing a videogames.

The explanation for presence is almost similar with cognitive absorption because presence requires the sense of engage while in the virtual environment. However, Jennett C., Cox, A et al (2008) argue that immersion can occur without presence. For example, a simple graphics games such as Tetris do not involve presence but it can still be immersive. This happen same to presence as it can be happen without a sense of immersion as one could imagine a person feel a presence in virtual

environment but not experience a lost sense of time (carrying a boring task in the virtual simulation).

Immersion can be group into three different levels. A research by Brown. E. & Cairns. P. (2004) indicates that immersion can be divided into three levels which are engagement, engrossment and total immersion. In their study indicate that the first level of immersion is engagement. In order to get into this level, the gamers needs give their time, effort and attention toward the games. The second level of immersion is engrossment. This level involve the emotion that directly affected by the games. Finally the last levels of immersion suggest by Brown. E. & Cairns. P. (2004) are total immersion where the gamers describes as being cut-off from reality and come to one extend that the gamers are only concerned about the game.

There are several criteria that lead to being immersed while playing computer games in blind user and normal person point of view. For example, person is unnoticed toward time passing, paying less attention toward what happen in their environment such as people around them or any changes in the environment, and being reckless toward their own responsibility.

According to Jennett. C., Cairns. P et al, (2008) immersion have several attribute which are lack of awareness of time, loss of awareness of the real world and

involvement and a sense of being in the task environment. In addition, Sanders T. & Cairns P. (2010) also suggests that gamers do have lost sense of time when being immersed while playing games that have a presence of music. Brown. E. & Cairns. P. (2004) proposes that in order to develop the immersion, there are barriers that need to be faced by the gamers. The gamers have to invest time, effort and attention toward the games. Moreover, they also point out that the gamers should have the feeling of empathy and being attached toward the environment of the games.

2.2 Immersion Evaluation Model

Based on the literature review conducted, this research paper proposed an evaluation model in order to assess the immersive concept in blind user point of view. The criteria used to evaluate immersion for blind user is unaware of time passing, unnoticed about the environment and emotional involvement toward the games .Figure 1 below is the summary of the immersion evaluation model. In this study, the concept of immersion is evaluated based on the survey and interview that will be conducted toward the blind user. Jennett C., Cairns P et al (2008) suggest that immersion can be measured subjectively (through questionnaire) as well as objectively (through time of completion of task given).

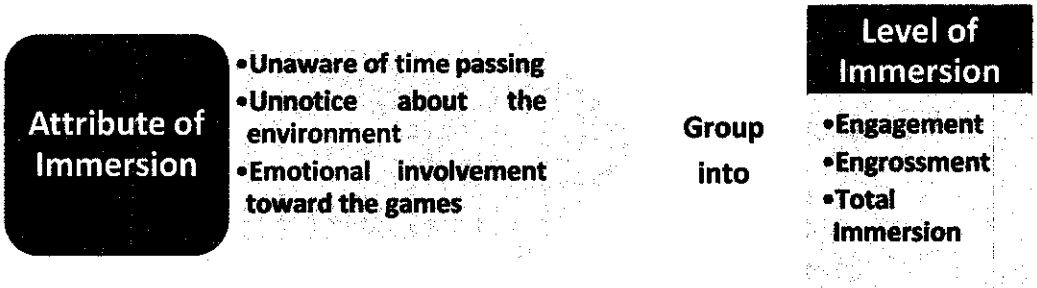

Figure 2 Immersion Evaluation Model

Therefore, before the interview and survey being conducted, the participant should have the experience of playing computer games. The games that have been played by the participant at least can full fill the consideration suggested by Johh Wood et al (2003). The research state that to provide a meaningful experience the games had to have an objective for player to pursue, decision that player could make and obstacle to their success.

CHAPTER 3

METHODOLOGY

In this paper research, there are several procedures that need to be carried out in order to study about the immersive concept in blind user point of view. Figure 2 below is the summary of the methodology used in this study.

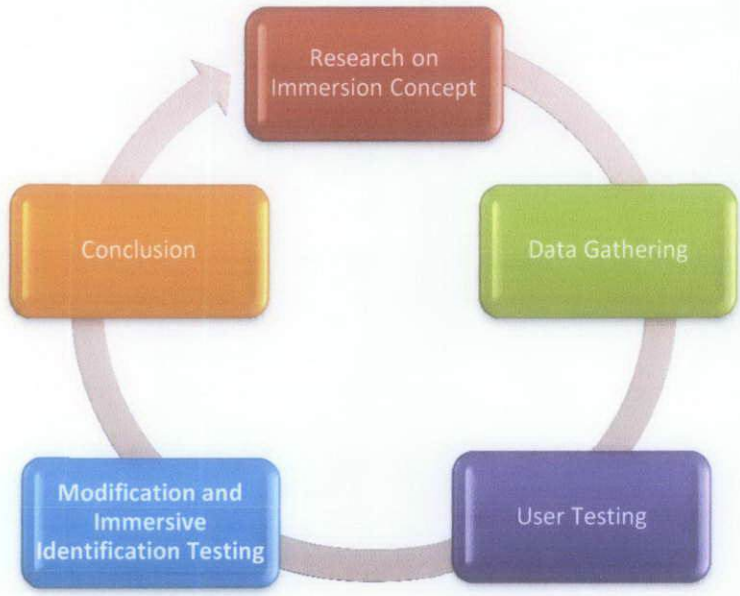

Figure 2. Summary of The Methodology

3.1 Phase 1: Research on the Immersion Concept

This project begins by the study about the definition between blind users; visually impaired people and non-visual impair people. In order to relate the blind user with the immersive concept while playing a computer games, there will be a critical study about what is the definition of immersion. This process will be perform during the literature review as there will be a lot of study about others researchers that doing study on immersion concept.

After defining the immersion concept, then this study had suggested one hypothesis which is, the concept of immersion that can be identified based on 3 attribute that is unawareness about the environment, unnoticed on the time passing and emotional involvement toward the games. Besides that, the categories of immersion are defined based on the literature review that has been conducted. These categories or level of immersion was taken from the study conducted by Brown. E. & Cairns. P. (2004). Even though the level of immersion is taken from the study conducted by Brown and Cairns, the final result on how to group the user into level of immersion will be done through the observation and survey question answered by the user. The users need to have the criteria of immersion then, they will be group into level of immersion.

3.2 Phase 2:Data Gathering - Interview

During the data gathering process, two interviews had been conducted. The first interview was conducted with a representative from National Council for The Blind, Malaysia and the second interview was conducted at Persatuan Orang Cacat Penglihatan Malaysia, Cawangan Perak. The purposed of the first interview is to get more information on how the blind people used and play the computer games. Furthermore, this visit also used to get further clarification on what is the criterion needed developing games application for blind people.

The planning for the first interview was to ask the blind user to test the games and answer several question based on the experience after playing the games. However, because of the user is unfamiliar with the computer games, then the user for the first visit is unable to be the subjects of study for this project. Although the subject of study unable to play the computer games, but the subject of study had given some input on the important element that should be included in any application made for blind user. Some of the important element being stress during the interview is the importance of audio instruction, and application that is easy to be use by the blind people. For example the application should use the keyboard in order to give instruction instead of using mouse.

The purposed of second interview is to get the visually impaired user to try the games that will be used in the testing phased. Meaning that, the second interview was conducted to get the blind user playing with the games. The blind user can

therefore evaluate the suitability of the games for blind people. Besides that, the result from this visit can actually determine what type of improvement that needs to be made in order to make the blind user feel immersed playing the computer games. The feedback received will be used as the guideline for the future improvement in this study.

3.3 Phase 3: User testing

The testing phase was conducted toward the blind folded user and real blind user. The purposed of the first testing is to examine the presence of time passing, unaware of environment and emotional involvement toward the games. This testing was conducted toward 5 blind folded users. In the first testing, the tool used to measure the immersive criteria while playing games is using The Curb Games. This game is readily available at the internet.

The games required the user to cross the road 10 times. The obstacle for this game is that, the user need to cross the games without being crash by cars. After that, the subjects of study need to answer several questions on their experience of playing with the games. The first testing was conducted during the first part of this study after the interview session with the blind people from National Council for The Blind.

The second testing was conducted during the second part of this study. The subject of study for the second testing is the real blind people. The tool used to measure the immersive concept is by using Matching Games named BrainiacB. The games can be find at www.spoonbillsoftware.com.au/blindgamers.htm. This game requires Microsoft's Speech Application Programming Interface Text To Speech (SAPI TTS) in order to execute the audio instruction. The games requires the user to match the word that hidden behind the numbers. The total number of words that need to be remembered by the user is 24. Thus, it is important for the user to remember each word that hidden behind the numbers. The method of this testing is same as the first testing where the user needs to play the games and after that complete the survey question.

3.4 Phase 4: Modification and Immersive Identification Testing

Based on the feedback received during the second testing, a simple prototype of matching games was developed using Microsoft Visual Basic. In order to load the sound, the prototype is using Microsoft Speech API 5.3. This Microsoft application allow the user to type the desired audio that user want to product and be able to convert the word that have been type into audio file.

The concept of the games is still the same as the concept of the games in second testing but using 12 number of choices. However, this prototype is not complete and unsuitable for blind user as it using mouse to move the picture between tiles. Therefore, this study had using the Matching game in the second testing to get the result for immersiveness of blind folded people while playing the games.

During the second testing, the number of choice in the matching games is 24, therefore some modification being made so that the choices are reduced to 12. The third testing was conducted toward the same group of user during the first testing with another 5 first time user playing games for blind people.

3.5 Phase 5: Conclusion

Based on the result from the testing, it can tell how accurate the elements (unnoticed about time passing, unaware of people in the environment, and emotional involvement toward the game) used in this experiment to the immersive criteria while blind user playing computer games. Therefore, well defined of immersion concept in blind user point of view can be constructed.

CHAPTER 4

RESULT and DISCUSSION

4.1 Study 1

4.1.1 Objective

To examine the presence three attributes of immersion used in this study which are time passing, emotional involvement, and awareness toward environment when playing computer games.

4.1.2 Method

This testing used 5 blind folded users. They were asked to play the games that required them to cross the busy road 10 times. The user can identify the right time to cross the road when the sound that coming into them is getting farther. Therefore, they cannot cross the road if the sound coming to the road getting nearer. This testing was conducted two times. Figure 3 below is the screenshot of the games. Below is the explanation about both of the experiment:

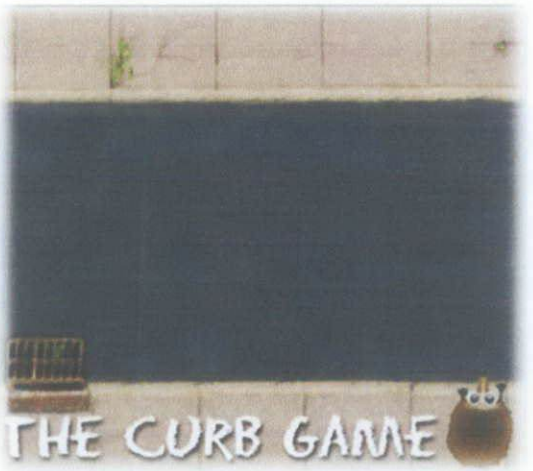

Figure 3. Screenshot of games used for study 1

Experiment 1

During the Experiment 1, the sample user had been asked to give their estimation time for completing the first experiment. The estimated time to complete the games was compared with the real time to finish the games. Then, the time takes to complete the games in experiment one will be used as a time limit to complete the games in experiment 2.

Experiment 2

In the experiment 2, the sample users are given time limit to complete the goal of the games. Based on the survey question, there are 5 questions being asked in order to evaluate the emotional involvement toward the games, 2 question that relate to the

awareness toward the environment and 1 question that asked about the time passing in the games. Figure 4 below is the survey questions that need to be completed after second experiment:

Question A	I am really excited to finish the target of the games
Question B	I had try my best to reach the target of the games
Question C	While playing this games I don't have intention to stop playing until I was said so
Question D	I think the games is easy
Question E	Rate the challenge of this game
Question F	I really want to win this game
Question G	Are you aware on what happen in your environment while playing this game
Question H	Do you think about your homework/assignment while playing this game?
Question I	Please rate to what extend that you feel emotionally involved in this game
Question J	I am satisfied with my result of this game

Note:

1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree

Figure 4. Study 1 Survey Question

4.1.3 Result

Table 1 below shows the result for study 1.

Table 1. Result of Study 1

User's Answer	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Question A	5	4	4	5	4
Question B	5	4	5	5	3
Question C	3	5	4	5	4
Question D	3	3	3	4	3
Question E	Intermediate	Easy	Intermediate	Easy	Intermediate
Question F	5	4	4	5	4
Question G	1	2	2	2	3
Question H	2	2	4	2	3
Question I	Very Much	Intermediate	Intermediate	Intermediate	Intermediate
Question J	3	3	4	3	3
Estimate time to complete the game in Exp 1	120 Second	300 Second	300 Second	120 Second	300 Second
Time completed the game in Exp 1 (sec)	70	30	37	40	180

Result from experiment 2 indicates that none of the sample user had managed to achieve the target of the game within the time limit given. Based on the result for the questions A and B, all 5 sample user is really excited and had tried their best to achieve the target of the games. When the sample user is really excited to complete the goal of the game, it shows that they are really got into the games.

Moreover at the question I, 4 out of 5 sample users had answer that they had feel emotionally involved in the games. Other ways to estimate the emotional involvement while playing the computer games is through question J. The result from the survey shown that 4 out of 5 sample user had answer they was feeling neutral about the result of their games. None of them was satisfied from the result in experiment 2.

This is because, during the experiment 2, the sample user had given shorter time. Therefore they were feeling excited to finished their games. However, while they want to achieve the target, the sample user was emotionally involved toward the game. They become careless while crossing the road. Hence, none of them had successfully crossing the road 10 times within the time limit. That is one of the reasons why most of the players feel unsatisfied with the result of the games because they were unable to achieve the target of the games.

In term of time, all 5 of the sample user did not realize the time passing. They feel that they had played the games longer than the real time. Besides that, all 5 sample user was unnoticed about what happen to their environment while playing the computer games. All of sample users had answer disagree when they were asked that they were aware about people around them while playing this computer games.

In addition, 3 out of 5 the sample user also stated that they were not thinking about the homework or assignments that need to be submitted while playing the computer games. This can show that the users are not only unaware of time passing but also unconcern on their current situation while playing with the games.

4.2 Study 2

4.2.1 Objective

To examine the suitability of games for blind user

4.2.2 Method

The sample user is blind people that had experience using the computer. However, the last time that sample user played computer games is two years ago. This games required the user to match the same word that hidden behind the numbers. In order to complete the matching word, the user therefore need to remember each word that hidden behind the number. In each time, only two hidden word can appear. If the word is not match, the word will automatically return into number. Figure 4 is the screenshot for the study 2.

Figure 5. Screenshot of study 2

4.2.3 Result

Based on the testing conducted, the sample user had said that he feel reluctant if he was required to play this games for the second time. The reason is that the games have a lot of numbers. The number of choices for this test is 24. Thus, it will be hard for the first time user to play this game as they were required to remember a lot of numbers together with the word. The user had suggested using lesser number of choices.

Moreover, the user had comment that the graphical interface is not important as the blind user cannot see. The only important point is to improve the audio instruction of the games. For the first time user, they will lost and need assistant from the others

if they want to play with this game. Besides that, the user had recommended to see how ping pong games work. This can be used in the further study of this project.

4.3 Study 3

4.3.1 Objective

To identify the criteria of immersion based on the modified matching games.

4.3.2 Method

By using the same modified games (the number of choice are reduced from 24 numbers change to 12 numbers) as study two but sample user are 5 participants from the study one and another 5 individual which are first time user playing blind games application. Figure 5 below is the screenshot of study 3.

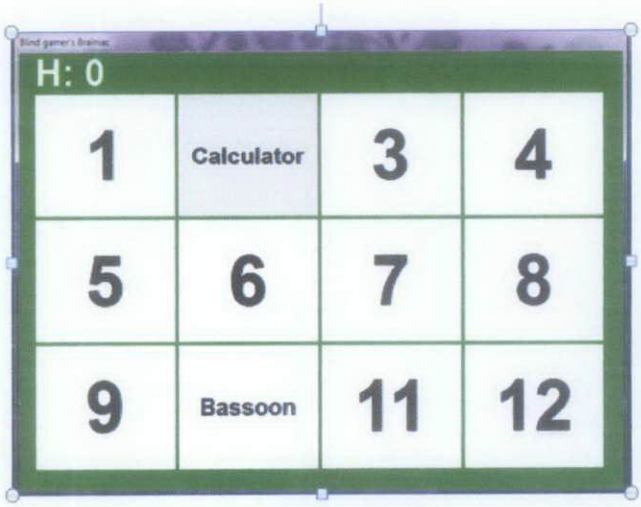

Figure 6. Screenshot of study 3

4.3.3 Result

The below is the question asked after the user playing the games.

Questionnaire for Study 3

This question was built to know your experience after playing this computer games. Therefore you should answer based on what you feel after playing this game.

1 Strongly Disagree
2 Disagree
3 Neutral
4 Agree
5 Strongly Agree

No	Question	Answer				
1.	I had using my memory skill to play with this game	1	2	3	4	5
2.	I need to focus in order to win this games	1	2	3	4	5
3.	I'm having difficulties to play this games because I hate to remember things	1	2	3	4	5
4.	This game is confusing	1	2	3	4	5
5.	Are you aware of time taken to finished this game	1	2	3	4	5
6.	I am only concern about finishing this game	1	2	3	4	5

7.	When I was unable to find the matched word, I try to work harder	1	2	3	4	5
8.	I really want to win this game	1	2	3	4	5
9.	I feel emotionally attached toward this game	1	2	3	4	5
10.	Are you aware on what happen in your environment while playing this game	1	2	3	4	5
11.	It feel like there are real card in front of me and I need to match the card with the same words	1	2	3	4	5

The result from the survey conducted after the participants playing the computer games are shown in the chart below.

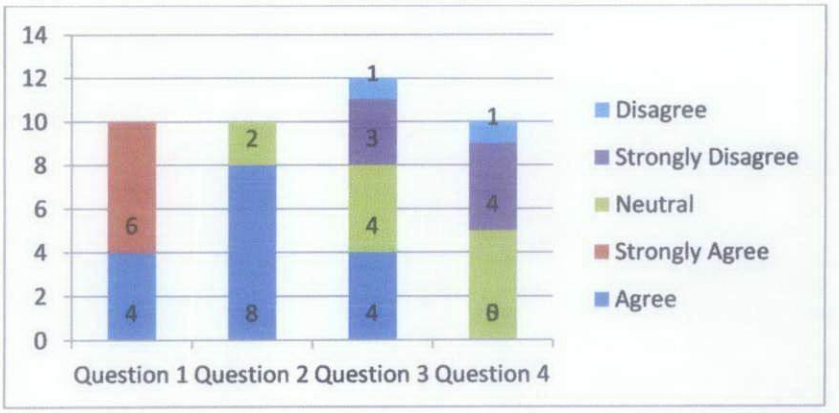

Figure 7 Result for study 3 Question 1 until 4

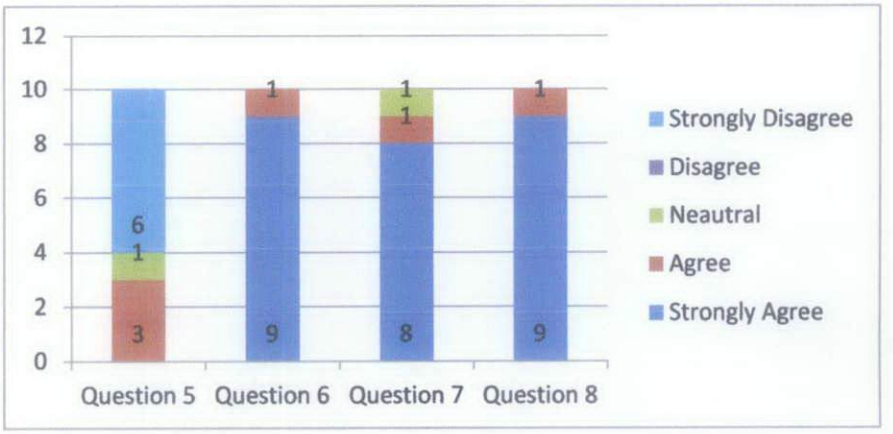

Figure 8. Result for study 3 Question 5 until 8

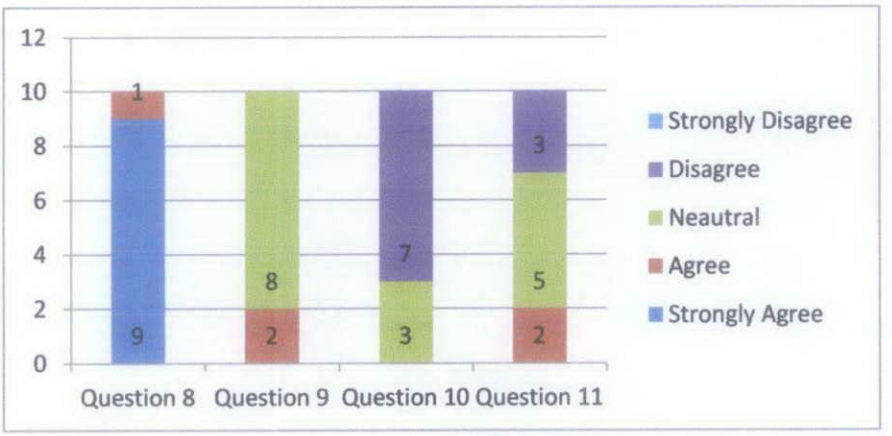

Figure 9. Result for study 3 Question 8 until 11

The result in the Figure 7 is illustrating the opinion from the user about the games that they played. Based on the survey, 10 participant knows that in order to play this games, they need to used their memory skill. Therefore, these questions are reflecting that the participants are aware of how this games work.

In Figure 8, the questions are made to evaluate how focus the participants playing the games until they are unaware of the time passing. Based on the result, it shows that 9

out of 10 participants are giving 100% effort in order to win this game. Therefore, based on the survey question number 5, it shows that 6 participants were unaware of time passing. The participants are noticed about unawareness of time passing when they were asked question number 5 because they cannot estimate how long they need to complete the games.

In Figure 9, the question basically asked about their awareness toward the environment and either there is emotional involvement while playing the games. The answer from question number 9 given by the participants stated that 8 out of 10 participants were not emotionally attached toward the games. However, if refer to question number 8, it shows that the participants are really want to win the games, but they are not emotionally attached toward the games. Then for answer question number 10,7 out of 10 participants are unaware about their environment. However, when they were asked about the feeling of playing with the real card, only 3 out of 10 participants were disagree.

In conclusion, the users were unaware of time passing and environment around them. They had tried to win this game within short time and consequently feel unaware of their environment. The assumption why the users feel unaware of their environment is because the users need to remember each word that hidden behind the number. Therefore, they had focusing in remembering the word and unaware about their surroundings.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

In conclusion, based on the study conducted, the immersive condition that only presence while blind folded user playing computer games are unaware of time passing and unnoticed about their surroundings. Therefore, out of three attribute used to measure the immersion, only two attribute had managed being captured during this study. The assumption that the participants was unable to emotionally immersed toward the games is because the games did not have level of difficulty.

Based on the study 2, the sample user responded that the games need to have level of difficulty so that they will getting eager to win this games. For example, if in the first round the games have 12 choices, then the second round the games should have more than 12 choices. This will give more challenging experience toward the participants. However, based on the study the user had only loss sense of time and environment. The participants had a desired to win the games and it lead to unawareness of time passing and environment around them. The games itself is design to make the user really focus in the games by requiring them to remember each word hidden behind the number and complete it within the short time. Thus, the users actually need to remember two things which are the numbers of the choices and word behind it so that they can locate the position of the matching hidden word.

Based on the attribute presence, the participants can be group into level of immersion. In this study, the sample user had only managed to be group into first level of immersion which is engagement. The participants had given their time and

effort in order to win the games. Besides that, the user also had shown the sign unaware of the environment. This criterion of immersion can be included in the first level of immersion because these two criteria of immersion, which are unaware of time passing and unnoticed of the environment, are happened consecutively.

When the participants are giving effort toward the games, they will then unaware of time passing and environment around them. However, if refer back in the literature review, the engagement happen when the user is giving time and effort toward the games. On the other hand, this study suggested that engagement happen when the user had given 100% effort to win the games, they are unaware of time passing and at the same time unnoticed about what happen to their environment.

This study had using blind folded user as a sample user for the final study to identify the criteria of immersion. For the future work, this study needs to use the real blind people as their sample user. This is because although the blind folded people cannot see, they had a chance to see the games or any games application. Compared to the blind user, they had no chance of seeing or imagine how the interface of the computer games application. This therefore can make the study less accurate due to the different background in term of opportunity to see the real games application.

The recommendation for this project is to include the difficulty level in the games that used to measure the immersive concept in blind user point of view. The difficulty level will provide some challenging experience toward the blind user.

Besides that, the study needs to consider the suggestion to look how the ping pong games work for blind people. Lastly, the graphical presentation is not important because the user only depends on the audio instruction given.

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Appendix

Gant Chart For Finel Year Project 2011

Week	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Task													
Phase 1: Research on Immersion Concept													
Definition of Blind User	This Activities has been conducted during the FYP 1												
Research on Concept of Immersion													
Progress Report of the project													
Phase 2:Data Gathering - Interview													
First Interview	This Activities has been conducted during the FYP 1												
Second Interview													
Define the immersion criteria in blind user													
Pre EDX													
Phase 3: User Testing													
Building Games prototype n to measure the immersion for blind user													
Conduct an experiment toward the blind user (study 2)													
Phase 4: Modification and Immersion Identification Testing													
Conduct study 3													
Dissertation													