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User Experience of Filipino Older Adults on Serious Games

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Abstract

This research was conducted to study user experience with serious games by Filipino older adults living in two care facilities and as well as the user experience of the care staff with the same games. The research was conducted in Davao City which is a highly urbanized city located in southern part of the Philippines.

There are two objectives formulated for the study. First is to determine Philippine cultural influences on the perception of older adults and care staff on the two mobile games. The second objective of the study is to gather data that could be utilized in the future design of serious games to maximize intended therapeutic benefits as well as their international acceptance.

To gather the data, the researcher observed the residents and the care staff as they played the two games. After playing, the participants were interviewed individually. Data from observation and from the interview were analysed using inductive content analysis.

The results concluded that Filipino older adults and the care staff perceived the serious games as potential tools for recreation and rehabilitation. The results also showed the effects of Philippine culture on user experience with serious games, and the challenges encountered when introducing serious games in an elderly care facility.

Key words: User experience, Serious Games, Mobile Games, Philippines, Older adults, Culture, Rehabilitation

CONTENTS

1 INTRODUCTION

By 2050 it is estimated that the population of older adults (aged 60 and older) will double in proportion and will account to 21.1% of the world's population (World Health Organization, 2019, Population Division of the Department of Economic and Social Affairs of the United Nations, 2013). The increase of older adults' population brings a high demand of social and healthcare services because of their age-related physical and mental conditions. With the economic constraints experienced globally, most countries are looking for innovative and efficient solutions for these challenges, which modern technology offers. (Wilkowska, Brauner, & Ziefle, 2018, 1.)

Play has always been part of human learning. In fact, children learn by playing and this remains true in adult life. With the influx of technological advancement, the idea of play has been utilized in different mobile and computer applications to provide learning and health promotions. These games are called Serious Games. Serious games have huge potentials in effectively promote health due their attractive features such as fun, challenging, while having implicit purpose or goal. The goal could be health training, health promotion, or rehabilitation. Literatures suggest that though there has been much focus on children's well-being and health promotion when creating serious games, a well-tailored serious game could cater any population and age group - older adults included. (Tăut, et al. 2017, Adams 2010, 162.)

This study involves two mobile games which have potential use for rehabilitation. These games, which are played on a tablet computer, were created by Well-being Enhancing Technology research group (WET-RG) at Satakunta University of Applied Sciences, Pori, Finland. The first game is called Cat vs. Mouse and the second games is called Trail Making Test. In the first game the goal is to have the mouse eat the cheese which appears on the screen. The movement of the mouse could be controlled by tilting the tablet. Later a cat will appear which the mouse should avoid. The second game is a memory test that can be played by tapping the figures on the screen. The figures could either be digits or combination of digits and letters which follows a sequence. The figure will turn red if it is not in the required sequence.

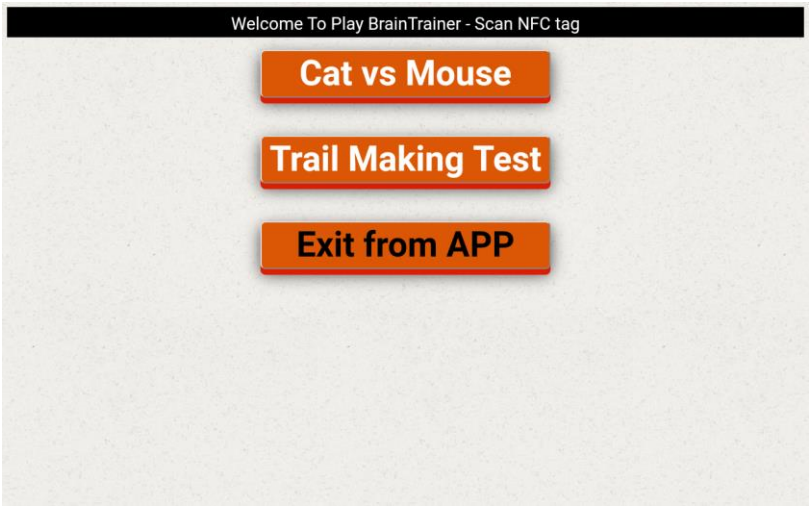

Photo 1. *Menu of the games.*

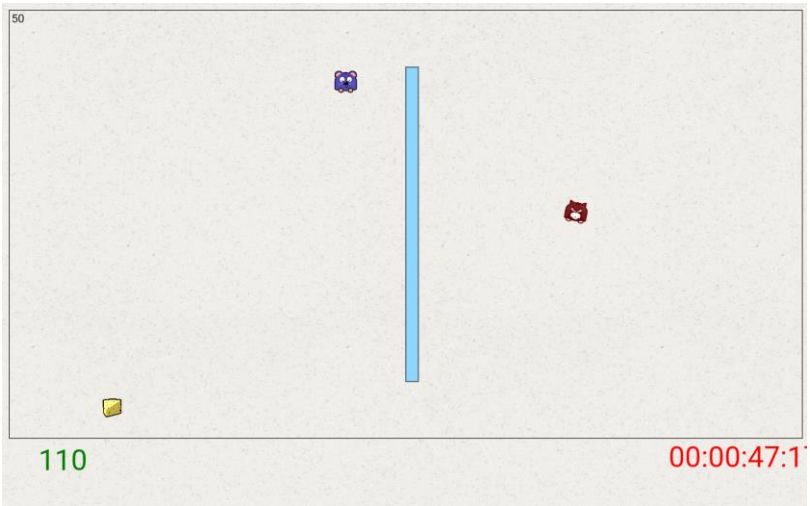

Photo 2. *Cat vs. Mouse*

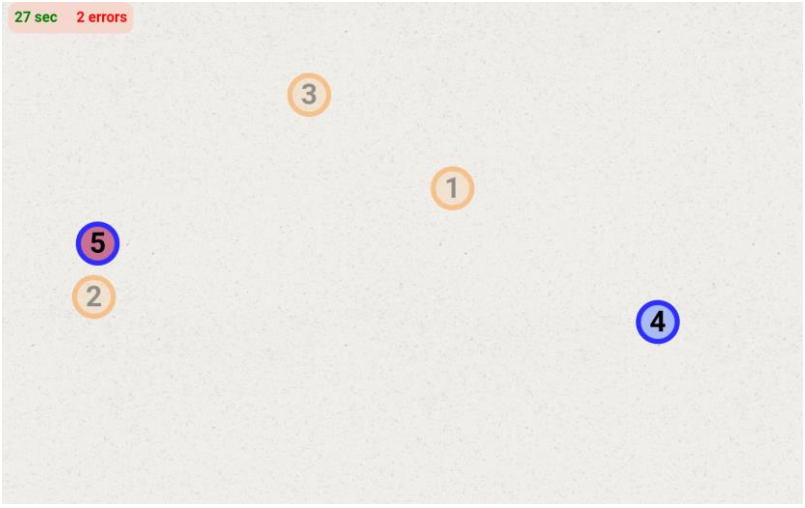

Photo 3. *Trail Making Test*

These mobile games or serious games were tested in two care facilities for the elderlies in Davao City, Philippines. Davao City is a highly urbanized city situated in the southern part of the Philippines with a population of 1,673,832 (Official Website of the City Government of Davao, 2018). It is the hometown of the researcher to whom the city's culture, customs, tradition and language are familiar.

In this thesis the researcher presented the aim, research questions and objectives of the study. Key concepts and previous research related to the study are also introduced. This paper also presented the methodology of the study, data collection process, the results gathered and discussion and analysis. Ethical considerations are also briefly discussed.

2 THEORETICAL FRAMEWORK

The concepts used in this study could be well established by presenting the background of serious games along with related previous research that were conducted, key concepts used and explaining why user experience and user research were utilized in this study. The integration of these concepts to achieve high-quality research constitutes the theoretical framework of this study (Polit & Beck 2012, 126).

2.1 Background

Studies and development of serious games in the field of healthcare are growing. Serious games as innovative tools in health care interventions are being exploited especially in health promotions, disease preventions, treatment, health education and physical and mental rehabilitation. Traditional approaches of treatment, therapy and rehabilitation of wide range of medical conditions are being supplemented with serious games to improve outcomes. Serious games as rehabilitative tools have been tested in patients with mental and physical conditions. The fun that serious games offer is empowering people to be more engaged in treatment, therapy or rehabilitation and this must be recognized by all stakeholders. (Adams 2010, 162, Brahnam & Brooks 2014, 153-154, 160.)

Research about end-user's behaviour on serious games showed that literacy, exposure and access to technology, and level of technological skills would determine how much a player could benefit from a serious game. When introducing serious games to someone with an intention of treatment or therapy, it is important to establish what kind of skills and roles a person needs to learn in playing the games. The desired outcomes of playing serious games could be achieved if a player has acquired the competencies and skills needed before playing the games. (Adams 2010, 160,162-163.)

For the past few years, there have been numbers of serious games being developed which are targeted towards older adults in response to their increasing population and health needs. However, many of these serious games were not fully enjoyed by older adults because they do not seem to be attractive to them. Those serious games which

were used by the older population and yielded positive outcomes were found to have common features which are palatable for older adults. These features are simultaneous visual and auditory stimulation, a task-oriented setting, and ease of play. Researchers argued the importance of the ease in playing serious games when it comes to older adults as the target group. (Kim, et al. 2015, 603-604.)

Brahnam and Brooks (2014, 160) have also explored the importance of training for the health care staff in order to properly administer and facilitate the use of serious games in rehabilitative or therapeutic context. According to them, the lack of training in using new technology in our health interventions would result to futile procurement of these technology, which means that they will end up not being used.

Trial studies about the two serious games or mobile games which will be the focus of this thesis have been conducted already in Finland and in China alongside with other mobile games. The researchers investigated the user experience in different user groups, including older adults staying in a care facility. Observations of the care staff were also considered. (Koivisto, Merilampi & Sirkka 2015, Merilampi, Koivisto, & Sirkka 2019.)

During the game design, accessibility issues have been addressed according to the users impaired perception and sensation skills. The games were meant to be simple and easy and requiring minimal amount of equipment to play. (Koivisto, Merilampi & Sirkka 2015.)

In Finland the research was done during a three-month period after which a private interview with each participant was done to gather data related to user experience and usability issues. Comments by the care staff were also included in the reflection of the data gathered. (Koivisto, Merilampi & Sirkka 2015.)

A trial study of the two games was also conducted in China to investigate whether the difference in culture would have an effect in user experience. The trial study was done on a semi-controlled setting where care staff can assist participants when asked while researchers where just observing. The study focused on qualitative findings. Like the study in Finland, each participant was also privately interviewed. Observations and

follow-up interviews were done. A care staff was present throughout the observation of trials. (Merilampi, Koivisto, & Sirkka 2019, 223-224.)

The participants from both Finland and China gave positive feedback on the two games. Participants in both countries reported that aside from fun, entertaining, exciting and challenging, the two games also provided a suitable physical and cognitive rehabilitation. The games also served as social activator among participants, care staff, and family members. (Merilampi, Koivisto, & Sirkka 2019, 226-230.)

With usability issues, participants from both countries reported that the touch screen is not sensitive enough creating false mistakes on the game. Researchers observed, that this is due to the dryness of the hands of the participants. There were also issues with the grip on the tablet which was solved by adding a silicon cover. Chinese participants were also pushing the touch screen too hard. (Merilampi, Koivisto, & Sirkka 2019, 226-230.)

Based on the feedback, adjustable difficulty levels, animations and sounds seem to be very important especially for the younger players. Finnish participants also commented that they did not like unnecessary elements in the game. Simple game setting is preferred. (Merilampi, Koivisto, & Sirkka 2019, 230.)

As for the cultural comparison, the researchers observed that motivation on game play can be improved through localizing the game elements based on the culture. Culturally familiar elements on the games could make participants relate and be more engaged in the game. Game logic becomes easier as well. Care staff and the participants in China were observed to share closer relationship compared to that in Finland as hugging, holding hands, cheering each other, and holding the tablet together were manifested. (Merilampi, Koivisto, & Sirkka 2019, 230-231.)

2.2 Key concepts

Serious Games are “games that do not have enjoyment, entertainment or fun as their primary purpose. Serious games have been used as a tool in numerous areas of application, such as education, rehabilitation, military training, among many others.” (Valladares-Rodríguez, S. et al. 2016, 298.). In some studies, serious games are also referred as mobile games (Merilampi, Koivisto, & Sirkka 2019).

For the context of this thesis, older adults are defined as people aged 60 and older. In the Philippines older adults are also referred to as senior citizens. These two concepts- “older adults” and “senior citizens”- will be used interchangeably throughout this study. Senior citizens are usually being taken cared by their respective families. According to Antonio (2015) it is not culturally common to send the elders of the family to a care facility. However, due to urban and labour migration, globalization and international migration more and more senior citizens are now living in a care facility.

English Oxford dictionary (2019) offers two definitions of culture which are significant to this thesis. First, culture is the arts and other manifestations of human intellectual achievement regarded collectively. Second, it is the ideas, customs, and social behaviour of a particular people or society.

Well-being is generally the state of being positive and feeling good about one’s life. With well-being, one can say that he or she is experiencing satisfaction in life and positive functioning. A good physical health is critical for well-being, however people with physical disability could also experience well-being when they find satisfaction in other aspects of life. Well-being can be economic, social, emotional, and psychological. (Website of the Centers for Disease Control and Prevention 2016.)

The World Health Organization (2019) defines rehabilitation as “a set of interventions needed when a person is experiencing or is likely to experience limitations in everyday functioning due to ageing or a health condition, including chronic diseases or disorders, injuries or traumas.” Iivanainen and Syväoja (2008, 25) argue that through rehabilitation process a person could potentially achieve good physical, psychological, and

social functioning. Rehabilitation could be directed towards physical and mental functioning. It could also be towards improvement of social skills and ability to work. Generally, rehabilitation enhances one's independence and well-being.

According to Garrett (2011, 6), user experience (UX) is the experience a product creates for the people who use it in the real world. He argues that user experience is often neglected when designing a product or service because people pay more attention to what the product or service does than to how it works. This creates the line between a successful and a failure product or service. User experience also focuses on having a deep understanding of users - what they need, what they value, their abilities, and their limitations (Website of HHS Digital Communications Division U.S. Department of Health and Human Services 2006).

2.3 User experience and user research

The approach used in this thesis is based on the concept of user experience. According to Garrett (2011, 6, 9 & 12) anything – a website, service or any technological product – that is made to be used by someone delivers an experience. Whatever this experience might be, good or bad, determines whether the user will use or buy that service or product or not. This is what user experience is all about. Garrett points out that user experience is essential part of all kinds of products and services.

Garrett (2011, 9 & 17) claims that to achieve a positive experience with a product, the one creating the product must pay attention to user experience design along with product design. This simply means taking the user into consideration throughout the whole process of product development. This can be done through user research where one must know and understand who the users are, what are their needs, what are their behaviours, how they think, what are their social and professional roles, what are their attitudes and perceptions about their environment and/or a technology in question and what are their explicit expectations towards that technology. The people who spend time talking to the users are the ones who know more about the users. They are the ones with valuable data and information which can be vital in product development.

The users are always the most productive source of requirements for creating any product or service. By using all these data from the users to create something useful for them ensures a positive user experience. (Garrett 2011, 8, 42-45, & 65.)

This thesis involves two mobile games which are made by Well-being Enhancing Technology research group (WET-RG) at Satakunta University of Applied Sciences, Pori, Finland. Since these involves two finished products, a user research and user test as described by Garrett (2011, 46 & 48) will be utilized to extract user experience from these two games. The target group for this research will be Filipino older adults age 60 and older living in a care facility in Davao City, Philippines.

3 AIM, RESEARCH QUESTIONS AND OBJECTIVES

This Master's thesis aims to investigate cultural variations in the user experience of two serious games in Filipino older adults living in a care facility compared to that of Finnish and Chinese older adults which have already been conducted. These serious games were created by Well-being Enhancing Technology research group (WET-RG) at Satakunta University of Applied Sciences, Pori, Finland. (Merilampi, Koivisto, & Sirkka 2019, 214.)

The research questions that will be tackled in this study are the following: How do the target group and care staff perceive mobile games as potential tools for physical and cognitive rehabilitation? How does the Philippine culture affect the user experience on the mobile games in question? What are the challenges that come along with implementing something new such as serious games as rehabilitative tools in a care home facility for older adults?

There are two objectives formulated for the study. First is to determine Philippine cultural influences on the perception of older adults and care staff on the two mobile games. The second objective of the study is to gather data that could be utilized in the future design of serious games to maximize intended therapeutic benefits as well as their international acceptance.

4 THE RESEARCH ENVIRONMENT

Filipinos have high respect and regard to the older members of their families. Households in the Philippines are usually multigenerational, and it is culturally expected that younger members of the family should take care of the elderly members (Paunan n.d., Badana & Andel 2017, 215). Failure to do so is considered shameful. This view of family caregiving has its roots on how Catholicism, the predominant religion in the Philippines, teaches about the idea of self-sacrifice to provide quality life to other members of the family. Filipino senior citizens reported that they have better quality of life when their own family takes care of them. However, due to globalization and international migration this system of family caregiving is now changing. Recently, more and more elderly care facilities are being established to address the growing demand of family members who cannot physically take care of their parents or grandparents. Many of these care facilities are privately owned. The custody and guardianship of the residents in these care facilities fall into the hands of the owners. (Badana & Andel 2017, 213-215, Antonio 2015, Paunan n.d.)

Garrett (2011, 47) mentioned that when observing user experience, especially when conducting task analysis, it is important for the researcher to observe the user using the product, or technology in this matter, in his or her own environment. Since the researcher went to elderly care facilities to conduct this research, it is important to describe the physical environment of the two elderly care facilities to have better understanding on how environment could affect user experience.

4.1 First Elderly Facility

The facility is owned by a private person and it has been operating since 2016. It has about 20 residents. Though it is an elderly care facility, it also has younger residents who need special care and assistance in their activities of daily living (ADL). In one work shift there is at least one registered nurse and two or three caregivers. The main recreational activities that the residents do in the facility are watching television and walking around the small garden in the front yard. There is a schedule for watching

television posted in the living room. When residents get sick or need medical check-ups they need to be transported to the nearby hospitals.

Photo 4. *The living room of the first facility*

From the outside, the place looks like an ordinary two – story family house surrounded with high fence which has metal sheet around it. From the outside, the residents are not visible even when they are outside in the garden. Most of the rooms are shared by two residents. Two of residents do not have own room but they have beds which are placed outside the kitchen. The owner, who is a registered nurse, and her family live in the same house in the second floor.

4.2 Second Elderly Facility

The second facility is also privately owned and was opened since 2014. It has about 30 residents. The residents are mainly elderly people. 1 resident who was there was younger than 60 years old. In a work shift, there is at least one registered nurse and four to five caregivers. The residents' recreational activities are watching television, listening to music, singing, dancing, strolling and some light physical exercises in the morning. Watching television is also scheduled.

Photo 5. *The garden view in the second facility*

Like the first facility, this facility also looks like an ordinary two-story concrete family house with high concrete fence around it which hides everyone inside. Around the main house there are small huts where some residents sleep. Some residents have their own rooms and other rooms are shared by two residents. Outside the house there is an area where the residents gather together to watch television or do other recreational activities. They also eat their meals on the same place. There is also a small garden where the residents can walk around. The owner also lives in the same house.

5 METHODOLOGY

A qualitative research approach was used in this study to address the three research questions which all are related to the user experience of Filipino older adults and care staff with serious games. The data gathered in this study are the demographics of the target group, the verbal feedbacks of the players and care personnel, their behaviours, attitudes, perceptions and expectations toward the technology involved. The researcher also took special attention to the cultural influences on the user experience.

5.1 Data collection

Data were gathered through observation and semi-structured interview. According to the accepted thesis plan, the researcher supposed to record the interview part. However, the place for the interview which the facility provided was noisy, thus the researcher was able to record only some of the interviews. The data gathered were encoded and analysed through inductive content analysis in the context of user experience as explained by Garrett (2011).

On the data analysis the researcher's personal experiences and background were taken into count in creating meaningful outcomes since the researcher shares the same cultural background as the target group even though there is a generational gap between them. In addition, the researcher also has a significant amount of work experience with elderly care in the Philippines, the Netherlands and in Finland. (Creswell 2003, 9.)

5.1.1 Observation

Observation, as a method of gathering qualitative data, aims to understand the natural behaviours and experiences of the target group as they go about in their own and familiar environment. When observing a target group, the researcher must minimize the structure of observation and must aim to remove or reduce any interference which could stain the data. (Polit & Beck 2012, 544.)

The researcher used a direct observation method in data gathering. The specific method of observation used is a disclosed participant observation where the researcher informed the participants that they were being observed. The researcher directly observed the Filipino older adults and care staff while they play the two mobile games in a tablet computer. The researcher observed their behaviours, gestures, and he listened and took notes of their verbal comments and feedbacks about playing, about the games and about anything related to user experience. (Rugg & Petre 2006, 109-110.)

According to Garrett (2011, 42, 47) observation plays a huge role in a user experience related research. Through observation, a researcher would know how the user uses the product being studied. The researcher would also be able to define and prioritize the needs of the user while interacting with the product.

5.1.2 Semi-structured interview

A semi-structured interview, also called focused interview, is deployed when a researcher wants to assure the coverage of determined set of topics when gathering qualitative data. In this mode of interviewing, the researcher already formulated the questions to be asked but the answer will still be up to the interviewee's subjective responses. Semi-structured interview creates an avenue for researcher to guide the interviewee in the whole interview process. This is possible because in this set-up the role of the researcher is based on a structure while the role of the interviewee is somehow free. The researcher encourages the interviewee to verbally express whatever he or she thinks about specific topics. This technique guarantees the researcher with needed data while giving the participants the freedom to talk about the topics as much as they desire. A good semi-structured interview questions allow participants to provide significant information about the phenomenon being studied. (Polit & Beck 2012, 537.)

A semi structured interview was also used in the data gathering of this research. The researcher asked the questions from a prepared questionnaire while giving avenue for follow up questions whenever a participant talked about things that the researcher con-

sidered significant and relevant for this research (Rugg & Petre 2006, 138). The researcher was taking notes of the personal views of the respondents about the technology concerned and about the games.

5.1.3 Comparative research setting

This thesis was conducted in a similar pattern as the one conducted in China (Merilampi, Koivisto, & Sirkka, 2019) to produce comparable outcomes. The researcher also used the same interview questions (see Appendix 2) which was provided by the previous researcher (Merilampi 2019). The initial plan was to conduct the study in just one elderly care facility in Davao City, Philippines. However, there was a need to conduct the study again in another facility because the interview part of the study was not implemented in the first facility. During the third day visit of the researcher to the first facility, the owner of the facility requested the researcher to finish the study on that day because one of the participants felt that it was disturbing his routine. The study finished two days earlier than planned.

The researcher explained the situation to the thesis supervisor who then allowed the researcher to conduct the thesis again in another elderly care facility. Some approaches of data gathering were also modified to suit the preferences of older adults as experienced in the first facility. These changes were also made known to the thesis supervisor before implementation.

The researcher prepared a short power point presentation about the study which was presented separately to the care personnel of each facility. After introducing the study, the researcher allowed the care personnel to play the two games and they were told that they will be interviewed later. However, the researcher was only able to interview the care personnel of the second facility because the research was abruptly stopped in the first facility. An Acer Iconia One 10 Model A5008 computer tablet was used to play the games.

Because there was only one computer tablet, the researcher approached the participants individually and explained to them briefly the purpose of the research and how to play

the games. The games were played around the same time of the day creating structure of the activities which was found to be beneficial in making older adults engage in the activity and for them to have anticipation of what is coming in each day (Assis, et al. 2010, 61). The communication was made using the local language mixed with the national language and English depending on the preference of the participants.

The researcher informed the care personnel and everyone in the target group that participation in this research is completely voluntary and an informed consent is needed from each participant. In the first facility, the owner said that not all could give consent because some of them could not talk or write. In this case the owner, as their legal guardian, gave the consent in their behalf given that they expressed desire to participate. The same happened in the second facility, the over-all manager who is acting as the legal guardian of their residents gave consent on behalf of those who cannot give consent by themselves. In the first facility there were 3 care staff who tried the games. Their subjective comments and feedbacks were gathered and included in the analysis. In the beginning, there were 7 residents who agreed to participate, 5 females and 2 males. The 5 female participants really played the games and their data were included in the analysis. 1 male refused to play in the end. Another male participant played the games, but his data were only partly included in the discussion because he is younger than 60 years old which makes him not part of the target group. His participation was somehow considered significant by the researcher because of his characteristics. He does not speak, he does not socialize with other residents, he exhibits flat affect and he was also restrained on a chair in one corner of the house. In the second facility there were 5 older adults who agreed to participate in the research, 4 females and 1 male. Everyone played the games and their data were included in the analysis. There were also 3 care personnel who played the games and were interviewed and whose data were included in the analysis.

Before allowing the participants to start playing the mobile games, a Mini-mental State Examination (MMSE) was conducted. To some participants MMSE was conducted in the local language Cebuano (see Appendix 1) and to some in English as they preferred it so. The MMSE was conducted so that the researcher will have a grasp of whether the participants are having memory issues and to what extent. The researcher thought that these data might play a role in their user experience of the two games.

The researcher facilitated the game play with one participant at a time while a care personnel was available nearby to assist whenever necessary. In both facilities, the researcher was given 09:00 to 11:00 and 15:00 to 17:00 time schedule to conduct the study. During this allotted schedule, while the researcher was with one resident, other residents were watching television, listening to music and dancing with each other or with care staff. Other recreational activities were also done during this time of the day. In the first facility, the researcher planned the research to run for about a week. The first three days were allotted for explaining the study and conducting MMSE with the residents and just let them play as much as they wanted. The next few days should be when they would play each game for 30 minutes and after which they would be interviewed individually. The latter part of the initial plan was not implemented because the study was stopped on the third day. When the participants were learning to play the two games, they already have feedbacks about the games which were included as data for analysis. The researcher also observed their behaviours while playing the games in their personal environment. Their comments about the tablet were also gathered for data analysis.

In the second facility, with the permission of the thesis supervisor, the approach was modified to suit the preferences of the older adults and the manager of the facility. The study was planned to run for 3 days. The researcher approached the participant one at a time. The methods were - to explain the study, asked their consents to participate, conduct MMSE, let the participant play the two games as much as he or she wanted and after playing he or she will be interviewed. The researcher observed how that participants played the games, their comments and feedbacks about the games, their attitudes towards playing as well as the environment where they play. J.J Garrett's (2011) user experience framework was used as the foundation for data collection and analysis.

During observations and interview, the researcher focused on qualitative data such as personal and cultural characteristics, past game playing experiences, likes and dislikes, lifestyle, social manners and norms, history and the environment of the participants. Interview was done privately with each participant to obtain authentic and subjective data (Merilampi, Koivisto, & Sirkka, 2019, 224) but the place was open and quite noisy because other residents were listening to music and were singing and dancing.

Some interviews were audio recorded which was part of the plan, but some were not because of the loud noises in the background.

5.2 Data analysis

The researcher was interested on the qualitative data which were gathered through observation and interview. The data gathered in this thesis were analysed using inductive content analysis. Content analysis was used because the researcher would like to analyse and see meanings behind people's subjective responses and non-verbal expressions and communications which include gestures and facial expressions. The researcher's written personal observations of phenomena which surfaced within the environment of the study were also analysed. Through content analysis, understanding of data is enhanced by putting the data into the context of the theoretical framework used in the study. (Elo & Kyngäs 2008, 107-108.)

Using content analysis in making sense of the data aims to provide "knowledge, new insights, a representation of facts and a practical guide to action" (Elo & Kyngäs 2008, 108). Another purpose of using content analysis in research is to describe and quantify a phenomenon through the process of organizing the narrative content into key concepts, categories, or themes which are then used to establish models of knowledge, system, conceptual map or categories addressing the phenomenon – see Figure 1. With content analysis, the researcher is interested of the significant themes and patterns of the data gathered. (Elo & Kyngäs 2008, 107-108, Polit & Beck 2012, 505.)

Though content analysis could be used in both qualitative and quantitative research, the applicability of this method is questioned and criticized in the field of quantitative research because it is thought to be insufficient when doing detailed statistical analysis. However, the reality is that the sufficiency of any methods depends on the skills of the researcher. A skilled researcher could provide quality outcomes regardless of what method of analysis is used. (Elo & Kyngäs 2008, 108.)

Content analysis could either be deductive or inductive. Deductive content analysis is recommended when the structure of analysis is driven by the previous knowledge

available or if the researcher wants to test a theory. In deductive content analysis, a researcher aims to test hypotheses grounded in acquired knowledge from previous research. When using deductive content analysis, a researcher's inquiries are done based on acquired theories or concepts from previous empirical studies. On the other hand, inductive content analysis, which was utilized in this research, is recommended if there is no former knowledge about the phenomenon being studied or the information about the phenomenon are fragmented. Inductive content analysis allows researcher to conceptualize themes, categories or theories from the gathered data through shared messages and patterns. These themes, categories and theories unify all the data into a meaningful concept. (Elo & Kyngäs 2008, 109, Wildemuth 2017, 319-320, Polit & Beck 2012, 562.)

The phenomenon being studied in this thesis is somewhat unique in nature because there are no studies yet conducted about Filipino older adults' user experience with serious games. Neither there was any study regarding serious games being used in health care in Philippine context.

The researcher has three sets of data for each facility. These are the data from observation, interviews and the scores of the games. The scores of all the participants were manually recorded in a score sheet and were separated from the rest of the data. The researcher focused more on the data from the observation and interviews than the games scores. The scores were considered to be insignificant in the study because some participants scored high because they were assisted by the researcher. When they tried to play by themselves, their score dropped dramatically. In addition, participants did not play the same amount of time. Some played longer than the others and some just played one of the two games.

The rest of the data were analysed using inductive content analysis. The data from the first facility were encoded in a coding sheet and were grouped according to the source of data (from the participants, from the care staff and from the researcher's personal observation). The data from the second facility were also encoded in a coding sheet and were grouped according to how the data answer the research questions. The group-

ings of data were different from each facility because the gathering of data was different from each facility due to unforeseen changes that happened along the process. As mentioned above, the semi-structured interview was not performed in the first facility.

The researcher also has audio recorded interviews from the second facility. The data from the interviews were transcribed and put into the coding sheet. Some data from both facilities were written in local language especially those that were spoken by the participants. The researcher translated them into English language to ease understanding and categorization.

From the coding sheets, the researcher reread the data and placed them under eight new categories. The eight categories were created based on the similarities of the message of the data. Under these eight categories, the research went through the data again and tried to even narrow the categories into three broader categories. With these three categories, the researcher was able to address the research questions more clearly and was able to dig out significant findings about the user experience of older adults and care staff in the Philippines with serious games.

The whole process of the data analysis used in this study followed the flow of activities as proposed by Elo and Kyngäs (2007, 109-111) - see Figure 1.

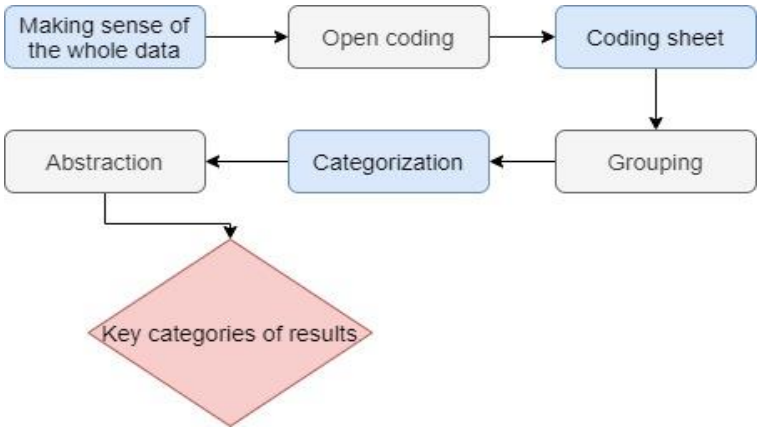

Figure 1. Inductive content analysis process based from the content analysis process of Elo and Kyngäs (2008, 110.)

6 RESULTS

The participants were residents of two privately owned elderly care facilities in Davao City, Philippines. The number of ten older adults participated (n=10), among them were one (n=1) male and nine (n=9) females and their ages range from 65 years old to 89 years old with an average age of 78,7 years old. The number of six care staff participated (n=6); total number of participants was 16 (N=16).

The results were grouped into three categories namely Recreation and Rehabilitation, Serious Games in Philippine Culture, and Challenges Perceived and Encountered. Most of the quotes from the participants found in the results were expressed in local dialects. They were translated into English by the researcher to ease understanding of the results.

6.1 Recreation and rehabilitation

During the orientation of the study with care staff from each facility, care staff showed interest and excitement about the study because it was their first time to witness a study related to technology and its use for rehabilitation. All the care staff from the two facilities, 6 of them, were curious on how games played in a tablet could benefit their residents. When the researcher discussed to them about the previous similar studies which were done in China and Finland as well as other studies about serious games being used in health care, they started to appreciate the potential of this technology in rehabilitation. It was observed that they were nodding and giving positive comments on how they themselves experienced other mobile games they played in their smartphones. According to them mobile games are entertaining, and good exercise for the minds. One of them said “it relieves my stress.”

The target group reported that the games were not hard to play though they needed a lot of assistance with their first few attempts. Most of them understood the goal of each game. Everyone was able to play and majority of them learned to play by themselves in just one setting or after few times of playing with assistance. There was one participant who learned to play independently the Trail-Making Test game after playing it

once. She immediately learned to operate the tablet by herself even though she has not used a tablet before. From all the participants, only one of them did not learn how to play the games independently. This participant exhibited short memory span as she immediately forgot that she played the game even after each playing time.

When the target group played the games, the researcher noticed that there were more body movements displayed than what was expected. Aside from upper limbs, movements of body trunk, hips and head were also observed.

Three participants have left sided paralysis. They have little to no movement of the left side of their body. They were eager to play despite their physical limitations. They were holding the tablet mostly with their right hand and their left hand was just supporting the tablet. One of them, held the tablet with the right hand and rested it on her left forearm to play the two games. Another participant was turning around the tablet using only her right hand when playing the Cat vs. Mouse. These three participants were the ones who complained that the tablet was too heavy since they were mainly using their right hand to hold it. Their complaint about the weight of the tablet led the researcher to weigh it, and it was found out that the tablet weighs about 700 grams without the casing.

Photo 5. *A resident with left-sided paralysis playing Cat vs. Mouse*

Playing the games had positives effects on the mental well-being of some participants. A care staff in the second facility reported that they often hear some residents expressing self-doubt, self-pity or putting themselves down. This person said - “we have residents here who think that they can’t do anything anymore. They say that they are useless because they are old.” Two care staff believe that playing the games would counter these negative thoughts of their residents, something that was also observed by the researcher. Few participants expressed happiness over learning something new, one of them said “I am happy that I know how to play these games and how to use the computer.” Another one was laughing and making her own sound effects all the time when playing Cat vs. Mouse. The games improved their self-esteem as they became proud of themselves that they were able to use the tablet even though it was their first time to use it.

The mobile games became like a mental exercise for most of them. Participants mentioned that the games made their mind works. One participant said enthusiastically “it pressed my mind.” She was referring to how playing the games made her think and she felt that it was a good exercise for her brain. Another participant commented “I feel like I am a child again” while playing. This the same participant was able to tell stories of her life while she was focused on playing the games on the tablet. This ability showed that the participant was able to multitask mentally. Still another one said happily “it was enjoyable.” The researcher also observed that some of the older adult participants, when trying to score in Cat vs. Mouse game, were slowly and carefully tilting the tablet giving precision to the movement of the mouse towards the cheese. This manner of playing showed that older adults could exercise their concentration and muscle control of the arms.

One participant expressed dislike towards playing the games. After playing few times she commented that it was tiring to look at the screen and have it closed to the eyes. She said, “the brightness of the screen strains my eyes”.

The researcher observed that the presence, absence and the conditions of assistive tools affect the user-experience of the participants with playing the serious games. One participant mentioned that she could have better scores if she had her eyeglasses which were lost that day. Two other participants have ill-fitted wheelchairs which negatively

affected their playing experience. Their sitting position was uncomfortable as they change their posture many times during playing. One of them stopped playing a lot earlier than the others because of the discomfort he was experiencing while sitting on his old wheelchair. The other person was assisted to have a comfortable position by adding pillows to the wheelchair and a pillow to rest her paralysed hand. After this, she was able to play the games better and she enjoyed it more.

During the interview, 4 out of 5 participants and all the care staff who participated in the study agreed that serious games are good for recreation and rehabilitation. Majority of participants said that if the technology is available, they would like to play it regularly. One participant said she would only play it sometimes when she doesn't have anything to do. All the care staff who were interviewed said that they would use the technology with the residents if it is available in their workplace. Some participants and one care staff think that it would have been better if the elements would be bigger than what they are so that they could be seen more clearly especially for those who have problems with their eyesight. It was also suggested by one of the care staff that it would be safe to put the tablet in a shock-proof casing to protect it from falling because some residents have poor grip and others might throw it if they get tantrums. Other than that, they did not give other suggestions for the games' improvement because most of them said that it was their first time to see and play these games. However, the participants and the care staff expressed that they have positive experience when playing the serious games.

6.2 Serious games in Philippine Culture

Serious games are unfamiliar to both Filipino older adult participants and care staff. The care staff, however, are familiar with mobile games but they haven't heard about serious games. The target group neither knew mobile games nor serious games.

In the first facility, one resident considered playing on the computer tablet childish. This person is a retired sports teacher and she would rather do physical activities than just staring at the tablet. Though she played the games, she did not enjoy them. She

was the one mentioned earlier who also complained that the brightness of the screen was straining her eyes.

In both facilities, watching television is their main past-time activity and many of their residents are looking forward to watching their favourite news channel, noontime variety shows, and drama shows. During the study, few of them did not want to participate because it conflicted to their television watching time. One said, “I am old, I just want to watch TV.”

Friendly teasing of the participants by care staff was observed. It was an unusual scenario for care staff to see their residents using a tablet computer. Care staff would say humorously “you are already an expert” and “you are so techy” to some of the residents who were playing the games. The players and care staff would laugh together when either scoring or losing in the games. In the second facility, one resident was encouraging some of the participants to play higher levels and she was telling them how good they were. One care staff also mentioned that if the games could be played with more than one player at a time and that it could be connected to a bigger screen such as the television, it would promote more socialization and entertainment among the players and other residents who would be watching the games.. She added that this is important to consider because their residents like to talk and be together in activities. She also added that Filipinos are known to be very social people.

Two participants thought that they are still in working age. When they were asked to play, they thought of it as a waste of time and unproductive. One commented “I will play later when I don’t have work. I like dancing better because I can earn from it.” This resident, when she was younger, was doing dancing as a part-time job, along with her regular job, to feed her kids. One of the residents was scared to play in the beginning. This resident thought that her father is still alive and watching her. She said, “I am afraid that my father will catch me playing.” When asked further, she told that her father was very strict and only wanted them to work to contribute to the income of the family. She added that when they were younger, her and her siblings had to hide from their father when they wanted to play. This the same resident was the one mentioned above who expressed happiness over learning something new as playing the tablet.

6.3 Challenges perceived and encountered

Majority of the residents who participated in the study did not know what tablet computer is. Among all the participants only one was familiar with a tablet computer because one of her children owns one. Many of them have not seen a tablet computer before and they do not know how to use mobile phones and computers. No one of them knew what video games are and how they work. These lack of exposure to these technologies explains why most of them needed a lot of guidance in the beginning of playing the tablet. Few of them even have problems just holding the tablet properly. When playing the TMT for example, some of the participants held the tablet in such a way that some numbers and letters were hidden under their palms so that they could not see them which then greatly affected their scores and their desire to continue playing. In the same game, some participants made false errors because some of their fingers were unintentionally touching the numbers or letters on the screen.

The researcher also noticed that tapping the screen lightly and quickly were challenging gestures for the older adult participants. Many of them pressed the buttons on the screen longer than necessary which was an unrecognizable gesture by the software. Sometimes tapping the screen cannot be registered because participants already rested their other thumb on the screen.

The researcher used the words “memory games” to describe to the target group the type of games to be played for this study. Three participants were intimidated to play thinking that it was a test of their memory. One of them said “I know that my memory is bad, so I would not be able to play it.” Later they all played after the researcher explained to them the main purpose of the study.

There were few participants who are illiterate. Giving verbal assistance in operating the tablet was not enough for them. The researcher had to guide their fingers where to press because they cannot read the text on the screen such as the “start-button” and “menu-button”. One of them commented that she would not play the games even though it will be available in the facility because she would not be able to read the instructions.

The care staff think that it is impractical to have tablets for rehabilitation in their facility because they are expensive. Though they said that they would use this tool for rehabilitation when available, they believe that the facility would not purchase tablets for this purpose. They suggested that residents or their relatives could buy tablets for the residents' use. However, this is something they are not seeing as a possibility yet. The facility and many of the relatives of the residents are already struggling in providing their basic needs. Some of the residents do not even have necessary basic assistive devices such as walkers or wheelchairs. Few do not have rollators even though they would be needing one. The facility also does not have all necessary equipment needed for providing sufficient and effective rehabilitation for their residents. In addition, the care staff also mentioned that residents might just destroy these tablets. One of them said that they have residents who throw things when they get irritated or annoyed. If they would have tablets in the facility, these residents might throw them especially these technological items are unfamiliar to them. They would not know that they are expensive and break easily when thrown.

The environment of both facilities also posed few challenges when playing the serious games on a tablet. The residents like to spend their time in the garden where they get fresh air. During the study, most of them played the tablet outside. They complained that it was hard to see the elements in the games because of the sunlight's reflection on the screen, which the researcher also witnessed himself. This problem encountered was experienced more by the participants when they play Cat vs. Mouse game which involves tilting the tablet. When tilted, the tablet reflects more sunlight. Another challenge encountered was the noise and other disturbances in the garden. In the second facility for example, their activity area is within the garden. There they play loud music, they sing, they do exercises, and they dance. When playing the serious games, the residents could not focus on the games because they hear and see other activities happening in the garden area and there was no other place where they could play the games in peace.

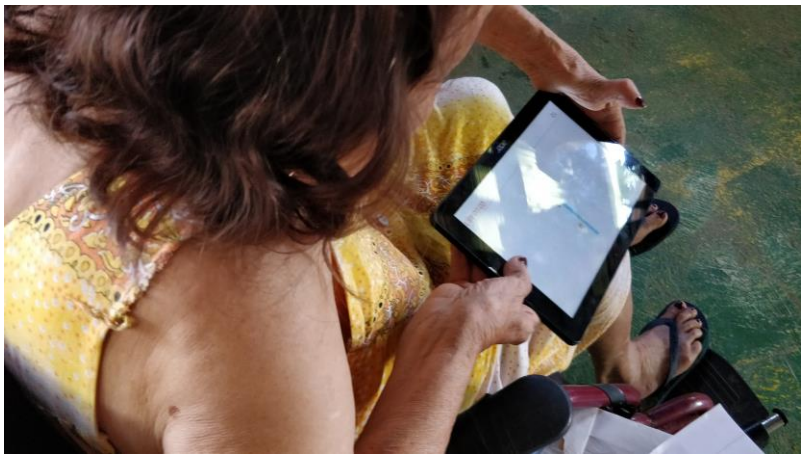

Photo 6. *A resident playing Cat vs. Mouse: Sunlight's reflections on the screen*

The researcher observed that handwashing was not properly practiced by the care staff and the residents. Hand sanitizers were not readily available around the facilities. Also, soap and water were not always easily accessible. During the study, it was noticed that the tablet could be a vector for spreading diseases especially if one tablet is shared by the residents. It was observed that participants did not wash their hands before and after playing the games. One participant was drooling on the tablet and another participant came to play the games after urinating in the corner of the garden without washing his hands. Because of these instances the researcher was sanitizing the tablet with 70% antiseptic alcohol solution before handling the tablet to another participant.

There were inconsistencies found in the gameplay specifically in Cat vs. Mouse game where the mouse gets stuck in the tip of the obstacle wall located in the middle. When this happens, the mouse could not be moved with just a minimal tilting. Some residents did not understand this situation and they would think that the game was over. Moreover, system gestures, especially the screenshot functionality gets triggered whenever the player inadvertently touch the screen in such a way that corresponds the gesture shortcut. This commonly happens when playing TMT. The buttons were also not equally sensitive. It was observed that the "menu-button" reacts quicker when tapped than the "start-button." Some residents needed help when tapping the "start-button."

To have a better view of the data and the findings, Table 1. shows a tabular presentation of the key results grouped together under the 3 key categories established by the researcher. The results here are combination of data from the two care facilities.

Table 1. Key results under the 3 key categories

Categories	Results
Recreation and Rehabilitation	The two games were not difficult to play, but residents need a lot of assistance in the beginning. Participants understood the goals of both games. Everyone was able to play and most of them learned to play by themselves in one setting. While playing, body movements were observed. Residents with left-sided paralysis were able to play. The tablet was too heavy for those with left sided paralysis; tablet weighs about 700 grams. Positive effects on residents' mental well-being Few residents expressed happiness because of learning to play the games. Residents' self-esteem is improved. Good mental exercise One commented: "I feel like I am a child again." Exercise of concentration and muscle control were observed. One commented: "the brightness of the screen strains my eyes". Assistive tools and devices affect user experience. Most participants said that the games were good for recreation and rehabilitation. People with vision problems could benefit from little bigger size of game elements. Most participants had positive experience.
Serious Games in Philippine Culture	Serious games are unfamiliar. One resident considered it childish Previous role affects user experience; a retired sports teacher prefers more physical activities than playing the tablet. It disturbed their TV-watching routine. TV-watching is very important past-time for them. Friendly teasing and laughing together while playing. Care staff desires for serious games which promotes socialization because their residents like to talk and do things together. 2 participants thought they were waste of time and unproductive. An unpleasant childhood experience negatively affected one resident's desire to play the games.
Challenges perceived and encountered	Poor exposure to technologies. Tablet is unfamiliar. Most of them needed a lot of guidance in using the tablet. False errors when playing because some of their fingers were unintentionally touching the screen. Tapping slightly and quickly are challenging finger movements for all the residents. The words "memory games" are intimidating for some residents. Few residents were illiterate. Care staff believe that they are impractical to have because they are expensive. Necessary basic assistive tools and devices were not available, or they are broken. Because tablets are unfamiliar, some residents might throw them and break them. Reflection of sunlight on the screen was common problem. No suitable place to play the games in peace. The environment had many distractors. Poor hygiene increases the chance of spreading infection with one tablet being shared by the residents. Software bugs were noticed.

7 DISCUSION

The novelty of serious games in the field of health care in the Philippines especially in rehabilitation of older adults living in care facilities received positive feedbacks from both care staff and from most of the residents who participated in this study. Most of the residents enjoyed playing the games and were willing to know how to operate the tablet. The simplicity of the games which was thought through by the team of Koivisto, Merilampi and Sirkka (2015) when designing the games was seen as major factor in residents' engagement in playing the games. Kim and his team (2015) also emphasized that serious games intended for older adults should be easy to play to improve engagement.

The target group also gave positive feedbacks about this technology and considered it to be a good mental exercise. The residents appreciated more the mental stimulation of playing the games than the physical exercise it gives. However, the researcher found out that these games also made them move even though they were in sitting position. Another significant finding from this study was the potential of "play" in extracting unpleasant life experiences which was experienced by one of the residents. This finding could be utilized in future designs of serious games which could make them applicable in other health care interventions such as in psychotherapy.

As claimed by Garrett (2011), user's social and professional roles might affect their user experience with a certain product. This was apparent when one resident who was a retired sports teacher and who was physically active did not like the mobile games being played. Perhaps, a more task-oriented and with simultaneous visual and audio stimulations serious games could be more attractive to her. This claim is based on what Kim and his team (2015) mentioned in their study where they provided common features of serious games which older adults would likely prefer.

When one resident, who did not fall under the category of the target group, was given the chance to play, his data gave a surprisingly significant finding. This person does not talk and showed no emotion on his face (flat affect). He seemed isolated in a corner, restrained with a long cloth in a chair so that he could not move around by himself. He

did not interact with other residents and only minimal interaction with the staff. This person was able to play the games and learned to use the tablet by himself with little assistance from the researcher. These findings from this particular resident and from the target group made the researcher realized the huge potential of serious games in activating one's cognitive and physical functioning.

The care staff saw the potential of serious games as alternative tools to facilitate physical and mental rehabilitation among their residents while at the same time offering them with new and enjoyable way of recreation. Seeing their residents holding, playing, interacting and having fun with a computer tablet has removed their prejudice towards the idea that seniors find it difficult to use modern gadgets. Not to mention that most of these seniors did not know or have not seen a computer tablet before in their lives. The care staff were amazed that their residents learned the use of this technology and were able to participate in this study.

Though the care staff perceived these serious games as good tools for recreation and rehabilitation, they also saw the impracticality of them in their working environment. The care staff raised the economic aspect involved. They believed that computer tablet is expensive to have in a care facility where even basic tools for care and rehabilitation are scarce. In relation to this, the researcher noticed that due to the absence of basic tools in providing appropriate care and rehabilitation to the residents, the principle of rehabilitation could not be properly implemented. The care staff are providing care with limited resources thus neglecting the importance of giving attention to each resident's physical and mental exercises and monitoring their progress. This might be the reason why they commented that serious games are not for all even though in this study, the residents were able to play and learned how to play the games by themselves regardless of their mental or physical conditions and their level of literacy. The researcher believed that the fact that the residents were able to play the games in just one setting, without prior experience of using computer tablet, is a significant finding in terms of the usability and accessibility of serious games in geriatric rehabilitation. Adams (2010) argued that previous exposure to technology and level of literacy could help in achieving the desired therapeutic outcomes of a serious game. However, we cannot just exclude older people without prior exposure to technology and with low level of literacy from being potential users of serious games because they too could

learn to interact with new technologies, as what have been found in this study. As a matter of fact, some of the participants even experienced a boost on their self-esteem and confidence when they realized that even though they see themselves as senile, they were able to learn to play the games. Desired therapeutic outcomes, which are beyond the scope of this research, could be considered later. Nevertheless, Adams (2010) mentioned that a well-designed serious game could be used by anybody.

In deploying serious games, or any new technology, to provide health care interventions or as supplementary tools to traditional health care interventions, the care staff's knowledge and know-how in facilitating the use of the technology are crucial. While conducting the study in the Philippines, the care staff's role was seen as distant as they were only teasing (in a friendly way) the residents who were playing. The researcher would have desired for more hands-on participation, with rehabilitative approach, from the care staff while the residents were playing the games. Indeed, providing professional training to the care staff about the use of new technology could help in achieving desired goals. This is congruent to the claims of Brahnam and Brooks (2014) on the importance of training the care staff when implementing new technologies in the field of health care.

The care staff and the residents who participated in this study shared close relationships. This is similar finding to what Merilampi, Koivisto and Sirkka (2019) observed in the study they made in China. Care staff and residents were laughing together while residents were playing the games. This close relationship allows friendly teasing among the staff and the residents. The researcher observed that the laughing and teasing was not perceived as mocking the residents, instead they made the playing atmosphere less intimidating for the players who were using a tablet computer for the first time.

The environment of the participants did influence their behaviour and over all user experience on the games. The reflection of the sunlight on the tablet screen and the way the games were played were not a good combination. All participants played outside the house and they were disturbed by how much reflection of the sunlight covered the tablet screen. This problem could be taken into consideration when designing future technology targeting people in Philippines or in other tropical countries in general.

When the researcher asked the older adults to participate by playing the games, it was perceived as something new in their daily routine. Somehow, others think that it was disturbing their routine. The researcher was given times of the day which were conflicting to their TV-watching schedules. Because of this, others did not participate. One of them even asked the owner of the facility to stop the research. This gave the researcher a new insight about older adults' attitude to something new. The researcher realized that older adults' routine is harder to change. Perhaps, this is something they could have autonomy over when other aspects of their lives are influenced by other people or by their relatives because of their decreasing ability to be independent. Another realization by the researcher is that older adults might have been doing their routines for years or even decades. These become their comfort zones. Considering all the emotional, mental and physical deterioration an older adult could experience, this comfort zone (routine) would be challenging to change.

Having only one tablet to be shared by many residents in a contained facility without high regard of hand hygiene is not a good idea when thinking about contagious disease prevention and infection control. This was well observed in this study and this must be taken seriously when considering the use of technology in health care which is intended for multiple users. Perhaps, there is a hygienic benefit behind the idea from one care staff who said that it would be good that the residents will have their own tablet if they wish because the facility does not have the resources to buy this expensive gadget for them.

When introducing a new technology to someone who does not have any idea about what to expect, it is crucial to think about how you will describe the said technology. The words you will use might affect how your target user will accept and experience your technology. This was experienced by the researcher when he used the words "memory games" to explain what type of games are involved in the study. A participant, who knew that her memory is declining, was reluctant to continue participating in the study. She perceived that the games will test how bad her memory is. For her, it was already a hard self-realization that her memory is getting worse along time and for others to remind that to her in a form of a game might be something she perceived as intruding and insensitive.

The physical features of the tablet also yielded significant data to consider for the future design of serious games targeting older adults. The weight of the tablet was too heavy for other participants especially for those who have limited mobility in their upper extremities. The tablet itself was hard to handle by older adults who are usually exhibiting poor dexterity of fingers which leads to false errors or unrecognized gesture on the screen while playing with a tablet computer. The sensitivity of the screen must also be adjusted to accommodate the limitations of older adult users because of their decreased mobility.

7.1 Limitations of the study

The researcher tried to look for previous studies about serious games being used in the Philippines, specifically with older adults. However, there were no previous studies found. Thus, the discussion and analysis of results in this study was limited to the available related literatures found in different journals online and physical copies obtained from the library, books and e-books, and to the previous studies about serious games which were all done outside the Philippines. This makes comparison of results narrow.

The size of the participants was too small to make a generalization of the perception of Filipino older adults towards serious games. In addition, the study was done only in one city in the Philippines which means that the results are quite regional in character and might not be true with the rest of the Philippines. It is important to consider that the Philippines, which has more than 7000 islands, have a diverse culture. Different regions almost have different languages, customs and traditions. Since the Philippines is an archipelago, the development of different cities varied a lot from each other. This could mean that people from more advanced urban areas might have a different user experience of a new technology than those who are from rural areas. However, though Davao City is considered to be highly urbanized city in the Philippines where technology is developing fast, senior citizens residing in the city do not necessarily have good exposure to new technologies.

The methodological choices were constrained by unforeseen changes which occur after the study in the first venue was discontinued due to a request from one resident. The researcher modified the methods to suit the preferences of the participants and the owner of the second facility with regards to the length of the study. There was also inconsistency with gathering the data in the second facility. Some participants were interviewed with an audio recording while others were interviewed without. This was because during the interview of other participants there were loud noises in the background which were coming from huge sound systems. The researcher was given with an unconducive area for interviewing the participants because it was the same area where the residents do their recreational activities such as dancing and singing which made it hard for the interviewer and the interviewees to focus on the interview being conducted.

The researcher thinks that 3 days, which was preferred by the owner of the second facility, was too short to conduct the study. The participants did not have enough time to really enjoy the serious games which might also have affected their perceptions toward them.

The interview questions were translated to the local language for those participants who cannot understand English. Most participants expressed their answers in the local language. Their answers were translated to English by the researcher himself to ease understanding and analysis of the data. Though English is an official language in the Philippines and the researcher as a good command with it, translating the questions to the local language might have affected the implication of the questions. In the same manner, translating the phrases of the participants to English might have changed the totality of what they really wanted to imply.

Despite the limitations mentioned, the researcher would like to reiterate the validity of the results. The researcher had a first-hand experience with how the older adults interact with the technology involved. Observations by the researcher were written down instantaneously in an open coding sheet to avoid missing out and forgetting valuable data.

7.2 Trustworthiness

Some of the findings in this research could be utilized to influence health care delivery with the use of new technology such as serious games. Therefore, it is necessary for the researcher to establish the credibility of these findings. After all, it is the ultimate goal of any research to provide meaningful and credible outcomes. (Noble & Smith 2015, Polit & Beck 2012, 582.)

Noble and Smith (2015) stated that a qualitative research comes with the challenge for the researcher to demonstrate rigour in his or her chosen methods and the findings he or she gets. The researcher of this study, who has no previous research experience, finds this challenge even more intensified because in qualitative research there is no scientifically accepted measures through which the research should be judged.

Despite the challenge, the researcher attempted to make sure that the whole research process was done in a trustworthy manner. The researcher's efforts to achieve trustworthiness is reflected in Whittemore and Colleagues' Framework of quality criteria as explained by Polit and Beck (2012, 585-586). In this framework, there are four primary criteria to validate qualitative inquiries. Along with these, there are also six secondary criteria to supplement the validity of a study, but they are not necessarily applicable to all qualitative research. These four primary criteria are credibility, authenticity, criticality, and integrity. The six secondary criteria are explicitness, vividness, creativity, thoroughness, and congruence. (Polit & Beck 2012, 585.)

The credibility criterion was attempted by the researcher through personally coming to the Philippines and stayed in the country until necessary data were gathered. The researcher personally approached the owners of the care facilities as well as the care staff and the residents. The researcher was also in constant contact with his thesis supervisors in the whole process receiving and following their advices. To supplement the background of the study, the researcher also requested through email the SAMK library staff for photocopies of journals which were not available online. One of the library staff personally sent these documents to the Philippines through a snail mail as to preserve copyrights of these documents.

Attempts towards authenticity were done through describing the environment of the participants, their living conditions, their physical and mental states, and gathering their subjective feedbacks regardless of their significance in study. This is to invite readers to understand the whole picture of the research setting.

Criticality was attempted by careful interpretation of every datum that came to the surface throughout the process. The data were gathered first before they were interpreted. Prejudices of any sort were consciously held back by the researcher especially the researcher has been living in Finland for the last 10 years before coming to Philippines which could have affected judgement of cultural aspects of the data. Along with criticality, integrity was aimed through professionally handling the data. As a registered nurse with almost 10 years of experience, the researcher also analysed the data through the lens of his profession.

With secondary criteria, the researcher aimed towards explicitness of the study by keeping the raw documents where the data from observation and interviews were written down. Through these records of data, even though the amount of data was overwhelming, it was still possible to retrieve data whenever necessary even after the data collection.

Creativity was demonstrated by modifying methods of data collection in response to the external factors which are beyond the control of the researcher such as the volatility of participants' and staff's thoughts and preferences. These changes were first consulted with the thesis supervisors before they were implemented.

The congruence of the study was made possible because the thesis supervisors were also the researchers of the previous study to which this research was based upon. Questions for the interview were provided by them.

Vividness was challenging for this study because the researcher has no previous experience with conducting research and did at one point experience being lost with the overwhelming amount of data. For the researcher, it was not so vivid or clear what themes to come up with when analysing the data. Through the assistance of the supervisors, it became clearer which data to include and which to omit to help the researcher

define the themes better. Thoroughness was also a challenge because of the limitations identified in the studies.

The last criterion, sensitivity, was attempted by respecting the participants' privacy and autonomy, obeying their wishes, and treating them with dignity. The researcher upheld the ethical considerations all the time to protect the participants from any un-intentional exploitations and violation to their human rights.

7.3 Ethical considerations

This study followed the same principles and methods as the one conducted in China by Merilampi, Koivisto and Sirkka (2019). An agreement contract to conduct similar study was obtained from the previous researcher/re-searchers.

Participation in the study was completely voluntary. An informed consent from participants and care facility management was obtained. When one of the residents in the first facility asked the management for the abrupt discontinuation of the study, out of ethical consideration, the researcher respected the request and went to look for another venue to conduct the study. With the permission of the management of the first facility, the researcher was given the prerogative to use the data gathered up to the moment when the research was stopped with the condition to keep the anonymity of the residents.

All data that were gathered from this study were handled with utmost confidentiality. No personal data were used to identify a participant. Photographs and videos were only taken to support data quality and only with the consent from participants and other people involved. The audiotaped interview was handled by the researcher solely for the purpose of this study. Confidentiality and participants' privacy were observed with respect and utmost importance (Fouka & Man-tzorou, 2011.) In writing this thesis, measures were taken to avoid plagiarism by giving proper credits to authors of articles and previous studies being referred to.

7.4 Recommendations

The potential of serious games as tools in physical and mental rehabilitation is a new concept in the Philippine health care setting. Thus, further research in other cities in the Philippines would contribute to a wider understanding of Filipino older adults' and health care providers' user experience with serious games. Further research should look at how much impact does exposure to technologies have in user experience with serious games.

The researcher would also recommend further research about user experience of older adults with serious games in other settings such as in hospitals or in their private homes. It would also be interesting to study user experience with serious games played in other devices such as smart phones or desktop computers.

8 CONCLUSION

This study aimed to investigate user experience of serious games of Filipino older adults living in care facilities. User experience of care staff were also included. The focus of the study is the perceptions of the residents and the care staff about serious games as rehabilitative tools.

The results showed that though serious game is a new concept in the Philippine health care, the participants gave positive feedbacks about it. They saw the potential of serious games as alternative tools for recreation and rehabilitation. The target group enjoyed playing the games while experiencing some elements of mental and physical exercises. The care staff saw how playing the games entertained their residents and perceived the serious games as possible tools to divert their residents' negatives thoughts. These therapeutic effects of playing the games are typical in serious games.

Based on the results, culture has significant influences on the participants' user experience on serious games played in this study. The socioeconomic status of an individual and the environment where he or she lives could also influence user experience. In a care facility where basic rehabilitation tools are scarce, it is considered impractical to integrate new technology (serious games) in providing care. The lack of understanding of basic rehabilitation principles from the care staff also influenced their perception towards the rehabilitative benefits of serious games.

The findings in this study also suggest that older adults, regardless of their level of literacy or their physical and cognitive status, are willing to learn and are able to learn new things such as playing serious games in a tablet.

This study also explored the importance of user experience research on knowing the applicability, accessibility and usability of serious games in Philippine health care setting. When the researcher attempted this study, there were no other similar studies ever conducted before in the Philippines. Therefore, the researcher highly recommends further research on serious games in the Philippines.

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APPENDIX 1

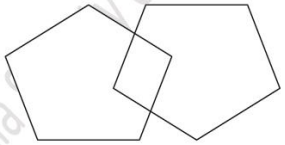
MMSE-P Cebuano Response Sheet
Name: _____ Age: _____ Education (years):_____
Date of birth: _____ Date of testing: _____

Cebuano Version of the Mini-Mental State Examination – Philippines (MMSE-P Cebuano Version)

This version is an adaptation of the MMSE-P which was validated in 2004*.
Please refer to thegeneral instructions on administration and scoring that accompanies this instrument.

				Maximum Score
Orientation: Time (1 point per correct answer)	Unsay petsa karon? Unsay bulaza karon sa tuig? Unsang tuiga karon? Unsang adlawa karon sa semana? Unsa ang panahon karon?	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	**5**
Orientation: Place (1 point per correct answer)	Unsay pangalan niining balay tambalanan o building? Sulod niing balay tambalanan, hain nga dapita kita karon mahimutang? Unsay pangalan sa dapi (dalan) nga imong gi puy-an? Asa nga lungsod / siyudad / probinsya kita nahisakop? Asa nga nasud kita karon nahisakup?	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____	**5**
Registration (1 point per correctly repeated word)	Akong ipakinta kanimo karon ang tulo ka mga dutang. Ako kining pagaiiinganlan, ug kini imong usbon paglitok. Hinmundumi pag-ayo, kay ako kining ipangutana kanimo pagusab. Papel Lamesa Mansanas Palihug usba paglitok ang tulo ka butang kay maminaw ako.	 _____ _____ _____	 _____ _____ _____	**3**
Attention	Ispilinga ang pulong "L-I-B-R-O" Balhina ang pulong "L-I-B-R-O"	 _____	 _____	**5**
Recall (1 point per correct answer)	Karon, unsa kadtong tulo ka butang nga buot kong pahinumdoman kaninyo?	_____ _____ _____	_____ _____ _____	**3**

Version 1.4 November 2016. By the DSP (Dementia Society of the Philippines) and the DSP MMSE Harmonization Group – Cebuano Team (E. Calderon, R. Yu, F. Costales)
*Adapted in 2002

Language: Naming (1 point per correct answer)	Unsay tawag niini? Show wristwatch (1 point) Show pen (1 point)	_____ _____	_____ _____	**2**
Repetition (1 point)	Buot kong usbon ninyo paglitok kining mga pulonga: Walay nga PERO, UC, APAN	_____	_____	**1**
3-step command (1 point per correct action)	Guniti ang papel sa imong wala nga kamot. Say the following: "Guniti ang papel sa inyong wala/too nga kamut, pilo sa ang papel ng katunga maka-isa sa inyong duha sa kamot ug pagkahuman ibutang sa salog" (1 point per correct action, total of 3 points)		_____ _____ _____	**3**
Reading Comprehension (1 point)	Palihug pagbasa nining mga pulonga, ug buhata kon unsay naisulat. Hand subject the laminated sheet with IPIKIT IMONG MGA MATA (1 point)		_____	**1**
Writing (1 point)	Hand subject a pen and paper. Say: Pagsulat a kumpleto nga tudling niining papel. (1 point)		_____	**1**
Copying (1 point)	Place design, pencil, eraser and paper in front of the subject. Say: Palihug ug kopya hiining mga disenyo. (1 point) 		_____	**1**
Total Score				**30**

Notes / observations:

Version 1.4 November 2016. By the DSP (Dementia Society of the Philippines) and the DSP MMSE Harmonization Group – Cebuano Team (E. Calderon, R. Yu, F. Costales)
*Adapted in 2002

APPENDIX 2

For care personnel:

Name:

Position/job:

Age:

Suitability of Mobile memory gaming in elderly care home					
1.	How do you see the residents' gaming situation?	Not interested, have negative effect ☹	No difference 😐	Games were a positive experience 3/3	can't tell ?
Free comments:					
2.	How do you see the suitability of mobile games for recreation and rehabilitation activities?	Not suitable ☹	somewhat suitable 2/3	Suitable 1/3	can't tell
Free comments:					
3.	If available, would you use similar games as tools in your work?	No I would not ☹	Maybe 2/3	Sure I would 1/3	can't tell
Free comments: (how would you use? why wouldn't you use?)					

Interview questions for personnel 1 of 2

Rate the following options regarding the usefulness of the games in order of importance according to your opinion - 5=most beneficial - 1=less beneficial

Memory training	[ ]
Dexterity	[ ]
Motor coordination	[ ]
Breaking routines	[ ]
Social interaction	[ ]
Other (what?)	[ ]

What would you like to change in the games?

What do you see as most challenging issue(s) in implementing the games in care sector?

How to solve the implementation challenges?

Interview questions for personnel 2 of 2

For residents:

Gaming in memory rehabilitation

Background information

Gender:

Age:

A. Technical skills/attitude related to technology use

- Do you have a mobile phone, a laptop or a tablet?
- Do you play any kind of games? Videogames?

B. Gaming experience

Visual design					
1.	The visibility of the game elements was…	Poor ☹	Sufficient 😐	Good ☺	can't tell
2.	I understood well the game elements …	not at all ☹	Somewhat 😐	well ☺	can't tell
3.	The visual appearance of the game was good	disagree ☹	somewhat agree 😐	totally agree ☺	can't tell
Information design and interaction design (game logic)					
4.	In my mind the game play was easy	disagree ☹	somewhat agree 😐	totally agree ☺	?
5.	In my mind the goal of the game was clear	disagree ☹	somewhat agree 😐	totally agree ☺	?
Functional specifications & content requirements					
6.	The game content was (cat and mouse)	insufficient ☹	OK 😐	Good ☺	?
7.	The game content was (TMT)	insufficient ☹	OK 😐	Good ☺	?
User needs and site objectives					
8.	If available, would you play these games on your own?	No ☹	Every now and then 😐	Sure ☺	?
9.	I think the games are good for recreation and rehabilitation?	No ☹	At some extent 😐	Yes ☺	?

10. How did you experience the game play situation (nice, exited, comfortable, anxious, frustrated, bored)?

11. Rate the following options regarding the usefulness of the games in order of importance according to your opinion - 1=most beneficial - 5=less beneficial

Memory training	[ ]
Dexterity	[ ]
Motor coordination	[ ]
Breaking routines	[ ]
Social interaction	[ ]
Other (what?):	[ ]

12. Any ideas how to improve the game?

Interview questions for residents 2 of 2