



A COMPARATIVE STUDY: THE DEMOGRAPHIC DIFFERENCES OF GAME LITERACY

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Abstract

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Nowadays, the development of literacy has found the new ways called Game Literacy. It is an approach based on literacy on game design or the ability to understand certain type of meaning. The aim of this study is to find an empirical data about game literacy across demographic factors (age, gender, playing game duration, and game's genre). The samples of this research are 418 gamers from 23 provinces in Indonesia that taken by nonprobability sampling. Data collected by using google form to the gamer communities and social media groups. The method of this study is comparative study that aims to find the differences between each demographic factors. The result found that there are differences of game literacy referred to age ($p=.000$), gender ($p=.004$), and playing game duration ($p=.004$). Meanwhile, the other result has found that there are no differences referred on game genre ($p=.063$). The limitation of this research is the developmental stage of the subject. The subject of this study was only taken from early adults and older.

Keywords: Game Literacy, Gamers, Age, Gender, Playing Game Duration

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INTRODUCTION

According to Macmillan Dictionary, game is a pleasing activity played with some rules that make the player will facing win or lose (Johan, 2019). Playing game has some meaning, such as a contest, entertaining, or recreation (Johan, 2019). Nowadays, the development of the game has been increasing through the development of human life. This statement is strengthened by the fact people cannot be separate from playing, starting from physical games that need face to face until the virtual game that using technology as the medium (Wirawanda & Setyawan, 2018). This statement in line with research by Gentile (2009) from Iowa State University that found games are being part of human life. This research found that average youth between ages 8 and 18 reported playing games three or four times a week. Gentile (2009) also found that the average amount of playing time for youth was 13,2 hours per week. Surprisingly, Gentile (cited in Wirawanda & Setyawan, 2018) found that preschool children between ages 2 and 5 are playing 28 minutes per day. However, early adults also spent at least 4 hours a day or increasing to 6-8 hours on holiday. Based on the data, it can conclude that American children spent about 10 thousand hours playing video games until they are 21 years old (Gentile in Wirawanda & Setyawan, 2018). Indonesian also have similarities with American children. Based on the sources from Maulida (2018) the average duration of playing games for Indonesian are 53 minutes.

These phenomena clearly show that many people spent their time playing games. Johan Huizinga, a professor and cultural theoretical from Netherland, also wrote a book

in 1938 entitles “Homo Ludens: A Study of Play Element in Culture” which creates Homo Ludens's term as playing creatures. Huizinga also said that play is older than culture (Tejo, 2018). Based on that terms, games not only being a cultured product but also an industry. In Indonesia itself, the population predicted 266.91 million in 2019 (Katadata, 2019) should be one of the most potential countries for the mobile game platform advertiser (Maulana, 2017). This advertiser looking at Indonesia as a new market because Indonesia is predicted to have more than 60 million gamers and predicted will grow to 100 million gamers in 2019-2020 (Trihendrawan, 2018). Strengthening by the release of Newzoo, AppAnnie, Forbes, and TechinAsia in July 2017, Indonesia is ranked in 16th place as the most active gamer country in the world. There are about 43.3 million active gamers, with 44% of them is female, and 56% are male with an age range between 10 to 20 years for 36%, 21-35 years for 47%, and 36-50 years for 17%. Genres of the games are 37% strategy, 24% races, 24% action and adventure, 15% simulation, and 9% arcade (Saputra 2018).

A similar result was found from the data of POKKT, Decision Lab Mobile Marketing Association (in Maulida, 2018) showed that the gamer base in Indonesia consisted of 49% men and 51% women. In terms of age, it shows a quarter of the total number of gamers having ages 16-24 years and 25-34 years, where the percentage is 27% each. Another 24% recorded aged 35-44 years, and ages 45-54 years also actively playing mobile games with a percentage of 17% of the gamers base in Indonesia. Another thing that is not less interesting is that 56% of mothers with children under the age of 10 years also often play mobile games (Maulida, 2018). From these findings, the evident is clear that games have indeed reached a variety of demographics and can be a new field for the industrial world.

Unfortunately, the massive development of the game triggered the emergence of cases from various demographic factors in some countries. For example, in the United States, the father of three children aged 35 years was found dead after playing the game 22 hours non-stop. In China, a 20-year-old man died after playing the King of Glory game 9 hours every day for five months (Jap, Tiatri, Jaya, & Suteja, 2013). In Australia, 51 years old man is divorced by his wife for spending 25 hours a week, playing Second Life (Aprilianto, 2018). In other cases in China, a 21-year-old woman named Xiaou Wu (name disguised) from Dongguan, was diagnosed with Retinal Artery Occlusion which resulted in permanent vision loss, aka blind due to having spent 7-8 hours a day, even willing not to sleep all night just to play King of Glory (Josina, 2017). In Indonesia itself, precisely in Banyumas, 10 children (7 children are elementary school students) were diagnosed with mental disorders due to addiction to playing online games throughout 2018 (Azis, 2018). Even with the estimated prevalence of 6.1% of game players experiencing addiction, it can be estimated that there are currently 2.7 million game players who may already be addicted (Jap et al., 2013).

All of these cases should not have to be happen if the victims are competent enough or literate with the game. In case, they not only can play the game but far from that, they also need to know how to interpret the game wisely. When borrowing a parable made by Umberto Eco (1979) tell that If you want to use television to teach somebody, you must first teach them how to use television (Buckingham & Burn, 2007), then the primary ability that must be possessed by every player the game is how to use it. Expertise/literacy games like this are commonly called game literacy. According to Zimmerman (2009), game literacy is a literacy approach based on game design or the ability to understand and create certain types of meaning from the game. Apperley and Beavis (2013) also described that gaming literacy is the requirement to analyze, design, and play digital games.

Discussing about literacy, Dubin F. & Kuhlman describe that literacy is not always talking about reading and writing; more than that it is competence, knowledge, and skills. Literacy also describes as an individual skill for reading, writing, communicating, calculating, and problem-solving at the necessary level at work, family, and social (Warigia, 2014). The absence of literacy skills associated with the development of a country such as poverty, ignorance, and helplessness (Chamdani, Mahmudah, Fatimah, 2019).

Game literacy is a literacy approach based on game design or the ability to understand certain types of meaning. Game literacy built the concepts of system, game, and design. All of this is closely related to game design, and each represents a type of literacy that is not currently included in traditional education. Each concept also shows a new paradigm of what it means to be literate in the next century. The new literacy abilities support a set of cognitive, creative, and social skills (Zimmerman, 2009). Meanwhile, according to Reeve and Read, in general, game literacy is categorized into two consisting of main competencies and choice competencies. Main competencies consist of 1) information: finding information, obtaining, monitoring, recording, documenting, processing, reviewing, assessing, translating, explaining, and solving problems; 2) learn: understand the set of rules, consequences, and systems in general. Strive to update information and consciously use new information. Growth through repetition and overlapping systems; 3) System: knowledge, perceived ability, and self-confidence; 4) source management: cognitive, behavioral, and affective components; dynamic management (planning or scheduling, or "meta-management - managing resource management). Choice competencies consist of 1) Sociable: Virtual representation, relationships (initiating, forming, developing, maintaining), teamwork, and social management and 2) design: Desire, pleasure, time, and level of complexity (Allen Rosenberg, 2011).

According to Zagal (2009) game literacy is the ability to play games; the ability to understand meaning about the game (understanding the game might be understood as having the ability to explain, discuss, describe, frame, place, interpret, and position the game: 1) in the context of human culture (games as cultural artefacts), 2) in the context of other games (comparing games with other games, genres), 3) in the context of the technology platforms where they executed, 4) understanding how they interact, how they facilitate individual experiences in playing; and the ability to make games (Zagal, 2009). The other perspectives of game literacy are also described as a literacy required to analyze, design, and play the digital game (Apperley and Beavis, 2013). Apperley and Walsh (2012) examine that digital game and literacy have the critical role of digital gameplay and game cultures to tangible literacy outcomes. Gaming literacy defines as complementary literacy that emphasizes the element of the gameplay and a sophisticated understanding of the computer system (Apperley and Walsh, 2012) explicitly. Gaming literacy focusing on how digital games (games played on computer, console, mobile, and others) present a complex challenge in the field of research and education. Apperley and Walsh (2012) have found a new heuristic model for gaming literacy in the education field that could assist the practitioner to acknowledge the pupils' gaming literacy and select games that support activities that appropriate for the curriculum.

According to the Digital Literacy Activists Network (*Japelidi: Jaringan Pegiat Literasi Digital*), there are 10 competencies in-game literacy: 1) accessing, 2) selecting, 3) understanding, 4) analyzing, 5) verifying, 6) evaluating, 7) distributing, 8) producing, 9) participating, and 10) collaborating (Wirawanda & Setyawan, 2018). Meanwhile, according to Koster (2005) in *A Theory of Fun for Games*, several things can be taught by the game: 1) patterns and structures, 2) prediction and calculation of probabilities, 3) battle simulation, 4) development and creation, 5) competition and hierarchy, 6)

environmental examination and spatial relationships, 7) interpreting symbols, 8) mapping, 9) conceptual mapping (possible actions and consequences), 10) learning through repetition, 11) memorization, 12) time reaction, 13) tactical awareness, 14) weakness assessment, 15) stopping time management, 16) teamwork, 17) network building, 18) role-playing and interpersonal communication, and 20) persistence and careful (Rosenberg, 2011).

Generally, the aspect of game literacy is divided into two: the main competencies and the choice competencies. The first aspect is the main competencies that are separated into three: information, learning, and system skills. 1) Information itself contains some definitions such as searching for information, obtaining, monitoring, recording, document, processing, reviewing, assessing, translating, explain and solving problems. 2) Learning defines as understanding the rules, consequences, systems in general, strive to update information and consciously use new information, and Growth through repetition and redundant systems 3) Resources Management, involves our Cognitive, behavioral, and affective components; dynamic management (planning/scheduling, or "meta-management" - managing resources). The second aspect of game literacy is choice competencies that are separated into sociable and design competences. 1) Sociable means the gamers have virtual representation, relationships (initiating, forming, developing, maintaining), teamwork, and social management through the game. 2) Design means the gamers have a desire, pleasure, time, and level of complexity through the game.

For the last twenty years, there have been many efforts to extend literacy ideas beyond their original application in writing. In 1986, one of the leading British researchers in this field, Margaret Spencer, introduced the idea of 'emergency literacy' in describing media games related to young children (Spencer, 1986). Followed by the study of visual literacy by Moore & Dwyer in 1994, television literacy by Buckingham in 1993, literacy by the British Film Institute in 2000, moving picture literacy by Burn in 2007, information literacy by Bruce in 1997 and digital literacy by Gilster in 1997 (Buckingham & Burn, 2007). All of these studies developed the idea of multi-literation, which refers to social diversity with various forms of contemporary literacy.

Games as one of the products of contemporary culture that are increasingly in demand by the community have indirectly helped shape the social diversity, cultural competence, and communication patterns of their own (Cope & Kalantzis, 2000). Therefore in 2009, Zimmerman began to initiate game literacy in his studies (Zimmerman, 2009). Based on Buckingham & Burn in 2007, that in a game a language can be created (at least in some ways) that is the meaning created similarly, it also implies that in playing games there is competence in using language obtained gradually (Zagal, 2009). Generally, game literacy is relatively new; therefore, not many kinds of research have been found related to it. Existing studies include challenges and difficulties of students taking game studies and game design courses (Zagal, 2009), media literacy analysis that focuses on games and film art forms (Zagalo, 2010), and constructs validation and literacy scale construction game (Theses & Rosenberg, 2011). In other words, it is not yet empirically known how the actual level of game literacy is among the various demographic factors.

Based on the issue, this research aims to understand how is game literacy among the demographic factor such as ages, gender, gaming duration, and genres of the game. Hopefully, this research could contribute to the development of the literacy field, especially gaming literacy and how to understand game phenomena from a new perspective.

METHODS

This research was comparative research that aimed to compare the similarity if differences between two or more facts and character of the research variables. In this research, a comparative technique was used to compare some demographic factors such as age, gender, gaming duration, and the genre of the games. The population of this research is gamers in Indonesia. Nonprobability sampling techniques used in this research where not all of the gamers in the population scope have the same chances to be chosen as the research participant. The samples of this research are 418 gamers from 23 provinces in Indonesia. Data collected in two ways 1) using google form that is shared to gamer communities in social media such as Facebook and Twitter, 2) Incidentally to the nearest people that match with the criteria. Data collected by using Game Literacy Scale from Rosenberg (2011)

RESULTS & DISCUSSION

Results

Not all of the people having the same reason for playing the game, some of them only play as time killers and some of them ended in addiction. According to Freddolino and Blasckhe (Cited in Sterling, 2017) gamers are categorized into eight categories: 1) Newcomers, 2) Time Killers, 3) Stress Reliever, 4) Social Player, 5) Enthusiast, 6) Professional, 7) Devotees, and 8) Addicts. In other words, gamers are classified into three-level: 1) playing as recreation, 2) playing to following the system without any targets, 3) playing to get the achievement at games. At the end of the day, these cases may affect the gamers' understanding of the system, playing tendencies, and user design in-game. In order to face these issues, gamers need some good cognitive, creative, and social abilities. According to Zimmerman, this issue is a new paradigm to classified a literate in the new century (Rosenberg, 2011). Zimmerman (2009) simply defined game literacy as an ability to understand and create meanings based on the system concept, games, and design.

Table 1.
 Game Literacy Variable Test One-Way ANOVA

No.	Hypothesis	Sig	Test (p<0.05)	Interpretation
1	Game Literacy and Age	0.000	H ₀ rejected	Approved
2	Game Literacy and Gender	0.004	H ₀ rejected	Approved
3	Game Literacy and Playing Duration	0.004	H ₀ rejected	Approved
4	Game Literacy and Genre of the Game	0.063	H ₀ Failed to reject	Disapproved

Source: Researcher (2020)

The result of this research in table 1 has found the differences between game literacy level and gamers' age (p=.000), gender (p=.004), playing game duration (p=.004), and have no differences with the genre of the game (p=.063).

Table 2.
 Partial Test of Game Literacy and Ages

No.	Hypothesis	Sig	Test (p<0.05)	Interpretation
1	Information and System Management	0.461	H ₀ Failed to reject	Disapproved
2	Exploration and Enjoyment	0.002	H ₀ rejected	Approved
3	Teamwork	0.000	H ₀ rejected	Approved

4	Design	0.016	H ₀ rejected	Approved
5	Socialization	0.000	H ₀ rejected	Approved
6	Skill	0.023	H ₀ rejected	Approved
7	Challenge	0.002	H ₀ rejected	Approved
8	Play	0.446	H ₀ Failed to reject	Disapproved

Source: Researcher (2020)

Specifically, the partial test of game literacy and ages (table 2) has found that only aspects of information and management systems ($p=.461$), as well as aspects of play ($p=.446$) in terms of the age range, have no difference in the literacy of the games. However, the research has found that the other aspects of game literacy such as exploration and enjoyment ($p=.002$), teamwork ($p=.000$), design ($p=.016$), socialization ($p=.000$), skill ($p=.023$), and challenge ($p=.002$) had a difference in term of the age range.

Table 3.
 Partial Test of Game Literacy and Gender

No.	Hypothesis	Sig	Test ($p<0.05$)	Interpretation
1	Information and System Management	0.009	H ₀ rejected	Approved
2	Exploration and Enjoyment	0.242	H ₀ failed to reject	Disapproved
3	Teamwork	0.000	H ₀ rejected	Approved
4	Design	0.013	H ₀ rejected	Approved
5	Socialization	0.001	H ₀ rejected	Approved
6	Skill	0.818	H ₀ failed to reject	Disapproved
7	Challenge	0.004	H ₀ rejected	Approved
8	Play	0.031	H ₀ rejected	Approved

Source: Researcher (2020)

The second result of this partial test between game literacy and gender in table 3 has found that only aspects of exploration and enjoyment ($p=.242$), and aspect of skill ($p=.818$) viewed in terms of gender, do not have any difference in the literacy of the games. Otherwise, the other aspects such as information and system management ($p=.009$), teamwork ($p=.000$), design ($p=.013$), socialization ($p=.001$), challenge ($p=.004$), and play ($p=.031$) had a difference in terms of the gender of the player.

Table 4.
 Partial Test of Game Literacy and Playing Duration

No.	Hypothesis	Sig	Test ($p<0.05$)	Interpretation
1	Information and System Management	0.002	H ₀ rejected	Approved
2	Exploration and Enjoyment	0.001	H ₀ rejected	Approved
3	Teamwork	0.000	H ₀ rejected	Approved
4	Design	0.004	H ₀ rejected	Approved
5	Socialization	0.000	H ₀ rejected	Approved
6	Skill	0.001	H ₀ rejected	Approved
7	Challenge	0.001	H ₀ rejected	Approved
8	Play	0.000	H ₀ rejected	Approved

Source: Researcher (2020)

The third result of the partial test between game literacy and playing duration in table 4 is impressive. Based on the analysis, it found that all of the aspects of game literacy have significant differences. Moreover, the significant score of each aspect of game literacy is information and system management ($p=.002$), exploration and

enjoyment (p=.001), teamwork (p=.000), design (p=.003), socialization (p=.000), skill (p=.001), challenge (p=.001), and play (p=.000).

Table 5.
 Partial Test of Game Literacy and Genre of the Game

No.	Hypothesis	Sig	Test (p<0.05)	Interpretation
1	Information and System Management	0.000	H0 rejected	Approved
2	Exploration and Enjoyment	0.000	H0 rejected	Approved
3	Teamwork	0.000	H0 rejected	Approved
4	Design	0.019	H0 rejected	Approved
5	Socialization	0.000	H0 rejected	Approved
6	Skill	0.000	H0 rejected	Approved
7	Challenge	0.000	H0 rejected	Approved
8	Play	0.000	H0 rejected	Approved

Source: Researcher (2020)

The last partial test of this research was the analysis of game literacy and the genre of the game. It has found that all aspects of information in-game literacy in terms of the category of gamers when playing games have significant differences. According to the analysis it was found that the significant score of each aspect of game literacy is: information and system management (p=.000), exploration and enjoyment (p=.000), teamwork (p=.000), design (p=.019), socialization (p=.000), skill (p=.000), challenge (p=.000), and play (p=.000).

Discussion

Game and human, both are unseparated from life. Nowadays, game is one of the most common aspects that developing with human needs. There are some different reasons for playing the game, for some people, games could be a recreation media, for some others, game could be a stress reliever or only a media for killing the time and much more. In order to understand more about the field of the game, this research tries to find the differences between game literacy levels in some demographic attributes. The first hypothesis of the research is to find differences between game literacy and ages. Based on the result, it found that there are differences between game literacy level and gamers' age (p=.000). Discussing about game literacy and age, game literacy is affected by cognitive, creative, and social abilities. Gottfredson describes cognitive ability is a general mental process that involved reasoning, problem-solving, planning, abstract thinking, understanding complex idea, and learning from experiences (Ispas & Borman, 2015). In other words, cognitive ability affected the information process while playing games. In accordance with the research of Howieson (2015) about cognitive skills and the aging brain shows that aged will affect cognitive deceleration (long term memory, language, problem-solving, and decision making). In the cognitive aging theory, there are three main things that created a deficit of working memories (deceleration of attention, processing information, and fail of controlling the obstacle (Glisky, 2007). Based on the discussion on the first hypothesis, it found that people with maturity will likely have better game literacy levels since they probably have better cognitive abilities. Human age could affect the experiences in facing a lot of life events could shape their ability in various aspects such as problem solving, decision making, understanding complex idea, planning ability, and their lesson learned from the experience itself. It was clear that the ages of the subject could affect the game literacy level and has significant differences in game literacy level.

The second hypothesis is approved that gender significantly differences with game literacy level. Creative cognition is based on cognitive function and flexibility, control inhibition, renewing working memories, originality, and knowledge. The creative drive covered some factor which affected the creativity (emotional motivation, awards, mood, focusing on rules, and social interaction) (Khalil, Godde, & Karim, 2019). Creativity differences are caused by the environment which covered different hope in male and female, different availability chances, and different experiences. In line with previous research by Baer and Kaufman (2008) that female creativity (0.33) is higher than male creativity (0.25). The differences in creativity could create different perspectives in understanding game literacy. Similar to the first hypotheses, the differences of creative cognition could make a different experience in understanding the game, and also made a significant difference between male and female game literacy. Other resources from Association for Psychological Science (2008) also found that females excel in verbal episodic memory tasks, such as remembering words, objects, images or daily events, and males outperform females in terms of remembering symbolic, non-linguistic information, known as visuospatial processing. It shows that there are differences between males and females in understanding the information while the female is stronger in verbal process and male is stronger in visuospatial process. Both of these differences also affected the way female and males think about the event in their life, and one of the events is when they are understanding the game that showed in their different level of game literacy.

Likewise, in the third hypothesis, that there is a significant difference between the duration of playing the game and the game literacy. This is reinforced from what is conveyed by Granic that playing games also have positive effects on the cognitive, motivational, emotional, social domains (Granic, Lobel, & Engels, 2014), improving learning skills, health, and strengthening cognitive skills (navigation, spatial, reasoning, memory, and perception) (Nauert, 2018). Not only that, scientifically games have the following advantages: 1) 3D video games can increase memory capacity, 2) can help relieve pain, 3) help dyslexic children improve reading skills, 4) Tetris can help limit trauma, 5) can make people smarter, and 6) can improve brain material (Bowler, 2017). In addition to positive impacts, games also have negative impacts. From the results of research conducted by Masfety et al, it can be seen that children with a high duration of playing the game will experience a decrease related to problems in relationships with peers and deficits in prosocial (Kovess-Masfety et al., 2016). In line with the result of the research, It could be defined that the higher duration of playing the game will have a higher opportunity to increase the positive impact and on the other hand, there also the possibility of increasing the negative impact. At the very least, people who often play the game will be more honed in understanding things that are interrelated in the game until he knows how to finish the game properly.

However, game literacy does not show a difference in the genre of the game or any game category, game literacy remains the same. It can be explained that whatever the category or the meaning they playing the game, the players must indirectly have the ability to understand and interpret the game. According to Zagalo (2010), literacy is a general code for creating understanding between the sender and receiver making it an important element in communication, moreover, because where there is no literacy, there is no communication. In playing games, the sender of information is the maker of the game and the recipients are gamers. If playing in groups, gamers can be the recipient and sender of the message at the same time. The main objective of each new literacy must be its capacity to increase knowledge, a more efficient understanding of the world and to create this possibility, we must first be able to present a code that defines the way subjects will communicate, read and write and read messages. The gamers must have 3C

(Cultural, Critical, and Creative) and 2D (Decode and Design) literacy abilities (Zagalo, 2010). Even it reinforced by what was delivered by Wirawanda and Setyawan (2018) that the ability of gamers to access, select, and understand games is related to personal experience, especially when they first get to know the game. So, even though the purpose of the game is just to relax from the routine, but he can access, select, and understand the game, so it does not rule out the ability to play the same literacy as a professional, the only difference is the purpose of playing.

When it is viewed partially, there are no differences in information and management aspects of the system and games in terms of age range. It also did not prove any difference in the aspects of exploration and fun and games in terms of gender (explained in tables 2 to table 5). This is closely related to what was stated earlier in relation to a person's cognitive abilities and creativity that can be influenced by age and gender. Specific results show that women excel in verbal episodic memory tasks, such as remembering words, objects, images or daily events, and men outperform women in terms of remembering symbolic, non-linguistic information, known as visuospatial processing (Association for Psychological Science, 2008). In the age range too, the age difference will affect its ability in cognitive, in this case the information and management systems and the ability to playing the game

CONCLUSION

Conclusions of this research are 1) There is the difference between game literacy level and ages, 2) There are differences between game literacy level and gender, 3) There are differences in game literacy level and playing game durations, and 4) There are no differences between game literacy level and genre of the game. The other result of the partial test also found that the age range, gender, duration of playing the game, and genre of the game can affect someone's game literacy.

The limitation of this research is the developmental stage of the subject. The subject of this study was only taken from early adults and older. According to the result and limitation of this research, the subject of the next research might broaden from many more developmental stages such as toddler (0 – 5 years), child (5 – 11 years), the early elder (45 – 55 years), and elderly (56 – 65 years). It is suggested because some of the subjects start playing the game when they were children and gamers around the world spread in all developmental stages. To prevent the negative effect of gaming itself, this research is also suggesting the campaign and socialization about game literacy. Parental control also a critical aspect to educate the child's gaming experiences.

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