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GENDER DIFFERENCES LEARNING VALUE: A CASE STUDY OF PLAYING MOTORCYCLE GAME LEARNING

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Abstract

This study investigated the gender differences in vocational high school for playing the 3D motorcycle digital game on the tablet and the participants who don't have the license of motorcycle driving yet. A questionnaire, relevant to the items of gameplay anxiety, cognitive anxiety, learning value and continuance intention, is conducted after playing the digital game simulated at the regulation of riding the motorcycle on the road, correctly riding behaviour and the interference

with another unexcepted driving behaviour. The finding of this study is that the gender difference significantly of the gameplay anxiety, cognitive anxiety, learning value (attitude and behaviour), and the feeling of females are more than male.

Keywords
Continuance Intention, Cognitive Failure, Learning Value, Game Anxiety

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1. Introduction

The density of motorcycle riding in Taiwan is relatively high. According to the statistics of the Taiwan Ministry of Transportation, there are 92.3 motorcycles per 100 people (National Police Agency, Ministry of the Interior, 2018). It is also relatively high. In addition, Taiwan's regulations stipulate that the driver's license for automobiles and motorcycles can be obtained at the age of 18, and the difference in the proportion of male and female students holding a driver's license is gradually decreasing. Therefore, the safety concept of motorcycle riding and traffic rules are very important; however, with the rapid development of digital technology, it has been widely used in human life, learning, etc. Laffey, Espinosa, Moore, & Lodree, (2003) pointed out that using digital games as an aid in the teaching process, students' learning effectiveness is higher than traditional teaching, and games can also arouse learning motivation and make learners' experience focus on the process of immersion (Pivec, 2007). Situation-specific anxiety exists when playing games and a state of competitive anxiety arises when learners are challenged (Martens, Vealey and Burton, 1990). Hong, Tai, Hwang, Kuo, & Chen, (2017) research pointed out that in the process of game learning if the anxiety is caused by multitasking or external factors, the participants' continuous behaviour of game learning will also be affected.

In Taiwan, digital games also have a population of 8.9 million, of which 18-24-year olds account for 55%. Given the high overlap between these two groups of young people, this study wants to explore whether the use of digital games in learning can improve male and female students. Pay attention to the traffic safety knowledge and behaviour of riding motorcycles;

furthermore, whether boys and girls can arouse interest in learning by this type of digital learning games, and whether they cause cognitive failure, game anxiety when using the digital games for locomotive driving simulation exercises, what are the differences and correlations between learning value and continuance intention?

2. Literature Research

This study makes the following explanations for Cognitive failure, Game anxiety, learning value and Continuance intention dimensions based on relevant literature.

2.1. Game Anxiety

The vast majority of teenagers (95%) are now online (Madden, Lenhart, Cortesi, Gasser, Duggan, Smith, & Beaton, 2013), with 24% of teenagers in the study reporting that they are online almost constantly (Lenhart, 2015). The majority of adolescents (78%) have their mobile phones and the majority (72%) play computer games (Lenhart, 2015). It is important to note that playing video games is becoming more complex and easier. However, the game may be affected by external factors, multiple tasks in the game or other information during the game and users may become anxious during their play.

Computer anxiety was another variant of individual variability related to computer skills and experience; it was framed as an emotive fear, the fear an individual feel about interacting with a computer or using computer thoughts (Marcoulides, 1989; Herdman, 1983). Computer anxiety is an essential personal difference that is distinct from computer self-efficacy and this difference needs to be examined in future research. Previous researchers have argued that computer anxiety is a form of 'state anxiety that changes under certain circumstances (Heinssen, Glass & Knight, 1987; Cambre & Cook, 1985; Raub, 1981). Computer anxiety is a valid response characteristic (Barbeite & Weiss, 2004) that can influence the use of computer technology and performance on tasks involving computer use (e.g., Heinssen et al., 1987; Mahar, Henderson & Deane, 1997; Rosen & Weil, 1995). In studies of male and female students in similar types of competitive games, girls have higher cognitive load and competitive anxiety than boys (Hwang, Hong, Cheng, Peng,

& Wu, 2013).

2.2. Learning value

Learning aims to acquire knowledge, skills, behaviours, or values (Jay Deragon, 2009), and curiosity is described as a diverse concept in Loewenstein's (1994) study, where inquisitive curiosity, in addition to showing up in the act of playing games, contributes to our understanding of learning, (Kang et al, 2009; Kashdan & Steger, 2007; Caillois & Barash, 1961)). When inquisitive curiosity was applied to the study of mobile games, the researchers hypothesized that the two types of cognitive curiosity would influence the player's intentions and that as humans age, I-type curiosity seems to decline and D-type curiosity grows because the older they get, the more they demand authenticity in their own lives (Lauriola et al, 2015).

2.3. Continuance Intention

Expectancy confirmation theory is used extensively in the literature of consumer behaviour to examine consumers' IT usage decisions and repetition of purchase decisions (Bhattacherjee, 2001). Based on expectation confirmation theory, most of the current literature on it has focused specifically on user acceptance. Some evidence suggests that utilitarian values are not only the most important determination influencing behavioural intentions to use an information system (Davis, 1989; Ernst, Pfeiffer, & Rothlauf, 2013), but are also closely related to the effective and efficient use of IT systems (Jasperson, Carter, & Zmud, 2005; Kim, Chan, & Gupta, 2007; Venkatesh & Brown, 2001). About usefulness, as previous research has shown, perceived fun can also determine user satisfaction and continued intention (Lin, Wu, & Tsai, 2005). In other words, whereas perceived Usefulness is an instance of extrinsic motivation, Fun is one instance of intrinsic motivation (Davis, Bagozzi, & Warshaw, 1992). Therefore, the use of information technology is influenced by both perceived usefulness and perceived enjoyment (Deng, Turner, Gehling, & Prince, 2010; Igbaria, Parasuraman, & Baroudi, 1996; Van der Heijden, 2004; Javornik, 2014). In addition, the values of helpfulness and enjoyment are crucial for customer contentment and behavioural intentions (Oh, Fiore, & Jeoung, 2007).

2.4. Cognitive Failure

We experience cognitive fatigue after a sustained period during cognitive processing (Lowe, 1985; McMorris, Barwood, Hale, Dicks, & Corbett, 2018; Laplante, Everett, & Thomas, 1992; McMorris, Barwood, Hale, Dicks, & Corbett, 2018) Cognitive fatigue is commonly used in learning to describe the state of inattention, misinterpretation of information, and inability to extract what is needed from a large amount of information due to changes in the learning medium (Hong, Tai, Hwang, & Kuo, 2016). Wylie, Genova, Deluca, & Dobryakova (2017) found that cognitive fatigue is a frequent experience for individuals, with the brain experiencing cognitive fatigue when brainpower is overused. When cognitive fatigue occurs, individuals are prone to cognitive or behavioural errors (Myszewski, 2010). Empirical studies suggest that the cognitive state of an individual is significantly correlated with task performance during continuous task performance (Caplan, 2010; Kanfer, 2011). This study defines game cognitive fatigue as a phenomenon or state of cognitive fatigue caused by game information after users have operated the game for some time. In other words, the information covered by the game may cause cognitive fatigue in users (Levy, Rafaeli, & Ariel, 2016).

3. Research Methodology

Based on the literature, this study differed between the cognitive fatigue, game anxiety, learning value (cognitive, behavioural, and attitudinal), and continuance intention components and the self-variant items (male and female students).

3.1. Research Context

In this study, male and female students who had not yet obtained their motorcycle licenses in technically advanced schools were used as the study subjects.

3.2. Game Description

In this study, we used the motorcycle 3D driving game from the "Motorcycle Hazard Perception Learning Tool Development and Application (2/2)" (MOTC-IOT-105-SEB) project, a

collaborative project between the Institute of Transportation, Ministry of Transportation and the Transportation Association of the Republic of China. The game screen is shown in Figure 1.

Figure 1: *3D motorcycle game schematic diagram*

(Source: Compiled by the author)

The game software is designed with three types of learning methods: motorcycle riding, feedback on mistakes and quick questions and answers, allowing users to learn three types of knowledge during the game: (1) the meaning of signs, lines and symbols; (2) right-of-way regulations and (3) proper driving behaviour.

3.3. Sample Analysis

A total of 140 questionnaires were sent out and 135 were returned, with a return rate of 96%. 21 of the questionnaires were invalid and 114 were valid, with a usability rate of 84%.

3.4. Questionnaire

Citing relevant literature and research content of relevant scholars, the questionnaire of this study on cognitive failure, game anxiety, learning value and continuance intention is developed, and the following explanation is made.

3.4.1. Cognitive fatigue

Cognitive fatigue is a term used to describe learning disabilities such as inattention, misinterpretation of information, and inability to extract what is needed from large amounts of information due to changes in the learning medium (Hong, et al., 2016). Cognitive fatigue is often caused by the repetition of the same mental processes over a short period, resulting in a state of uncomfortable slowness or inability to function mentally.

This study focuses on Hong, et al., (2017). This study mainly refers to Hong, et al., (2016) design of the Internet Cognitive Fatigue Scale, where higher total scores on the scale represent higher levels of cognitive fatigue in games.

3.4.2. Game Anxiety

Hong, et al., (2015) explained that game anxiety can be regarded as competitive anxiety, as the level of anxiety is influenced by psychological excitement, subjective discomfort and predictions of academic performance. In this regard, as the duration of play increases, the level of anxiety varies. In this regard, as playtime increases, having different attentional attractions or stimuli will lead to different levels of play anxiety in different play scenarios. This study, therefore, adjusted the items related to play anxiety in the 3D motorbike digital game. The higher the total score on the scale, the higher the level of anxiety in the game. The higher the total score, the higher the level of anxiety.

3.4.3. Learning value

The value of learning is the driving force and desire to develop and embrace wise conclusions about the world (De Dreu, Beersma, Stroebe, & Euwema, 2006). This study adapts McGill & Hobbs (2008) definition and emphasises that the value of learning can be extended to the extent that players perceive learning to include perceived effectiveness, productivity, importance and helpfulness. This study mainly draws on McGill & Hobbs' Value of Experience Scale and adjusts the items related to the value of learning in 3D motorbike digital games. The scale is a five-point scale the scale is scored on a five-point scale, with higher total scores indicating

higher levels of learning value.

3.4.4. Continuance Intention

Bhattacherjee (2001) suggests that the observation of continuous engagement intention is formed around the derivation of learning interests. Gollwitzer (1999) argues that continuous intention means that I will do Y even when X occurs. This study mainly referred to Hong, et al., (2016) continuance intention scale and adjusted the items related to continuance intention in 3D motorbike digital games. The higher the total score on the scale, the higher the intention to play. The higher the total score of the scale, the higher the intention to stay engaged in the game.

4. Research Results

In this study, SPSS analysis software was used to analyze with independent samples. The purpose of this arrangement is to confirm the reliable and efficient of the components and then check the relationship between the components. In this study, we used Visual PLS 1.04 analysis software and Partial Least Squares to test the measurement model.

4.1. Reliability Analysis

The reliability analysis in this study used Cronbach's alpha value and composite reliability as presented (Cornell & Larker,1981) to assess the model's internal consistency. Nunnally (1978) a Cronbach's alpha value of more than 0.7 is regarded as an admissible criterion, while (Hair et al., 2009), it is suggested that the threshold for composite reliability should be above 0.7. If the threshold is exceeded, then the concept has achieved internal consistency. From Table 1, we can see that the Cognitive Fatigue Scale has 4 questions with a statistically analyzed outcome scale Cronbach alpha of .901, the Game Anxiety Scale has 5 questions with a statistically analyzed outcome scale Cronbach alpha of .933, the Learning Value (Attitude) Scale has 5 questions with a statistically analyzed outcome scale Cronbach alpha of .962, and the Continuity of Intentions Scale has 5 questions with a statistically analyzed outcome scale Cronbach alpha of .962. Therefore, the combined reliability (CR) of the sample data of this study ranged from 0.925 to 0.971, which was

higher than the threshold value of 0.7 on average, and the Cronbach's alpha values were also greater than 0.7, indicating that The Cronbach's alpha values are also larger than 0.7 indicates that the questionnaire has a certain degree of reliability and a considerable degree of internal consistency of the measured variables in each section.

4.2. Validity Analysis

The validity analysis of this study was assessed using the averaging validity; the requirement of averaging validity was met when the loading of the measured items was greater than 0.5 (Nunnally, 1978). Furthermore, Fornell & Larcker, (1981) the average variance extracted of an isolated construct (AVE) is higher than 0.5, then the constructed has adequate validity. As we can see from Table 1, the factor loadings of each of the questions in this study are also greater than 0.5, which is higher than the threshold value of 0.5. Therefore, the measurement model of this study has sufficient convergent validity.

Table 1: *Mean, standard deviation, and factor loadings of each question*

Title
Cognitive failure：CR=.925, AVE=.756, α=.901, M=2.60, SD=1.001
Game anxiety： CR=.947, AVE=.783, α=.933, M=2.841, SD=1.184
Learning value ：CR=.971, AVE=.869, α=.962, M=3.741, SD=0.905
Continuance intention：CR=.97, AVE=.85, α=.96, M=3.832, SD=.824

(Source: Compiled by the author)

4.3. Independent Sample T-Test

After the reliability test, a t-test analysis of the independent samples was conducted. The explanatory ability was determined by the t-value of each construct. In this study, an independent specimen t-test analysis was used to determine if there were any significant distinctions on the dimensions of online cognitive failure between male and female technical high school students, game anxiety, cognitive fatigue, learning value, and Continuance intention. The results of the analysis are shown in Table 2 below.:

Table 2 *Comparison of T-Test differences between male and female*

	Gender	N	M	SD	df	t	*p*
Game anxiety	Male	53	3.62	.65	108.79	-2.27*	.02
	Female	61	3.89	.63			
Cognitive failure	Male	53	3.55	.77	105.32	-2.85**	.01
	Female	61	3.94	.69			
Learning value	Male	53	2.59	.77	112	-.75	.455
(Awareness)	Female	61	2.69	.70			
Learning value	Male	53	2.85	.65	102.70	-4.08**	.00
(Attitude)	Female	61	3.32	.56			
Learning value	Male	53	2.50	.85	108.52	-3.14**	.00
(Behaviour)	Female	61	2.99	.82			
Continuance intention	Male	53	2.86	.56	112	-.36	.72
	Female	61	2.90	.63			

**$p<0.01$，*$p<0.05$

(Source: Compiled by the author)

H1: A significant difference was found between male and female students in the aspect of game anxiety, and female students are more likely to have game anxiety than male students.

H2: A significant difference was found between male and female students in the dimension of cognitive fatigue, and female students have more cognitive fatigue than male students.

H3: A significant difference was found between male and female students in the cognitive value of learning.

H4: A significant difference was found between male and female students in the dimension of attitude toward learning value, and female students have this game cognitive situation more than male students.

H5: There are significant differences in the behavioural components of learning values between male and female students, and female students are more likely to play this game than male students.

H6: No significant difference between male and female students in the dimension of the value of learning.

5. Conclusions and Recommendations

In this study, a digital game called "3D Motorcycle" was played on a tablet for technical high school students who had not taken the motorbike driving test. The game was designed to simulate motorbike riding situations for both male and female students. The game was designed to simulate the situations that the participants might encounter when riding a motorbike, including the rules and regulations of riding on the road, proper riding behaviour, and the interference of other riding behaviours. After playing the game, users can learn about traffic regulations, safe riding behaviour and After playing the game, users will be able to learn about traffic laws, safe riding behaviour, and the handling of other vehicles.

5.1. Conclusions

In this study, a "3D motorcycle" game was played on a tablet to allow male and female technical high school students who had not obtained a motorcycle license to simulate the situation of riding a motorcycle, in which the content of the game was engineered to simulate a motorcycle ride on the road in terms of regulations, proper riding behaviour, and interference from other vehicles. After playing the game, the student's awareness, attitude and behaviour regarding traffic regulations, safe riding behaviour, and paying attention to other cars approaching...etc. in the game had relative gains.

5.2. Recommendations

This study only focuses on technical high school male and female students' understanding of motorcycle riding regulations, riding behaviours, and other simulated situations so that the study subjects can pay more attention to traffic regulations and safety after they pass the motorcycle riding test, and increase the safety of life. Does the structure of the game differ between men and women in terms of road network cognitive errors, game anxiety, game interest, cognitive fatigue, learning values (cognition, attitude, behaviour) and intention to keep playing? However, this game

is set up by the Ministry of Transportation and Communications after expert discussions and is still relatively unused. If the future revision is completed, the game will be released for download and the subjects who will be tested on motorcycle riding will be allowed to play this simulation game first and then analyze and study it, perhaps in the future, the nationals will be able to improve riding safety when riding motorcycles to reduce the chance of car accidents.

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