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Article

Technology Acceptance Model on Using Baseball Game Console for Hearing Impaired Learners

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Abstract: The purpose of this study is to explore the factors that affect the use of the baseball game console for hearing impaired learners. The research framework was based on a Technology Acceptance Model (TAM) and external variables such as social norms, perceived enjoyment, and self-efficacy. Questionnaires were distributed to students at National Taichung School for Hearing Impairment Students. There was a high acceptance rate for using a baseball game console among the hearing impaired students as the hearing-impaired students have fewer leisure activities in their daily life. The results provide references to the institution for future improvement in teaching and curriculum planning.

Keywords: Hearing Impaired, Technology Acceptance Model (TAM), Self-Efficacy

1. Introduction

Because of the popularity of computer applications and the rise of issues about the disadvantaged group, the hearing impaired is assisted in learning through the help of information technology. They can obtain more vocational skills, improve self-learning skills, develop potential skills, and strengthen their employment, accomplishment, self-esteem, and motivation (Wu et al., 2008). Students with mental or physical disabilities often need various multimedia aids to increase learning as information technology provides diverse learning. Nintendo launched its simulation console "Switch" in 2017, creating a new era of human-computer interaction mode in the game industry. The traditional keyboard was replaced by the wireless remote controller (Chen and Wen, 2008). Thus, the acceptance of using the baseball game console in the classroom for hearing-impaired students was worth studying.

Davis' Technology Acceptance Model (TAM) is mainly to evaluate the degree of users' acceptance of new information technology. The degree of acceptance is based on personal beliefs and attitudes towards a new technology (Succi and Walter, 1999). TAM was used in this study to measure hearing impaired students' perceived usefulness, perceived ease of use, attitudes, and willingness to use with the baseball game console.

2. Literature Reviews

2.1. Characteristics of Hearing-Impaired Students

2.1.1. Definition

According to the Ministry of Health and Welfare of Taiwan (2017), impaired hearing occurs for various reasons which lead to permanent hearing defects. People with a hearing loss of 55 dB or more are regarded as the hearing impaired. In general, people who cannot effectively use external auditory organs and have problems in speaking and hearing are considered the hearing impaired (Hu, 2000).

2.1.2. Mental Characteristics

Huang (2004) pointed out that the hearing impaired students lack listening practices, which often leads to misconstruct the outer world with their perception. Because of the incomplete reception of information, hearing impaired students often have problems in abstract learning, which later influence the development of self-conception. Hearing-impaired students often have

problems in communication which lead to behavioral and social problems. Not only affected is their mental development, but also the difficulties increase in social adaptation.

2.2. Leisure Activities of the Hearing Impaired

Research has indicated that suitable leisure activities help improve disabled learners' abilities for social adaptation and reduce inappropriate behaviors (Wehman, Renzaglia, and Bates, 1985). In Chang's study (2005) of the analysis of recreational activities for the hearing impaired, they were capable to enjoy leisure activities due to listening problems. For fulfilling their needs, the degree of participation needs to increase. Factors that hinder people with disabilities to participate in leisure activities include intrinsic factors, environmental factors, and communicative factors (Kennedy, Austin, and Smith, 1987).

2.3. Technology Acceptance Model (TAM)

According to TAM theory, certain behaviors are determined by behavioral intentions and then are affected by attitudes and social norms. TAM is shown in Fig. 1.

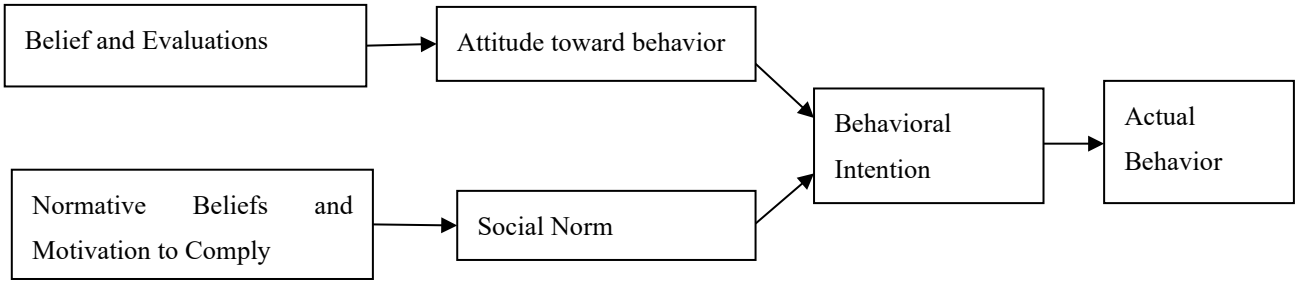

Fig. 1. Framework of TAM theory.

Venkatesh and Davis (2000) suggested that social norms affect perceived usefulness, and its result later affects the intention to use. Su (2004) studied instant messaging and found that teenagers' social norms had a significant impact on perceived usefulness, which had the same result as Venkatesh and Davis (2000).

Teo, Lim, and Lai (1999) found that perceived enjoyment has a positive effect on perceived ease of use and perceived usefulness and an indirect effect on the behavioral intention of Internet users. Perceived enjoyment affects individuals' perceived usefulness and perceived ease of use when using new technology. In this study, perceived enjoyment is to measure the level of pleasure when using a baseball game console. Moreover, its relationship among users' perceived usefulness, perceived ease of use, and behavioral intention were analyzed.

2.4. External Variables of Using Wii

External variables that may impact the hearing impaired students when using Wii as a baseball game console are as follows.

Hsiao (2007) discovered that there was a significant positive relationship between social norms and perceived usefulness. The result indicated that the more hearing impaired' relatives use the internet, the more hearing-impaired become effectively in using the internet. This further affects their intention of using the internet. Self-efficacy is one of the external variables of Venkatesh and Davis (2000). Their result indicated that the factor of self-efficacy influences people's perceived ease of use. Hsiao (2007) included the factor of perceived enjoyment. The result indicated that perceived enjoyment had a significant positive effect on perceived usefulness and perceived ease of use.

3. Methodology

3.1. Research Framework

We defined external variables as "social norm", "perceived enjoyment", and "self-efficacy" to form a conceptual research framework as shown in Fig. 2.

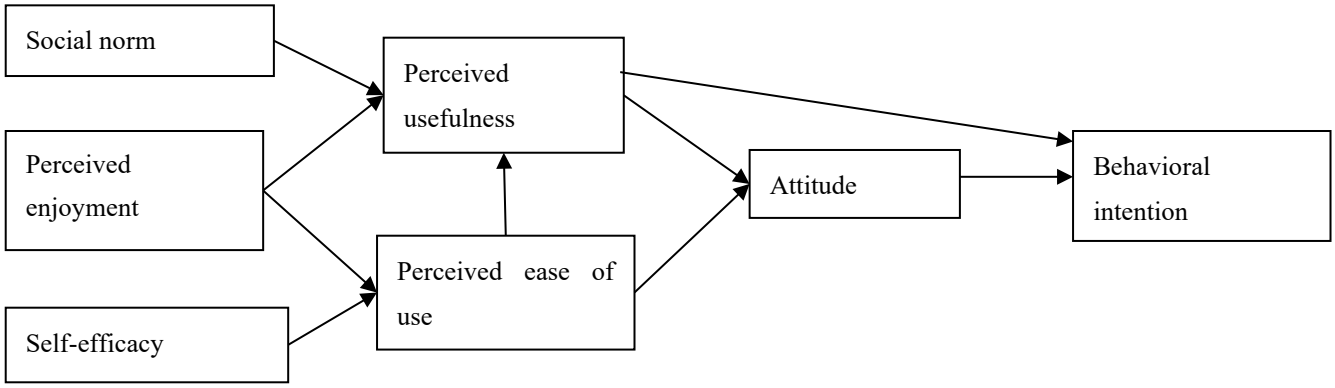

Fig. 2. Research framework.

This study was carried out to discover the relationship between external variables (self-efficacy, social norm, and perceived enjoyment) and internal beliefs (perceived usefulness and perceived ease of use), attitude, and behavioral intention. The cause and effect model was used to examine the relationship between factors and behavioral intention.

The sample subjects were the hearing impaired students from National Taichung School for Students with Hearing Impairments. Questionnaires were distributed with a purposed sampling method.

3.2. Methodology

According to the results in Table 1, Cronbach α values were above 0.8 in each dimension, which validates the reliability of the study for follow-up analysis.

Table 1. Reliability of hearing-impaired for using Wii

Dimension	Reliability	Dimension	Reliability
Total reliability	0.985	**Perceived usefulness**	0.946
Social norm	0.906	**Perceived ease of use**	0.910
Perceived enjoyment	0.947	**Attitude**	0.935
Self-efficacy	0.876	**Behavioral intention**	0.944

The results of factor analysis showed that each dimension is suitable for factor analysis as follows: social norms (KMO = 0.791, $p = 0.000 < 0.001$), perceived enjoyment (KMO = 0.854, $p = 0.000 < 0.001$), self-efficacy (KMO = 0.802, $p = 0.000 < 0.001$), perceived usefulness (KMO = 0.802, $p = 0.000 < 0.001$), perceived ease of use (KMO = 0.865, $p = 0.000 < 0.001$), attitude (KMO = 0.795, $p = 0.000 < 0.001$) and behavioral intention (KMO = 0.777, $p = 0.000 < 0.001$).

4. Results

The result of correlation analysis shows that variables in the research framework were positively correlated to each other. Table 2 and Fig. 3 show the correlation coefficients of the variable within the framework.

Table 2. Correlation analysis

Dimension	Social norm	Perceived enjoyment	Self-efficacy	Perceived usefulness	Perceived ease of use	Attitude	Behavioral intention
Social norm	1						
Perceived enjoyment	0.664***	1					
Self-efficacy	0.635***	0.646***	1				
Perceived usefulness	0.678***	0.871***	0.784***	1			
Perceived ease of use	0.652***	0.644***	0.818***	0.797***	1		
Attitude	0.653***	0.797***	0.815***	0.873***	0.889***	1	

Behavioral intention	0.693***	0.784***	0.705***	0.754***	0.651***	0.723***	1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

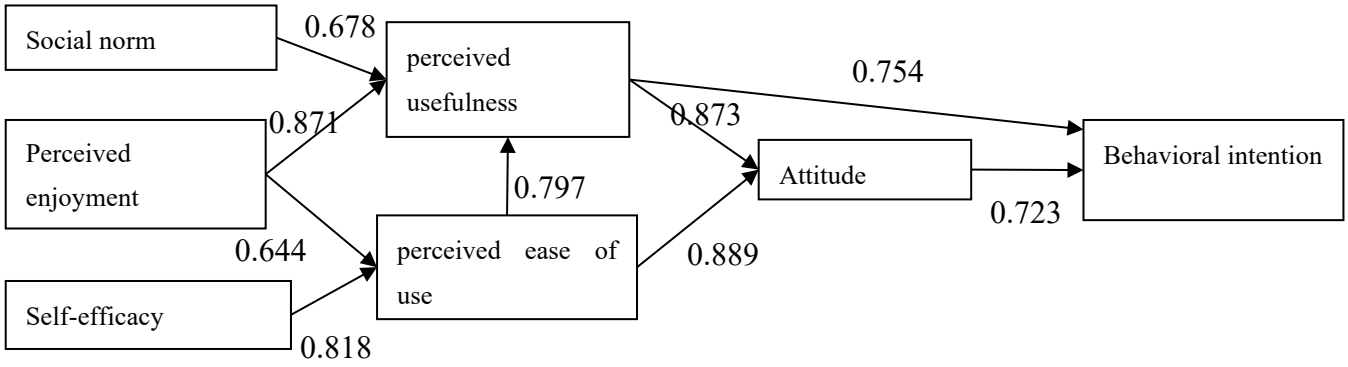

Fig. 3. TAM of hearing-impaired using baseball game console with Correlation coefficients.

The hearing-impaired students had greater enjoyment when influenced by their classmates. They also had a greater sense of independence to use the baseball game console along with a higher level of user perception and ease of use. The users' attitudes toward using the baseball game console and intention of using it in the future were also increased.

The acceptance of the baseball game console for the hearing impaired students is relatively higher than the general public in terms of perceived usefulness, perceived ease of use, attitude, and behavioral intention. A possible assumption is that the hearing-impaired students have fewer leisure activities. Therefore, their acceptance of a newer, more attractive game console is higher than the public.

5. Discussion

This study was performed to explore the relationship between social norms, perceived enjoyment, self-efficacy to perceived usefulness, perceived ease of use, attitude, and behavioral intention. TAM research structure was applied to the hearing impaired students using a baseball game console.

There was a positive correlation between perceived usefulness and behavioral intention, which means that the hearing impaired learners increase their learning performance by using the baseball game console. They have a greater intention to use the console. A similar result was found in the studies of Hsiao (2007), Venkatesh and Davis (1996), and Davis (1985). Researchers concluded that perceived usefulness is an important in affecting users' adoption of new technology.

There was a significant positive impact on social norms, perceived usefulness, and perceived ease of use, which means that the classmates and family of the hearing-impaired students influence their willingness to use the baseball game console. This result was consistent with the studies of Hsiao (2007), Su (2004), and Venkatesh and Davis (2000). The hearing impaired users' fammily and classmates play an important role in influencing their perception of using the baseball game console. Using the console had a positive effect on perceived enjoyment, perceived usefulness, and perceived ease of use, which means a higher level of enjoyment helped the students learn and feel to use the baseball game console. Hsiao's study (2007) also indicated that the level of perceived enjoyment had a positive impact on the perceived usefulness and perceived ease of use, which is consistent with this study's result.

In addition, there was a significant positive correlation between perceived ease of use and perceived usefulness, which means having an easier usage perception while using the baseball game console increases the level of learning performance. This result was consistent with the studies of Chang, Chen, and Liao (2008). They indicated that perceived ease of use has a significant positive correlation with perceived usefulness. Lastly, self-efficacy has a significant positive effect on perceived ease of use, which means that the students thought the baseball game console was easy to use when they were independent in using the baseball game console without any trouble. The studies of Venkatesh and Davis (2000), Hong, Thong, Wong, and Tam (2001), and Su (2004) drew the same conclusion on self-efficacy influencing the level of perceived ease of use as this study.

6. Conclusion and Suggestions

The family and classmates of the hearing-impaired students are important in the students' decision of using the baseball game console. When the family and classmates start to use the baseball game console, the hearing-impaired students think that the baseball game console is safe to use, then they start to use it as well. The level of the usefulness also influences the perception of the

usefulness of the family and classmates. If they start to use the console and have an interest in using it, the hearing-impaired students think that the baseball game console is useful to their learning.

Many factors influence the hearing impaired users on the use of the baseball game console. As a quantitative study, the hearing-impaired students' insights are not included in this study, which needs further discussion in detail. Also, it is difficult to use random sampling for a specific group of users. Therefore, the result cannot be representative for more hearing-impaired students. In the future, a qualitative research method needs to be considered to overcome the limitation of this study.

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