

The Influence of Student Learning Styles toward Behavioral Intention to Learn via Online Educational Games Platform

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The Asian Conference on Education 2019
Official Conference Proceedings

Abstract

The rapid expansion of new technologies has led to a change in the learning and teaching process. With the paradigm shift, the conventional teaching method no longer appeals to the current generation whose lives revolve around social media and technology. It is time educators learn to adopt new teaching methods to cater to the learners' needs. Fun learning evokes enthusiasm among learners. Hence, this study attempts to investigate how different learning styles among students influence their perception towards the intention to learn using online educational games instead of the conventional learning. Technology Acceptance Model (TAM) is employed in this study. Perceived usefulness and perceived ease of use from the model serve as the mediating variables in strengthening the analysis. This quantitative study employs a questionnaire adopted from the Selmes Learning Style Inventory targeting 240 undergraduate students in a private higher institution in the northern region of Malaysia. The inventory consists of five learning styles which are deep learning, surface learning, well organised learning, diligent learning and motivational learning. Data obtained was analysed using Partial Least Square- Structural Equation Modelling (PLS-SEM) version 3.0. The expected outcome aims to enhance the student's behavioral intention to learn via online educational games during lecture based on their learning styles. This study further provides insights to the educators who adopt 21st century learning methods, to take into account their student's learning behavior before preparing the teaching materials so as to produce talented and high potential learners.

Keywords: Selmes Learning Style Inventory, Technology Acceptance Model (TAM), perceived usefulness, perceived ease of use, behavioral intention

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1.0 Introduction

The rapid expansion of new technologies has led to a change in the learning and teaching process. With the paradigm shift, the conventional teaching method is no longer applicable to the current generation whose lives revolve around social media and technology. It is time educators learn to adopt new teaching methods to cater to the learners' needs. Fun learning evokes enthusiasm among learners. Educators who adopt 21st century learning methods can produce talented and high potential learners. According to Kamsin (2005), the infusion of technology in learning gives a positive effect to the learners.

Selangor Education Department Director, Zainuren Mohd Nor in The Star Online, April 24 2016 said that the traditional chalk and talk method is no longer applicable with this generation. He added that 21st century learning can help produce a generation of 'high quality students'. Technology is evolving and online learning has become easily accessible globally. This technology established a new platform for language learning which is known as gamification, a term coined by Nick Pelling in 2002 (Pelling, 2011). The term gamification is commonly defined as the use of game design elements in non-game contexts (Deterding et al., 2011).

Online educational games platform is often utilized by educators to attract learners to participate in a certain task by infusing game like elements into it. Game based learning is a popular method whereby most research focuses on its positive effects on students (Liu & Chen, 2013, Wang & Lieberoth, 2016, Bakan & Bakan, 2018). The effects are usually seen in student performance, motivation and engagement. There is limited research which investigates the relation between different learning styles and the varied perception to the use of online educational games during lecture.

Hence, this study attempts to investigate how different learning styles among students influence their perception towards the intention to learn using online educational games. On the other hand, this study aims to address the research objectives as below:

- i. To identify student learning style based on Selmes Learning Inventory
- ii. To examine the influence between student learning style and perceived usefulness on the online educational games platform
- iii. To examine the influence between student learning style and perceived ease of use on the online educational games platform
- iv. To examine the influence between student learning style and behavioral intention to learn via online educational games platform mediated by perceived usefulness and perceived ease of use

Section 2.0 presents the related studies pertaining to the learning styles and online educational platform. Section 3.0 presents methodology including the sample size size and research instrument. Selmes Learning Style Inventory is used in this study. This inventory consists of five learning styles which are deep learning, surface learning, well organised learning, diligent learning and motivational learning. Section 4.0 presents the results generated from the PLS-SEM 3.0 software consist of descriptive analysis, model measurement, convergent validity, discriminant validity, path coefficient and mediating effect tests. Section 5.0 discusses the results and concludes the study.

2.0 Related Studies

Learning style refers to the approach that best suits a student in learning. According to Isyak and Awang (2017), learning style is the method used by individuals to retain and absorb new information. There are students who learn something according to their own approach and they do not realize the approach used is different compared to other students (Chik & Abdullah, 2018). Learners may be inclined to use more than one learning style depending on the content they are learning. Some learners have a combination of learning styles but often have a certain preference they are most comfortable with. Each individual process new information differently. It is of utmost importance that educators understand which approach suits the learners to maximize the retention of new information. The term 'learning style' can be defined as unique and different ways to learn among individuals (Dunn et al, 2010 as cited in Samarakoon et al, 2013).

Learning Styles Frameworks

In general, there are many different learning styles. This can be seen in the availability of a variety of learning styles frameworks. The models that are often used by educators to understand learning styles are Kolb's (1981,1984) inventory and VARK model by Fleming (2001).

Kolb's model (1981) listed four learning styles which are known as the converger, diverger, assimilator, and accommodator. The convergers are unemotional and good with applying ideas in practical, divergers are creative and good in brainstorming ideas, assimilators are great in inductive reasoning and creating theoretical models and accommodators are willing to take risks to try new experiences.

Fleming's VARK model (2001) categorises learners into four types which are visual, auditory, read/write and kinesthetic. Visual learners favor charts, colors and diagrams, auditory learners like discussing topics and ideas with their friends and teachers, read/write learners prefer textbooks, manuals and taking notes and kinesthetic learners enjoy hands-on approaches and finding solutions to problems. According to Selmes (1987), there are five learning styles which are deep learning, surface learning, well organised learning, diligent learning and motivational learning.

Learners Acceptance Models

There are many models that investigate learners' acceptance to technology such as Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Theory of Reasoned Action (TRA). Davis (1989) has developed TAM and it has been widely used to explain users' acceptance to technology. The perceived ease of use and perceived usefulness based on the Technology Acceptance Model are key factors in computer use behaviors. Perceived usefulness and perceived ease of use are defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" and "the degree to which a person believes that using a particular system would be free from effort" (Davis,1989). Marangunic and Granic (2015) believe the two key factors which are perceived usefulness (PU) and perceived ease of use (PEU) can directly or indirectly describe the outcomes.

Online Educational Games Learning

With the 21st century learning comprising communication, collaboration, critical thinking, and creativity, advocates believe that educationist need to teach these skills to help students thrive in today's world. Interactive and fun learning using social media and technology that can evoke enthusiasm among students in the 21st century classroom, needs to be incorporated into new methods so that every learner's deepest potential is unlocked. By making learning fun and engaging through online educational games, and taking into account student's learning behavior, online educational games learning platform is able to produce talented and high potential learners.

Online educational games using technology such as Kahoot and Zuvio are two of the many game-based learning platforms that form powerful classroom assistance for educationist. These game-based learning platforms can be used as educational technology in schools and other educational institutions in the process of making education fun and engaging for the 21st century learners.

Educational researchers have pointed out several features of online educational games that allow them to be used as learning tools. For example, games are engaging (Dickey, 2005) and motivating (Prensky, 2003). They also provide a lot of experiences (Arena and Schwartz, 2013) and an excellent feedback on performances (Shute, 2011). Finally, games support very well the learner centred education (Gee, 2005). The advantage of a broad range of online educational games platforms is that they foster their learners learning through fun learning.

Research Framework

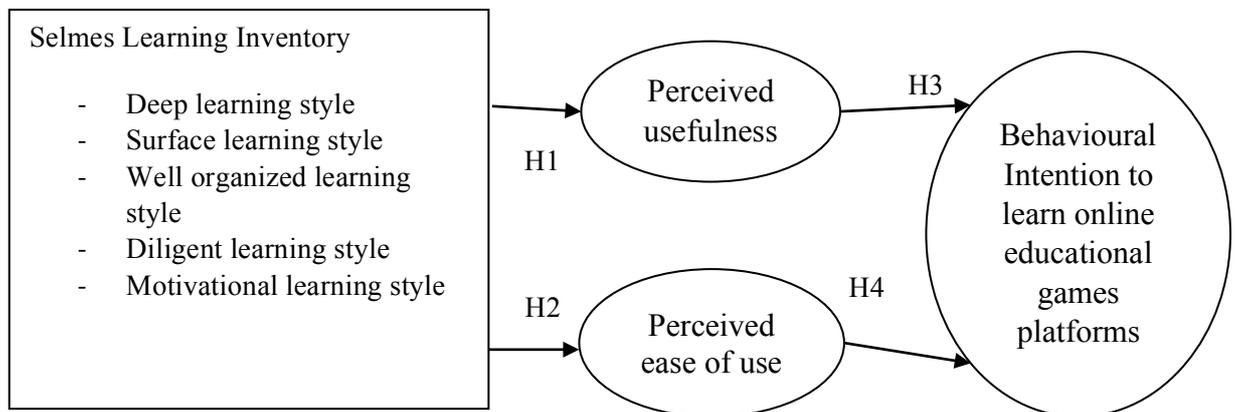


Figure 1: Research Framework

Based on the Figure 1, the research framework was developed to examine the behavioral intention among tertiary level student to learn via online educational games platforms. Different students have their own learning style to obtain knowledge. Thus, student learning styles served as the external attribute in this study. The mediating variables include perceived usefulness and perceived ease of use. Research questions and hypothesizes have been developed to address the study's need in order to achieve the research objectives.

Research Questions

- i. What are the student learning styles based on Selmes Learning Inventory?
- ii. Is there any significant influence between student learning style and perceived usefulness on the educational games platform?
- iii. Is there any significant influence between student learning style and perceived ease of use on the educational games platform?
- iv. Is there any significant influence between student learning style and behavioral intention to learn via online educational games platform mediated by perceived usefulness and perceived ease of use?

Hypotheses

- H1: Student learning style will influence the perceived usefulness
H2: Student learning style will influence the perceived ease of use
H3: Student learning style will influence the behavioral intentional to learn via online educational games platform mediated by perceived usefulness
H4: Student learning style will influence the behavioral intentional to learn via online educational games platform mediated by perceived ease of use

3.0 Methodology

This quantitative study employed Technology Acceptance Model (TAM) and Selmes Learning Inventory to develop the questionnaire. Questionnaire has been distributed to the undergraduate students across field of study in a private higher institution in a state of Perak, Malaysia. This institution have been selected as the research location due to the large number of undergraduate student among private institution in Malaysia.

There were 240 undergraduates from science and social sciences stream involved as the respondents. Data obtained from the completed questionnaire will be inputted into the excel sheet. Thereafter exported to the PLS-SEM software version 3.0 to generate descriptive and inferential analysis.

4.0 Results and Discussions

Analysis of empirical results

As shown in Table 1, out of 240 respondents, 70% of them are female students. Majority of them are first-year undergraduates obtained foundation qualification.

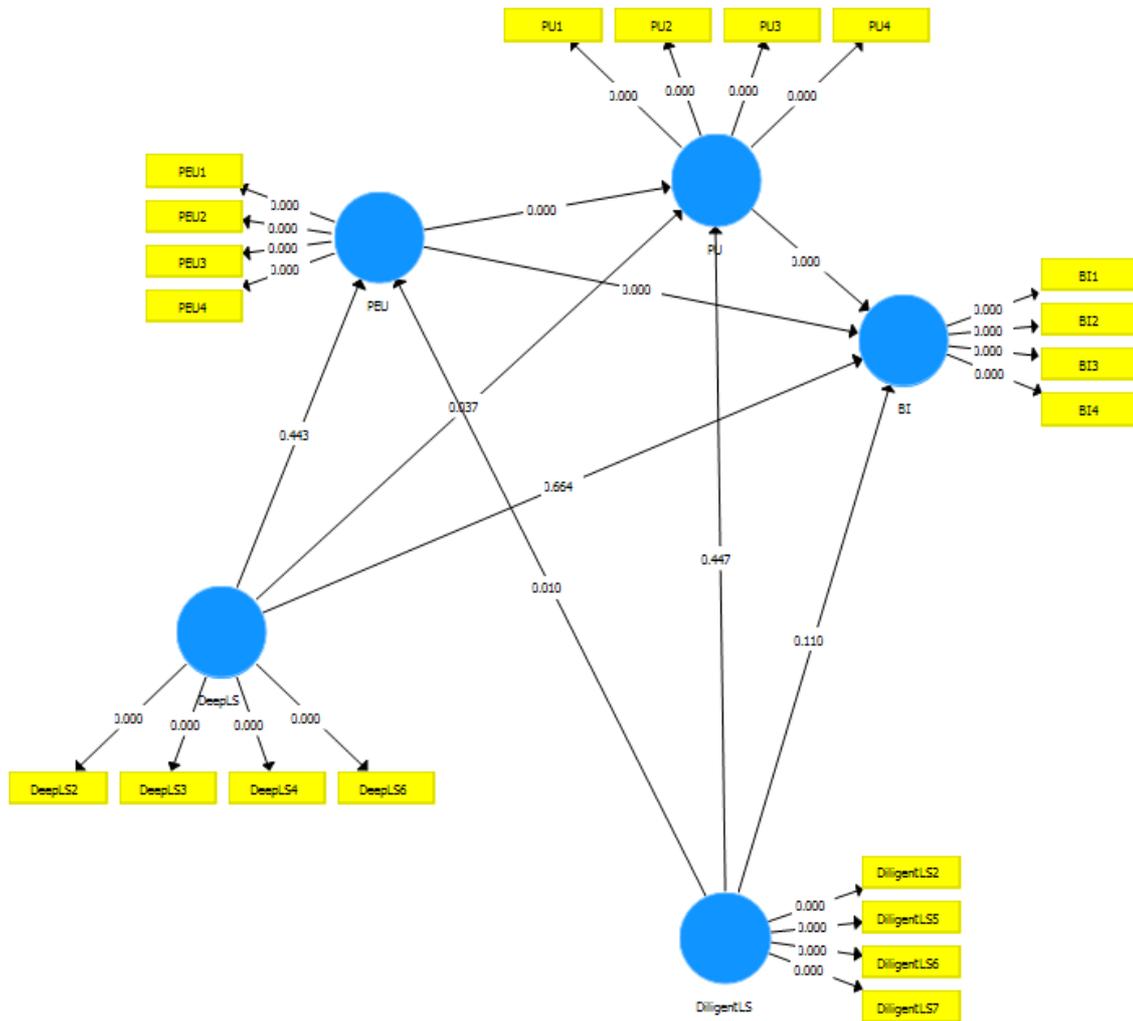
Table 1. Respondent's Profile

Demographic profiles		%
Gender	Male	30.4
	Female	69.6
Latest Educational Level	UEC	5.8
	STPM	10
	Diploma	5.4
	Foundation	54.6
	Others	24.2
Years of Study	1	57.5
	2	36.7
	3	5.4
	4	0.4

Results of the model's assessment

The proposed model as described in Figure 2 has a good fit by the sample data set as the Standardized Root Mean Square (SRMR) the estimated model is $0.066 > 0.008$ (Henseler et al., 2016).

Figure 2. Proposed model



As shown in Table 2, the indicators' loadings for all the latent constructs of the model are significant at 99.99% confidence level via bootstrapping procedure with 5000 subsamples of the original sample data set In all constructs of the model. Besides, Cronback's α , Dijkstra-Henseler's rho, composite reliability and Average Variance Extracted (AVE) for all the latent constructs of the proposed model are 0.7 or more. It shows that the scales used in all the model constructs have a good convergent validity. Based on variance inflation factor (VIF) computed among indicators in each model construct, there is no critical collinearity problems in the proposed model as all VIF values < 5 (Hair et al., 2018).

Table 2. Convergent Validity

Latent Variable	Indicators	Standard Loading	t-statistics	p value	Cronbach's α	Rho_A	Composite Reliability	AVE	VIF
Deep Learning Style					0.700	0.701	0.807	0.513	
	DeepLS2	0.652	3.795	0.00					1.332
	DeepLS3	0.725	4.214	0.00					1.556
	DeepLS4	0.783	5.469	0.00					1.349
	DeepLS6	0.698	3.887	0.00					1.202
Diligent Learning Style					0.716	0.746	0.820	0.536	
	DiligentLS2	0.632	3.671	0.00					1.222
	DiligentLS5	0.678	4.179	0.00					1.406
	DiligentLS6	0.787	7.267	0.00					1.385
	DiligentLS7	0.815	7.525	0.00					1.498
Perceived Usefulness					0,911	0,917	0,937	0,790	
	PU1	0.847	24.735	0.00					2,468
	PU2	0.915	60.426	0.00					3,524
	PU3	0.927	74.526	0.00					3,833
	PU4	0.864	36.165	0.00					2,378
Perceived Ease of Use					0.925	0.755	0.892	0.896	
	PEU1	0.879	47.323	0.00					2.450
	PEU2	0.842	24.896	0.00					2.271
	PEU3	0.884	42.838	0.00					2.743
	PEU4	0.868	44.179	0.00					2.266
Behavioral Intention					0.935	0.783	0.908	0.909	
	BI1	0.875	37.142	0.00					2.468
	BI2	0.856	27.089	0.00					2.382
	BI3	0.906	64.458	0.00					4.060
	BI4	0.903	61.540	0.00					3.969

In Table 3, as diagonal elements are larger than off-diagonal elements in Fornell-Larcker criterion analysis and Heterotrait-monotrait ratios (HTMT) between two constructs are <0.9, all constructs in the proposed model have satisfactory discriminant validity (Hair et al., 2016)

Table 3. Discriminant Validity

Construct	Fornell-Larcker criterion analysis					Heterotrait-Monotrait (HTMT)				
	BI	Deep LS	Diligent LS	PE U	PU	BI	Deep LS	Diligent LS	PE U	P U
BI	0.885									
DeepLS	0.127	0.716				0.155				
Diligent LS	0.068	0.354	0.732			0.082	0.528			
PEU	0.696	0.131	0.214	0.869		0.767	0.167	0.248		
PU	0.695	0.211	0.173	0.775	0.889	0.759	0.258	0.207	0.850	

In relation to the influence of students' learning style on the perceived usefulness of the online educational game platform, from the path coefficients and their corresponding p values generated by bootstrapping with 5000 resamples in Table 4, only deep learning style has significant effect on the perceived usefulness of online educational game platform at 0.05 significance level. Besides, only diligent learning style has significant effect on the perceived ease of use on online education game platform.

Table 4. Path coefficients between latent variables

Path	Standardized Estimate	t statistics	p value
Deep Learning Style -> Behavioral Intention	0.026	0.434	0.664
Deep Learning Style -> Perceived Ease of Use	0.063	0.767	0.443
Deep Learning Style -> Perceived Usefulness	0.123	2.086	0.037
DiligentLS -> Behavioral Intention	-0.096	1.598	0.110
DiligentLS -> Perceived Ease of Use	0.192	2.568	0.010
DiligentLS -> Perceived Usefulness	-0.035	0.760	0.447
Perceived Ease of Use -> Behavioral Intention	0.415	4.426	0.000*
Perceived Ease of Use -> Perceived Usefulness	0.766	21.520	0.000*
Perceived Usefulness -> Behavioral Intention	0.385	4.200	0.000*

Table 5. Mediating effects test

Path	Standardized Estimate	t statistics	p value
Deep Learning Style -> Perceived Ease of Use -> Behavioral Intention	0.026	0.704	0.481
DiligentLS -> Perceived Ease of Use -> Behavioral Intention	0.080	2.122	0.034
Deep Learning Style -> Perceived Usefulness -> Behavioral Intention	0.047	1.667	0.095
DiligentLS -> Perceived Usefulness -> Behavioral Intention	-0.013	0.738	0.461
Deep Learning Style -> Perceived Ease of Use -> Perceived Usefulness -> Behavioral Intention	0.019	0.766	0.444
Perceived Ease of Use -> Perceived Usefulness -> Behavioral Intention	0.295	4.315	0.000
DiligentLS -> Perceived Ease of Use -> Perceived Usefulness -> Behavioral Intention	0.057	2.087	0.037
Deep Learning Style -> Perceived Ease of Use -> Perceived Usefulness	0.048	0.769	0.442
DiligentLS -> Perceived Ease of Use -> Perceived Usefulness	0.147	2.529	0.011

As shown in Table 5, there are significant indirect effects between diligent learning style on perceived ease of use on online educational game platform and perceived ease of use on the students' behavioral intention to learn via online educational game platforms. Thus, the influence of diligent learning style on the students' behavioral intention to learn via online educational game platform is mediated by perceived ease of use.

5.0 Conclusion

Based on the results, it can be concluded that students have deep and diligent learning styles. It is also cleared that perceived usefulness and perceived ease of use do influence the students' perception with deep and diligent learning styles on their behavioral intention to learn via online educational game platforms. Implications of this study indicates that students with deep and diligent learning style are interested and motivated to learn via online educational game platforms such as Kahoot, Blendspace. Thus, this will make teaching and learning process run smoothly and effectively. Educators could plan for more online educational games based learning in the lecture or tutorial class to encourage students to participate actively in their studies.

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