Behavioural E-Learning Adoption among Higher Education Institution Students: A Possibility for Mentawaian Students Living in Contemporary Culture

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Abstract: This study aims to investigate the influence of personalization, responsiveness, controllability, and two-way communication on perceived ease of use and perceived usefulness. besides, this study also determines the influence of perceived ease of use and perceived usefulness on students' intention to participate in e-learning. Besides that the study also glances at a possibility of development of e-learning for Mentawaian students living in contemporary culture. Forty-four students were participating in this study and SEM-PLS is used to analyse the primary data collected through on-line survey. Ten hypotheses were developed. The study results in five hypotheses are supported and the rest rejected. The result show that personalization significantly effects on perceived ease of use and perceived usefulness. In addition, the controllability is positively related to perceived usefulness. Further, two-way communication is also positively associated with perceived ease of use. Finally, the perceived ease of use positively determines the students' intention to participate in e-learning. This study provide contribution to Technology acceptance model by extending this theory. Practically, this study highlights some findings which are contribute to the university management and they discuss in detail.

1 RESEARCH BACKGROUND

World is currently marked by new economy. (Cidral et al. 2018) argue that the new economy is characterised by the revolution of information technology (IT), reinventing of the classroom and etc. In fact, the great availability of devices to access the internet (e.g. computers, tablets, laptop and smartphones) and the population and access to the World Wide Web (www) learning utilizing e-learning practices has broadened quickly (Cidral et al. 2018). In addition, (Al-gahtani 2014) add that technology (the internet and network) transformed our world into ubiquitous connectivity. Thus, development on IT has brought about e-applications. (Alsabawy et al., 2016). System of E-learning is a system which enables the 21st-century education and it has a big effect on the educational environment (Aparicio et al., 2016). There is increasing dependents on e-learning usage to accommodate the knowledge transfer and generation in workplace (Fleming, Becker, and Newton 2017).

An e-learning can be defined as an information system in which various teaching-materials like text, video and audio media can be integrated are delivered in online learning (discussion, email and assignment (Lee et al., 2011). In addition, (Y. Cheng 2011) also defines that e-learning is a device employing the computer and instrument network such as extranets, internets and internet to convey the learning materials to learners. Such learning may return to the beginning of 1980's in which subjects on television were offered. The online learnings so-called virtual or distance learning were developed because technology and information develop fast. (Fleming, Becker, and Newton 2017). E-learning systems give chance to students to study regardless of place and time, and support them with new teaching methods (Alhabeeb and Rowley, 2018). Through E-learning, students also gain new techniques of learning, and lecturers can convey a learning guidance using audio, video, animation, text, and pictures, and can give online feedback and spaces on learning. (Abdullah and Ward, 2016). (Clay et al., 2008) argue that in order to be successful applying the devices and procesures, it depends on intention of students to

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receive or refuse the tool and systems. There have been many universities in the world implementing e-learning (Garrison, 2011), one of which is Bung Hatta University, Indonesia (Khairuddin et al. 2018). Unfortunately, even though e-learning gives benefits, the students and lecturers still use it in low level (Bhuasiri et al., 2012) included its use at Bung Hatta University (Khairuddin et al., 2018).

There are bundle of studies investigating the behavioural intention of using the e-learning (Cheng, 2014; Zhang et al., 2012; Roca et al., 2006; Rui-Hsin and Lin, 2018; Cheung and Vogel, 2013; Timothy, 2011; Khairuddin et al., 2018; Sánchez et al., 2013; Fleming et al., 2017; Abdullah and Ward, 2016; Al-Gahtani, 2016; Alhabeeb and Rowley, 2018; Alsabawy et al., 2016; Aparicio et al., 2016; Ching-Ter et al., 2017; Cidral et al., 2018; Hubalovsky et al., 2019; Khasawneh, 2015; Kimiloglu et al., 2017; Cheng, 2011; Bhuasiri et al., 2012). Based on previous studies, there is very limited studies investigating in Indonesia's environment. In addition, most of studies used the teachers, instructors and lecturers as research object and there is lack of studies using the students as object of research (Abdullah et al., 2016; Cheng, 2014; Rui-Hsin and Lin, 2018; Cheung and Vogel, 2013; Sánchez et al., 2013; Ali et al., 2018). Besides, studies which employ the external factors to technology acceptance model (TAM) variables are also lack. In addition, studies using an Indonesia's environment have seldom used the students as research object. Therefore, there is gap in literature. It needs further investigation in this field.

E-learning system participation is considered as adoption of technology. Several theories discuss adoption of the technology in organization and individual level, such as innovation diffusion theory (Rogers, 1962), and reason action theory (Fishbein and Ajzen, 1977), theory of plan behaviour (Ajzen, 1991), task-technology fit (Goodhue and Thompson, 1995). This research applies the model of technology acceptance (Venkatesh and Davis, 2000) and plan behaviour theory (Ajzen 1991). Theory of plan behaviour (Ajzen 1991) predicts that intention determines behaviour to behave. Additionally, determinants of intention to behave involves attitude on technology, subjective norm and control of perceived behaviour (Ajzen 1991). Based on model of technology acceptance (Venkatesh and Davis 2000), perceived ease of use and perceived usefulness determine acceptance of technology. (Abdullah and Ward 2016) and (Ching-ter, Su, and Hajiyev 2017) conclude that there are external variables influencing the variables of TAM. Experience,

subjective norm, enjoyment, computer anxiety and self-efficacy are used as antecedents of perceived ease of use (PEU) and perceived usefulness (PU) variable. (Y. Cheng 2011) classified the antecedents of PEU and PU into social, factors, and individual factors. (Al-Gahtani, 2016) involve the variables of subjective norm, image, job relevance, output quality, result demonstrability as determinants of PU. PEU determinants are computer self-efficacy, perception of external control, computer anxiety, and computer playfulness (Al-gahtani 2014). Only (Y. M. Cheng 2014) proposed a different external factors to PEU and PU: personality, controllability, two-way communication and responsiveness as antecedents of PEU and PU. This model is not yet applied in Indonesia's education environment and therefore, this study's objectives are to investigate the effect of these four external factors (personality, controllability, two-way communication and responsiveness) on PEU and PU. In addition, this research also determines the influence of PEU and PU on students' intention to participate in the system of e-learning. This paper is organised as follow (i) background, (ii) method and material, (iii) result and discussion, and (iv) conclusion and recommendation.

In the learning context, personalization deals with transmitting the learning contents that suit particular individual through the electronic learning system (Y. M. Cheng 2014). Therefore, personalised e-learning system is perceived as more useful (Baylari and Montazer 2009) and provides student with robust guidance mechanism, such as adaptive navigation support, curriculum ordering, tailored presentation and etc. (Papanikolaou et al. 2002). In addition, Controllability, in the context of learning, refers to students' capability to manage time, content and communication stream by means of e-learning system (Y. M. Cheng 2014). If the students think that they can manage the e-learning system, they believe that the e-learning is more useful and easy to use (Pituch and Lee 2006). Further, responsiveness refers to the extent to which students discern that the reaction from the learning system is consistent, fast and reasonable (Pituch and Lee 2006). If the students notice that the system is so, they are aware of system response useful and easy to use (Pituch and Lee 2006). Moreover, the ability of reciprocal communication between lecturer and students are suggested definition of two-way communication in the learning context (Pituch and Lee 2006) and they add that if this type of communication occurs, student will feel that the e-learning is useful and easily used. If it is usefully perceived and easily used, the students will create an intention to participate in the system of e-learning

(Abdullah and Ward 2016; Cheng 2011; Ching-ter, Su, and Hajiyev 2017; Al-gahtani 2014). Based on explanation above, we proposed the research framework as follow.
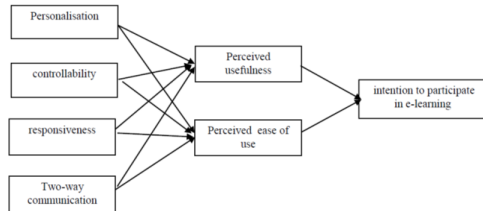

Figure 1: Research Framework

2 MATERIAL AND PROPOSED METHODS

This research uses the students in the semester six and above who are registered in faculty of business and economics and education as research object. Data in this research is primary data that gathered through online survey. The research uses intention to participate in e-learning as dependent variable and personalization, controllability, responsiveness, two-way communication, perceived ease of use, and perceived usefulness as independent latent variables. Intention to participate in e-learning has three items which developed by (Bhattacherjee, 2001; Roca et al., 2006). PEU and PU consist of three items each (Davis, 1989; Ngai et al., 2007). In addition, personalization has four items which was developed by (Papanikolaou et al., 2002; Wu and Guohua, 2006). Further, controllability has three items (Liu, 2003; Wu and Guohua, 2006). Thus, responsiveness also has three items (Liu, 2003; Pituch and kuei Lee, 2006; Song and Zinkhan, 2008). Finally, two-way communication employ four items (Liu 2003; Song and Zinkhan 2008). Five-scale Likert is used to measure all constructs. Structural Equation Modeling is used to run data. Smart-pls is employed due to benefit of smart-pls (Chin et al., 1998). It has two assessments: measurement model and structural model assessments (Hair Jr et al., 2017). Measurement model assessment has two criteria's: convergent validity and discriminant validity. Convergent validity is assessed using four properties (Hair et al., 19). In addition, Fornell-Lacker criterion (Fornell and Larcker, 1981)(Fornell and Larcker 1981) and cross-loading (Hair et al. 2017) are applied as base for discriminant validity evaluation. Further, value of Q square and R square is used to assess the structural

model. Acceptance or rejection of The hypotheses is based on the value of path coefficient and p-value. At last, the hypotheses are connected qualitatively with learning-culture of Mentawaian students to see a possibility for developing the e-learning in Mentawai.

3 RESULT AND DISCUSSION

This session would be discussed about result and discussion: demographic data, measurement model assessement, and structral model assessment. The result begins with demographic data. Table 1 provide us with data of gender, age, semester, CGPA and department of respondents. Based on gender, respondents are dominated by female respondents (86.36%). With regard to age, most of respondents is age of 21 to 22 years old (65.91%). Further, respondents are dominated by students in fourth and sixth semester. Based on CGPA, most of students is with CGPA of 3.00-3.50 (45.45%). Finally, respondents mostly are from accounting department, faculty of economic and business.

Table 1: Demographic Variables

Dem var	Category	Count	%
Gender	Female	38	86.36
	Male	6	13.64
	not answer	0	0
Age	19 to 20 years old	9	20.45
	21 to 22 years old	29	65.91
	23 to 24 years old	3	6.82
	¿ 24 years old	2	4.55
	not answer	1	2.27
Semester	4th to 6th	40	90.91
	7th to 9th	3	6.82
	¿ 9th	1	2.27
	not answer	0	0
CGPA	2.50 to 3.00	6	13.64
	3.01 to 3.50	20	45.45
	3.51 to 4.00	15	34.09
	not answer	3	6.82
Department	Accounting	38	86.36
	Elementary school teacher training	1	2.27
	Management	2	4.55
	English training	2	4.55
	not answer	1	2.27

Table 2 demonstrates the assessment result gained from measurement model (convergent validity). Based on outer loading, all items from all constructs have outer loading value which is bigger than 0.700. and it can be concluded that these value support the convergent validity (Hulland, 1999). Internal consistency of indicator is second criteria of convergent validity (CV). The consistency is determined by using Cronbach's Alpha (CA) and composite reliability (CR). Thus, the result show that value of CA and CR for all constructs is above 0.700 and it support the convergent validity (Bagozzi and Yi, 1988). Dealing with the average variance extracted (AVE), the result indicates that all constructs have the value of AVE exceed the

cut-off value, 0.500 (Bagozzi and Yi 1988). Based on four SEM properties above, it can be concluded that convergent validity requirement has been reached.

Table 2: Convergent Validity

Construct	items	outer loading	CA	CR	AVE
Intention to participate in e-learning	itp1	0.935	0.899	0.936	0.831
	itp2	0.923			
	itp3	0.875			
Controllability	con1	0.835	0.772	0.866	0.683
	con2	0.779			
	con3	0.863			
Personalization	per1	0.818	0.852	0.9	0.693
	per2	0.82			
	per3	0.887			
	per4	0.803			
perceived ease of use	peu1	0.86	0.875	0.923	0.801
	peu2	0.926			
	peu3	0.898			
perceived usefulness	pu1	0.898	0.873	0.922	0.798
	pu2	0.893			
	pu3	0.888			
Responsiveness	res1	0.862	0.882	0.927	0.81
	res2	0.896			
	res3	0.941			
two way communication	twc1	0.827	0.861	0.905	0.704
	twc2	0.909			
	twc3	0.777			
	twc4	0.838			

The result of second assessment (discriminant validity) of measurement model is presented in Table 3. In this case, we use the Fornell-Lacker criterion. Fornell-Lacker criterion must be reached by comparing the square root of a construct (Fornell and Larcker 1981). For example, the square root of controllability is 0.826 (bold) and this value is greater than correlation between controllability with other construct, such as intention to participate in e-learning (0.800), perceived ease of use (0.671) and so on. Thus, it can be concluded that the discriminant validity requirement is reached.

Table 3: Fornell-Lacker Criterion

Const	1	2	3	4	5	6	7
CON(1)	0.83						
ITP (2)	0.8	0.91					
PEU (3)	0.67	0.78	0.9				
PU (4)	0.79	0.73	0.84	0.89			
PER(5)	0.79	0.78	0.85	0.92	0.83		
RES (6)	0.82	0.74	0.68	0.82	0.86	0.9	
TWC(7)	0.79	0.82	0.81	0.76	0.84	0.78	0.84

Second criteria for discriminant validity is cross-loading. Table 4 provide us with result of discriminant validity assessment (cross-loading). Cross-loading is assessed by determining the loading of an indicator (item) to its assigned construct is higher compared to its loading to other construct (Hair et al., 2017). For example, loading of item of itp1, itp2, and itp 3 (ITP is its assigned construct) are higher to ITP (bold, 0.935, 0.923, and 0.875) compared to other constructs, such as PEU (0.627, 0.637, and 0.839). These values show that the discriminant validity is reached.

Second smart-pls assessment is structural model evaluation. It is to test hypothesis and about the

Table 4: Cross Loading

Items	CON	ITP	PEU	PU	PER	RES	TWC
itp1	0.779	**0.935**	0.627	0.622	0.683	0.695	0.687
itp2	0.74	**0.923**	0.637	0.643	0.706	0.698	0.741
itp3	0.674	**0.875**	0.839	0.713	0.738	0.64	0.791
con1	**0.835**	0.722	0.606	0.68	0.628	0.563	0.658
con2	**0.779**	0.618	0.405	0.464	0.513	0.685	0.559
con3	**0.863**	0.643	0.611	0.75	0.773	0.784	0.716
per1	0.668	0.687	0.609	0.738	**0.818**	0.816	0.694
per2	0.678	0.721	0.795	0.76	**0.82**	0.679	0.767
per3	0.717	0.644	0.773	0.845	**0.887**	0.692	0.698
per4	0.553	0.555	0.648	0.699	**0.803**	0.691	0.625
peu1	0.524	0.695	**0.86**	0.613	0.695	0.516	0.788
peu2	0.596	0.666	**0.926**	0.826	0.813	0.675	0.651
peu3	0.678	0.739	**0.898**	0.82	0.778	0.625	0.73
pu1	0.763	0.705	0.664	**0.898**	0.864	0.866	0.673
pu2	0.69	0.597	0.7	**0.893**	0.73	0.652	0.591
pu3	0.647	0.647	0.89	**0.888**	0.851	0.665	0.775
res1	0.675	0.612	0.575	0.647	0.731	**0.862**	0.604
res2	0.719	0.635	0.58	0.805	0.808	**0.896**	0.725
res3	0.804	0.753	0.666	0.756	0.785	**0.941**	0.767
twc1	0.579	0.587	0.79	0.655	0.718	0.572	**0.827**
twc2	0.65	0.724	0.823	0.66	0.759	0.604	**0.909**
twc3	0.663	0.675	0.485	0.558	0.636	0.691	**0.777**
twc4	0.786	0.786	0.561	0.683	0.682	0.795	**0.838**

relationship among latent variables as indicated by Table 5. Before presenting the hypotheses result, the Q square and R square should be interpreted firstly. Q square shows the predictive relevance of the model. In this study, the value of Q square is ranging from 0.460 to 0.590 and they fall into large predictive relevance categories (Henseler et al., 2009). It means that the structural model is very much relevance. In addition, R square is predictive power of structural model. Maximising of R square of endogenous variables is objective of the SEM-PLS (Chin 1998). R square of intention to join e-learning and perceived ease of use endogenous constructs is 0.633 and 0.663 respectively, and they are classified into moderate predictive power of structural model (Hair et al., 2014). R square of other endogenous construct (perceived usefulness) is 0.854 and it fall into substantial predictive power (J. Hair et al. 2014).

Table 5 presents hypotheses testing result.. P-value and path coefficient is used to see whether the hypothesis is supported or not supported. The significant level (1%, 5%, or 10%) or two tail of t-statistic (2.58, 1.96 or 1.645 respectively) (J. Hair et al. 2014). Relationship; positive or negative relationship is known through path coefficient. The result indicates that five hypotheses are supported. First, the personalization has significantly effect on PEU (β=0.811, p-value=0.000) as well and it can be concluded that H1 is supported. Second, the association between personalization and perceived usefulness is positively significant (β=0.813, p-value=0.000) and H2, therefore, is supported. Third, the effect of controllability on PU (β=0.180, p-value=0.036) is positively significant (H4 supported). Fourth, two-way communication

Table 5: Assessment of Structural Model

Endogenous construct	Q2	Dec.	R2	Dec.
intention to participate in e-learning	0.46	large	0.633	moderate
perceived ease of use	0.468	large	0.663	moderate
perceived usefulness	0.59	large	0.854	substantial
relationship	**path coef**	**t stat**	**p value**	**concl**
controllability — > perceived ease of use	-0.031	0.184	0.854	not supported
controllability — > perceived usefulness	0.18	2.107	0.036**	supported
perceived ease of use — > intention to participate in e-learning	0.577	2.332	0.020**	supported
perceived usefulness — > intention to participate in e-learning	0.245	0.836	0.404	not supported
personalization — > perceived ease of use	0.811	4.422	0.000***	supported
personalization — > perceived usefulness	0.813	3.58	0.000***	supported
responsiveness — > perceived ease of use	-0.295	1.322	0.187	not supported
responsiveness — > perceived usefulness	0.056	0.264	0.792	not supported
two-way communication — > perceived ease of use	0.385	2.683	0.008***	supported
two-way communication — > perceived usefulness	-0.103	0.665	0.507	not supported

Note: ***, ** and * (significant level at 1%, 5% and 10% respectively)

and perceived ease of use is positively significant (β=0.385, p-value=0.008) and H7 is supported. Finally, PEU and intention to participate in e-learning have positive related (β=0.577, *p*-value=0.020) and the ninth hypothesis is supported. Structural model is indicated in the following Figure 2.
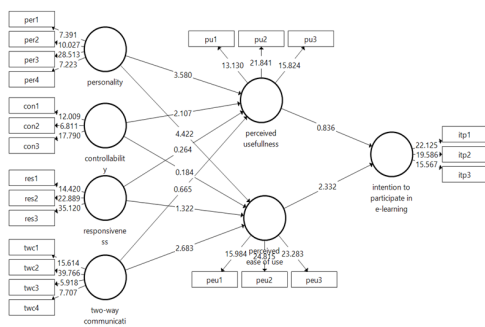

Figure 2: Structural Model

The positively significant effect of personalization on PEU and PU is consistent with finding of (Y. M. Cheng 2014). PEU and PE are achieved if the content of learning-system content being conveyed to the student is customised with the students' tastes. Such system would provide students with strong guidance mechanisms (Papanikolaou et al., 2002), such as adaptive navigations support, good material presentation, and curriculum sequencing. Therefore, the students feel the system useful and easy to use (Baylari and Montazer, 2009). (Y. M. Cheng 2014) also supports that controllability has positive effect on PU. The e-learning system has been perceived by student as useful due to the system is manageable, suitable and interesting content, and facilitating the stream of communication (Pituch and kuei Lee, 2006) because the student is able to do so. Therefore, the e-learning system of Bung Hatta University is perceived as useful (Pituch and Lee 2006; Y. M. Cheng 2014). Further, the significant association between two-way communication and perceived ease of use is also in line with (Y. M. Cheng 2014). Bung

Hatta university's e-learning has facilitated reciprocal communication between lecturers and students and this type of communication has been happening in the system. Some students are derived from Mentawai. Observations qualitatively show that there is no any complaint with the system. They follow and enjoy the system which makes them easier to understand lectures. Even though they are stereotyped as students from underdeveloped region, they can follow the higher education system. They have got used to "playing" with internet in their home region before they are sent to higher education. Therefore, the students feel that it is easy to use the e-learning system easy to use (Pituch and Lee 2006). Finally, the significant effect of perceived ease of use on intention to participate in e-learning is supported by (Abdullah and Ward 2016; Al-gahtani 2014; Y. M. Cheng 2014; Ching-ter, Su, and Hajiyev 2017). Students' intention to participate the e-learning class will increase if the system is easy to use.

4 CONCLUSION AND RECOMMENDATION

The industry revolution has changed the way things done, including teaching (e-learning). The important of learning has been raised by many experts. The intention to participate in e-learning very much depends on lecturers, students and support by prior-to-higher education environment of internet-development. There are few perspectives why an intention to use or participate in e-learning are varying from one lecture or student to another, such as technology acceptance model. In addition, technology acceptance model variables is influenced by external variables, such as personalization. However, there is lack of studies in Indonesia's learning environment investigating the effect of external factors on TAM's variables (perceived ease of use and perceived usefulness) and their impact on student's intention to participate in e-learning. we find that personalization has a positive relationship with perceived ease of use and perceived usefulness. In addition, we also documented the significant effect of controllability and perceived usefulness. Further, two-way communication also has a significant association with perceived ease of use. Finally, the perceived of ease of use positively determine an intention of student to participate in e-learning. This result has practical and theoretical implications.

Theoretically, this study presents the overwhelming subscription toward the existing state of the art in e-learning literature, especially students' intention to participate in e-learning. This paper provides with high point of the existing effect of personalization, controllability and two-way communication on TAM's variables. in addition, this paper also spotlights the relationship between perceived ease of use and students' intention to participate in e-learning. In addition, the implication of the positively significant relationship between controllability and perceived usefulness is that to increase the perceived usefulness of e-learning among students, the university management can improve the manageability, suitability, interested e-learning system, and the system provide the stream communication. Third, the positive effect of two-way communication and perceived ease of use of e-learning system implies that to improve perceived ease of use of the e-learning system by designing the system with reciprocal communication. Finally, University management can escalate the students' intention to participate in e-learning by improve the perceives ease of use: taking care of the personalized and two-way communication equipped e-learning system.

A number of caveats need to be noted regarding the present study. First, this study uses a limited sample size and it might not be gaining the rigorous result. Second, this study sees the students' intention to participate in e-learning from external factors of TAM's variables. Finally, this study did not test the mediating role of TAM's variables between external factors and the students' intention to participate in e-learning. Therefore, it is recommended that further research be undertaken in the following areas. First, future study can increase the number of students involving Mentawaian students in this study. Second, the students' intention to participate in e-learning also can be investigated using other perspective or theory, such as social cognitive theory. Finally, other future study also can investigate the role of perceived ease of use and perceived usefulness as mediator between external factors and TAM's variables.

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