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Investigating University Student's Acceptance of Moodle

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Abstract The Indonesian government has temporarily closed higher educational institutions across the country and changed the learning activity to distance learning to prevent further spread of coronavirus disease 2019 (COVID-19). Various universities, including the State Islamic Institute of Jember, try to adopt Moodle as a learning management system during this COVID-19 pandemics situation. This study aims to take TAM (technology acceptance model) as a basic and include prior experience, enjoyment, facilitating conditions, self-efficacy, and subjective norm as a new external variable in predicting students' acceptance and use of Moodle. SPSS 25.0 was used for the quantitative analysis. Data collected were analyzed using descriptive statistics of Mean and Standard Deviation. Multiple regression analysis was conducted to test the hypothesis of structure model. A total of 217 college students were involved in this study. These students had been using Moodle for at least six months. The results of this study confirm the original TAM's findings and reveal that the Moodle was well accepted. Prior experience, enjoyment, facilitating conditions, self-efficacy, and subjective norm had significantly positive impacts on students' perception of usefulness and perception ease of use.

Keywords: Covid-19, Moodle, Higher education, Learning management system, Technology acceptance model

INTRODUCTION

Moodle (Modular, Object-Oriented, Dynamic, and Learning Environment) is one of the learning management systems that has been most used. In October 2020, there were 234,000,000 Moodle users and 30 million courses in 159,000 registered and verified sites (Moodle, 2020). Moodle is a form of education that uses Information and Communication Technology (ICT), which is a new trend in the present day (Susantini et al., 2021; Lukšėnienė et al., 2014). Moodle is provided freely for the public as open-source under the terms of the GNU General Public License. Moodle, is a learning management system (LMS) used to host the courses, manage learning resources, and conduct assessments to evaluate students'

learning (Kuromiya et al., 2022). Nowadays, Moodle has high global acceptance (Costello, 2013) and commonly used in higher education in this online era (Teo et al., 2019). Moodle is one of the most innovative and structured internet-based learning media (Angriani & Nurcahyo, 2019). Moodle has been translated into more than 120 languages, and it can be adjusted to the users' needs (Hasan, 2019). Students can connect with learning materials anytime and anywhere, and use the software on any devices (Lonn & Teasley, 2009; Carvalho et al., 2011). Moodle created by using sound pedagogical principles to assist the lecturer in generating effective online learning (Beatty & Ulasewicz, 2006). Moodle serves multiple core features for the teaching and learning process. Moodle is also used in many research for classroom instruction (Jitpaisarnwattana et a;., 2022; Lagmay & Rodrigo, 2022; Buchner et al., 2022; Bates & Ludwig, 2020).

The course home page of Moodle is a very efficient learning media (Chung & David, 2015; Deng et al., 2017). In comparison to traditional classroom instruction, the substantial profit of Moodle as e-learning are geographical flexibility, reduction of travel costs (Umek et al., 2017), global learning resources availability, and others learning barriers elimination (Harahap et al., 2019). The communication features in Moodle are incredibly helpful for students to gather information and interact in social negotiation and mediation among themselves in a timely manner. This is relevant for higher education students today in their pursuit to fast feedback, answer, and responses (Teo et al., 2019). Some studies conclude that the use of Moodle as LMS improves students' academic performance (Putri et al., 2020; Kamaruddin & Avianti, 2020; Angriani & Nurcahyo, 2019; Gulbinskienė et al., 2017; Onacan & Erturkm, 2016). Moreover, in general, using an effective LMS may assist students in improving their learning and enhancing their academic performance, particularly in developing the 21st-century skills that are increasingly vital in today's competitive landscape (Nasution et al., 2023; Dewi et al., 2023).

In March 2020, the Indonesian government confirmed the country's first two coronavirus cases. As of October 02, 2020, as many as 295,499 cases have been confirmed in Indonesia, with 10,972 deaths and 221,340 recoveries recorded thus far. The Indonesian government has temporarily closed higher educational institutions across the country and changed the learning activity to the online course to prevent further spread of coronavirus disease 2019 (COVID-19). Moodle is one of the most common LMS used in many Indonesian universities during this time, as in IAIN Jember. This sudden change in a learning activity to an entirely online course force students to use online learning technology. In some higher education institutions such as IAIN Jember, Moodle selected as mandatory LMS to be used in all courses. The new technologies can be unsuccessful because the end-users (students) do not accept or reject them (Al-Assaf, 2015). This may occur for the reason that they find these systems too complicated, which causes enough troubles for them, or they do not figure out any advantage from using these systems (Almarabeh et al., 2014). Hence, a study to predict and explain student acceptance of any technology is crucial.

There are many theories of technology acceptance used to appreciate the perceptions of end-users, i.e. TRA model, several MIS models, and the TAM model (Al-Assaf, 2015). Technology Acceptance Model (TAM) by Davis (1989) is a well-known and suitable model and have empirically verified used as an effective and capable instrument in predicting student approval and use purpose of online learning systems (Zain et al., 2019; Teo et al., 2019; Al-Assaf et al., 2015; Alharbi & Drew, 2014; Rauniar et al., 2014). TAM is covering perceived usefulness (PU) and perceived ease of use (PEU) as two central elements of students' attitudes regarding technology use (Davis, 1989). Subsequent to TAM, other variables have been added to the model to form an extended TAM in the Literature (Wu & Gao, 2011). In this study, we extended the TAM to include additional external variables, such as prior experience (PE), enjoyment (E), facilitating conditions (FC), Self Efficacy (SE), and subjective norm (SN).

Technology acceptance model (TAM)

Davis (1989) developed TAM. TAM is possibly the most broadly applied theoretical model in technology use study (Nasution, 2023; Essel, 2017). Numerous researches have tested TAM as a foundation theory to analyze and investigate the acceptance of technology efficiently. TAM is applied both in the education and non-education field. TAM was used to understand the acceptance of the WWW (Lederer et al., 2000), Facebook (Rauniar et al., 2014), E-government (Hamid et al., 2016), E-portfolios (Abdullah et al., 2016), Whiteboard (Onal, 2017), E-book (Liao et al., 2018), SPSS (Kusumah, 2018), Edmodo Mobile app (Hasanah et al., 2019), LMS (Yalcin & Kutlu, 2019), Edmodo (Zain et al., 2019), and others. TAM develops and validates two specific variables, PU and PEU, as fundamental determinants of student acceptance toward technology use. PEU directly influences PU, and both affect students' AT. AT and PU together influences BI. BI then determines AU (Abdullah & Ward, 2016). PEU, PU, BI, and AU are the standard TAM constructs (Zain et al., 2019).

Perceived ease of use (PEU)

PEU is the degree to which the student considers that using a particular system (Moodle in this study) is free of effort. PEU is an influential aspect for students since an easy to use the system will create to more satisfaction and more frequent use (Essel, 2017). Several studies (Ziraba et al., 2020; Teo, 2019; Rai, 2019; Moakofhi et al., 2019) found that PEU Positively affects the attitude of people towards using technology. Some studies also found a significant positive relationship between the PEU with PU (Moakofhi et al., 2019; Rai, 2019; Teo, 2017; Alharbi et al., 2014), with BI (Moakofhi et al., 2019; Abdullah et al., 2016), and with AU (Alharbi et al., 2014). Past studies have published multiple difficulties correlated with the use of Moodle, such as difficulties in logging into Moodle, enrolling, operating, getting files, submitting tasks and searching learning materials (Carvalho et al., 2011), technical issue, Internet connectivity, and absence of routine updates (Sanchez, 2012), help tool, interface familiarity, materials organization, and visual appearance (Essel, 2017).

Perceived usefulness (PU)

PU is the degree to which the student considers that using a particular system (Moodle in this study) would improve his or her learning performance (Davis, 1989). Davis et al., (1989) discovered that PU is a fundamental cause of people's intentions to use computers. Several studies (Ziraba et al., 2020; Teo, 2019; Zain et al., 2019; Rai, 2019; Moakofhi et al., 2019; Teo, 2017; Esel, 2017) have showed that PU can do a vital aspect in students' attitude towards using a LMS such as Moodle, it shows that students will use Moodle if they find it useful for their learning activity. Thus, students' attitudes about the usefulness of Moodle might have a critical influence on their rate of Moodle use in their cause of learning (Essel, 2017). Hence, we propose:

H1: The Perceived ease of use affects positively perceived usefulness of Moodle.

Attitudes toward using (AT)

Individuals' attitudes (or liking) for particular behaviors can, under some situations, exert a strong influence on their actions (Compeau & Higgins, 1995). Some indicators of students' attitudes toward using Moodle are positive feelings towards the use of Moodle, look forward to those aspects of learning that require the use of Moodle (Teo et al., 2019), hard to stop once start using Moodle, like to use Moodle (Compeau & Higgins, 1995), Moodle makes learning more enjoyable, studying with Moodle is fun (Teo et al., 2017). TAM proposed that PU and PEU are two factors that affect AT in researches focusing on technology. Therefore, the following hypothesis is proposed:

H2: The Perceived ease of use affects positively attitude towards using Moodle.

H3: The Perceived usefulness affects positively attitude towards using Moodle.

Behavioral intention (BI)

BI determines the AU of a particular technology system and consequently specify technology acceptance (Alharbi et al., 2014). BI is a behavioral inclination to keep on using the Moodle technology in the future (Zain et al., 2019). Moakofhi (2019) stated that BI is the degree to which a potential student has formulated prearranged plans to perform or not perform some specified future behavior. The TAM acknowledges BI as the most significant antecedent to technology acceptance behavior, and both AT and PU have a positive impact on BI (Teo, 2019; Almarabeh et al., 2014). PU and PEU mediate the impact of external variables on students' attitude and BI, and then the actual system use (Alharbi et al., 2014). Davis (1989) conclude that BI is the strongest predictor of AU. Hence, the following hypothesis is proposed:

H4: The Perceived usefulness affects positively behavioral intention to use Moodle.

H5: Attitude towards using affects positively behavioral intention to use Moodle.

Actual use (AU)

The AU is the exact state of the use of technology. It is calculated by the regularity and period of using the technology (Zain et al., 2019). Rauniar et al. (2014) define the AU as the frequency of technology used by the student. Yasa (2014) also describes the AU is the actual adoption of a technology, which can be detected in the amount of the commonness and time length of the usage of the technology. Therefore, we measure AU students in this research by way of the time spent by students to use Moodle. Several studies (Zain et al., 2019; Fathema et al., 2015; Al-Assaf et al., 2015) validated that BI positively affects AU of people towards using technology. Thus, we posit that:

H6: Behavioral intention to use affects positively actual using Moodle.

Prior experience (PE)

PE is defined as the total and type of computer skills a student obtains over time (Smith et al., 1999). Thompson et al., (2006) also stated that PE represents the abilities that one achieves through using technology and the exposure to the tool. Students' PE of LMS and feeling about it set the student's opinion of ease of use (Saadé & Kira, 2009). Therefore, students presumably will apply the ability gained from computer experience to perceive the ease of use of the system, which improves their intentions to use the Moodle (Purnomo & Lee, 2012). Acceptance of the e-learning system is affected by an individual's prior computer experience (Lee et al., 2013). Previous studies found that PE affected both students' PEU (Abdullah et al., 2016; Al-Assaf et al., 2015; Lee et al., 2013; Purnomo & Lee, 2012; McFarland & Hamilton, 2006) and PU (Al-Assaf et al., 2015; Lee et al., 2013). Therefore, the following hypothesis is proposed:

H7: The student's prior experience affect positively on Moodle perceived ease of use.

H12: The student's prior experience affect positively on Moodle perceived usefulness.

Enjoyment (E)

E is adapted from Davis et al. (1992) and specified as the degree to which the activity of utilizing a specific system is believed to be enjoyable in its own right, apart from any outcomes resulting from system use. Past researches have informed that TAM is more effective when context concerned variables are examined, for example, enjoyment (Alenezi et al., 2010). Lee (2010) said that E is a primary variable in determining students' participation in an e-learning environment. Previous studies validated that E affected both students' PEU (Abdullah et al., 2016; Wu & Gao, 2011) and PU (Abdullah et al., 2016; Wu & Gao, 2011). The results of a lot empirical researches have confirmed that E is essential in deciding students' acceptance of e-learning systems (Kim et al., 2018; Abdullah et al., 2016). Thus, we propose that:

H8: The student's enjoyment affect positively on Moodle perceived ease of use.

H13: The student's enjoyment affect positively on Moodle perceived usefulness.

Facilitating conditions (FC)

FC is the circumstance at which all the essential facilities, tools, equipment and assistance are supplied to a student to assist the application of a system (Kabir et al., 2017). FC create access to technology resources and availability of technical and administrative supports (Teo et al., 2017). FC in which higher education would be probably to have more resources and assistance would affect the intention to use the system as they will get the required help when they need (Venkatesh et al., 2003). SE will influence a students' PEU of the technology (Priyanto et al., 2017; Teo et al., 2008; Ngai et.al, 2007) and students' PU (Teo, 2010). The results of a lot empirical researches have confirmed that FC is vital in deciding students' acceptance of e-learning systems (Priyanto et al., 2017; Teo et al., 2017; Fathema et al., 2015). Therefore, we propose that:

H9: The student's facilitating conditions affect positively on Moodle perceived ease of use.

H14: The student's facilitating conditions affect positively on Moodle perceived usefulness.

Self-efficacy (SE)

Bandura (1977) stated that SE points to students' awareness of their capability to do particular tasks. In the technology usage context, SE refers to a students' confidence with the information technology in general. SE is an individual evaluation of the ability or competence to perform a task, achieve goals or overcome obstacles (Kustyarini, 2020). SE will influence a students' PEU of the technology (Li, 2020; Fathema et al., 2015; Alenezi et al., 2010) and students' PU (Fathema et al., 2015). If a student feel himself/herself as less capable of using a system (i.e. L.M.S.) than he/she will discover the system as less beneficial and hard to use (Fathema et al., 2015). A student with a high SE will be less likely to be frustrated by technical difficulty; instead, he or she will show perseverance in attempt to resolve the challenges and demonstrate a higher intention to use technology than do those with insufficient SE (Teo et al., 2017). The results of a lot empirical researches have confirmed that SE is essential in deciding students' acceptance of e-learning systems (Park, 2009). Thus, we posit that:

H10: The student's self-efficacy affect positively on Moodle perceived ease of use.

H15: The student's self-efficacy affect positively on Moodle perceived usefulness.

Subjective norm (SN)

Venkatesh et al (2003) stated SN as the person's belief that most people who are important to him think he should or should not perform the behavior in question. SN is similar to social influence (Alwahaishi & Snásel, 2013). A student perceives that the more others who are close to him think he or she should do a behaviour; the more he or she will intend to do so (Yuen & Ma, 2008). SN will influence a students' PEU of the technology (Abdullah et al., 2016; Motaghian et al., 2013) and students' PU (Motaghian et al., 2013; Yuen & Ma, 2008). The results of a lot empirical researches have confirmed that SN is essential in deciding students'

acceptance of e-learning systems (Teo et al., 2019; Abdullah et al., 2016; Farahat, 2012; Park, 2009). Hence, we posit that:

H11: The student's subjective norm affect positively on Moodle perceived ease of use.

H16: The student's subjective norm affect positively on Moodle perceived usefulness.

METHOD

This study used a quantitative methodology approach. Due to COVID-19 pandemics situation, the online survey was the proper tool to use. This research uses an online survey for data collection. The online survey was developed to investigate the relationship between variables proposed in the study hypotheses.

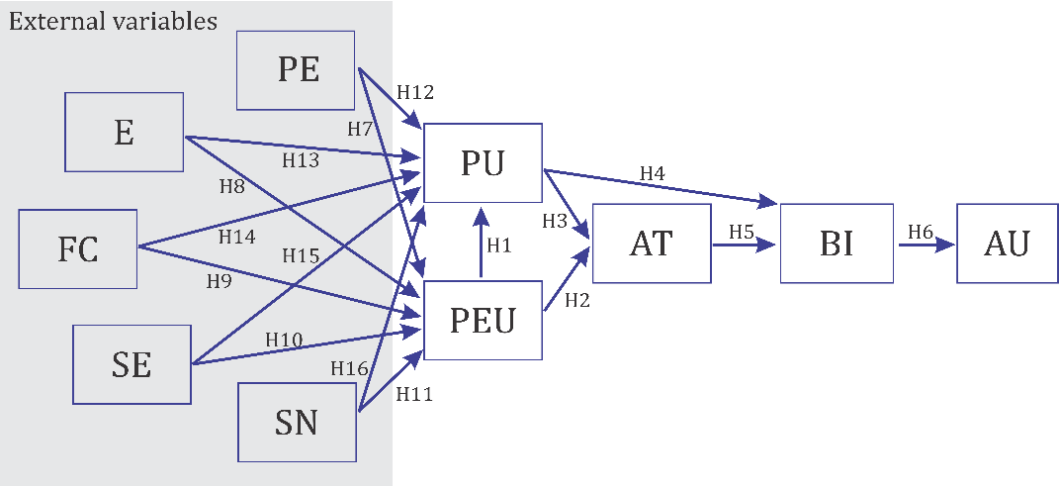

Figure 1. The research model employed in this study and the summary of hypotheses.

Questionnaire and data analysis

The questionnaire used was adapted from the measurement scales applied in TAM (Davis et al., 1989) and from various other literatures (Li & Yu, 2020; Chung & Ackerman, 2015; Alharbi et al., 2014; Rauniar et al., 2014; Purnomo & Lee, 2012; Fathema et al., 2005; Venkatesh, 2000; Fishbein & Ajzen, 1975) with several modifications and the required wording adjustment to suit the context of Moodle usage. The questionnaire items and literature references are listed in Appendix 1. The questionnaire were revised by taking the validation of 2 lecturers who are experts on education. The questionnaire contains 31 questions divided to 4 questions for PEU, 4 questions for PU, 3 questions for AT, 3 questions for BI, 2 questions for AU, 3 questions for PE, 3 questions for E, 4 questions for FC, 3 questions for SE, and 2 questions for SN The data were collected using a five-point Likert Scale (5 = strongly agree/ frequently, 4 = agree/often, 3 = average/occasionally, 2 = disagree/rarely, 1 = strongly disagree/never) for each item.

All statistical analyses were carried out with SPSS Statistics analysis software. The Cronbach's alpha coefficients was calculated to ensure the reliability and internal consistency of the items used for each variable. The value of Cronbach's alpha for the constructs in this study is .93. This prove that all the items in the test present high reliability. Descriptive statistics analysis was performed to calculate the average, and standard deviation of test results. Multiple regression analysis was conducted to test the hypothesis of structure model.

Table 1. Descriptive statistics and cronbach alpha coefficient value.

Variable	Item	Mean	SD	Variance	Min	Max	Alpha
Perceived ease of use	PEU1	3.27	1.270	1.613	1	5	.813
	PEU2	3.37	1.222	1.494	1	5	
	PEU3	3.37	1.156	1.336	1	5	
	PEU4	3.25	1.185	1.403	1	5	
Perceived usefulness	PU1	3.05	1.237	1.530	1	5	.787
	PU2	3.32	1.227	1.507	1	5	
	PU3	3.18	1.094	1.197	1	5	
	PU4	3.52	1.210	1.464	1	5	
Attitudes toward using	AT1	3.71	1.095	1.200	1	5	.781
	AT2	3.66	1.046	1.095	1	5	
	AT3	3.57	1.185	1.404	1	5	
Behavioral intention	BI1	3.72	1.113	1.238	1	5	.889
	BI2	3.55	1.122	1.258	1	5	
	BI3	3.49	1.179	1.390	1	5	
Actual use	AU1	3.62	1.087	1.182	1	5	.958
	AU2	2.91	1.175	1.380	1	5	
Prior experience	PE1	2.35	.637	.406	2	5	.734
	PE2	2.74	.745	.556	2	5	
	PE3	3.16	.813	.661	2	5	
Enjoyment	E1	4.02	1.124	1.263	1	5	.899
	E2	3.89	1.074	1.154	1	5	
	E3	3.87	1.129	1.274	1	5	
Facilitating conditions	FC1	2.86	1.073	1.151	1	5	.883
	FC2	2.78	1.216	1.479	1	5	
	FC3	2.88	1.193	1.424	1	5	
	FC4	2.88	1.190	1.415	1	5	
Self efficacy	SE1	3.48	1.010	1.019	1	5	.745
	SE2	4.01	1.097	1.204	1	5	
	SE3	4.00	1.023	1.046	2	5	
Subjective norm	SN1	4.14	1.086	1.179	1	5	.89
	SN2	3.87	1.064	1.131	1	5	
Total	31 items	3.45	0.66				.934

Participants and data collection

This study was carried out within education faculty at State Islamic Institute of Jember (IAIN Jember, now UIN KHAS Jember) in Indonesia. A sample of 217 students were selected using random sampling technique. These students were using Moodle in all of their courses. Moodle is a mandatory university LMS used in distance learning in times of COVID-19 pandemic. After 6 months using the MOODLE, this survey was conducted.

Majority (42.4%, n=92) of the participants were aged 20 years. This was followed by 19 years (39.2%, n=85), 21 years (14.7%, n=32), 18 years (1.4%, n=3), 22 years (1.4%, n=3), 17 years (.46%, n=1), and 23 years (.46%, n=1). Among the students, 173 (79.72%) were female and 44 (20.28%) were male. 121 participants (55.8%) are student of biology education department, 48 participants (22.1%) are student of social education department, 18 participants (8.3%) are student of Islamic education department, 16 participants (7.4%) are student of English education department, and 14 participants (6.5%) are student of math education department. The participants were picked from all levels in the undergraduate program. However, majority (55.9%, n=115) of them were second year students. The third year students were 41.9% (n=91) and the fourth year students were only 5.06% (n=11).

Majority (62.2%, n=135) of the participants used smartphone or tablet to access Moodle. This was followed by smartphone or tablet and laptop (30.8%, n=67), laptop (4.14%, n=9), smartphone or tablet and pc (1.3%, n=3), smartphone or tablet, laptop and pc (1.4%, n=2), and pc (.46%, n=1). Most (98.6%, n=214) of participants use their personal devices to access Moodle, and the rest (1.3%, n=3) use non personal devices to access Moodle.

FINDINGS AND DISCUSSION

Result

The mean, SD, and correlation of all variables studied are reported in Table 2. The results display that correlation between all variables is significant ($p < 0.05$) and positive except the correlation between E and FC The results also show that the most of r (coefficient of correlation) is higher than 0.5 which implies the correlation between the variables is very strong. It was also found that BI and AU has the highest r value (.95; $p < 0.01$) and E and FC has the lowest r value (.071; $p > 0.5$).

Table 2. Numbers of items, mean, SD, and correlation of all variables.

Variable	Mean	SD	PEU	PU	AT	BI	AU	PE	E	FC	SE	SN
PEU	3.32	0.97	1									
PU	3.27	0.93	.483**	1								
AT	3.65	0.93	.499**	.612**	1							
BI	3.59	1.03	.567**	.583**	.62**	1						
AU	3.26	1.11	.518**	.549**	.638**	.95**	1					
PE	2.78	0.58	.308**	.365**	.376**	.405**	.403**	1				
E	3.93	1.01	.296**	.436**	.549**	.429**	.44**	.295**	1			
FC	2.85	1.01	.193**	.175**	.194**	.178**	.173*	.275**	.071	1		

SE	3.83	0.85	.424**	.554**	.632**	.568**	.55**	.412**	.51**	.214**	1	
SN	4.01	1.02	.289**	.392**	.512**	.423**	.411**	.32**	.535**	.183**	.758**	1

The regression analysis was used to validate the research model by examining the path coefficients. Table 3 shows the regression results for model hypotheses, and table 4 displays the summary of model hypotheses. In the regression matrix there are five parameters: β-Value (Beta) indicates the slope of the relationship, SE-Value of β points the percentage of error that may occur. t is the coefficient divided by its error. P-Value implies the significant of the relationship, and the R2-Value (the coefficient of the correlation or the relation) displays the strength and direction of the relationship (Al-Assaf et al., 2015).

Table 3. Regression results for model hypotheses.

Independent Variable	β	SE of β	t	P	R^2	Dependent Variable
PEU	.465	.058	8.086	.000	.233	PU
PEU	.478	.057	8.45	.000	.249	AT
PU	.608	.054	11.349	.000	.375	AT
PU	.644	.061	10.519	.000	.34	BI
AT	.699	.059	11.857	.000	.395	BI
BI	1.023	.023	44.475	.000	.902	AU
PE	.510	.107	4.744	.000	.095	PEU
E	.283	.062	4.541	.000	.088	PEU
FC	.185	.064	2.882	.004	.037	PEU
SE	.483	.07	6.871	.000	.18	PEU
SN	.274	.062	4.429	.000	.084	PEU
PE	.582	.101	5.741	.000	.133	PU
E	.402	.057	7.106	.000	.19	PU
FC	.162	.062	2.605	.01	.031	PU
SE	.608	.062	9.754	.000	.307	PU
SN	.358	.057	6.247	.000	.154	PU

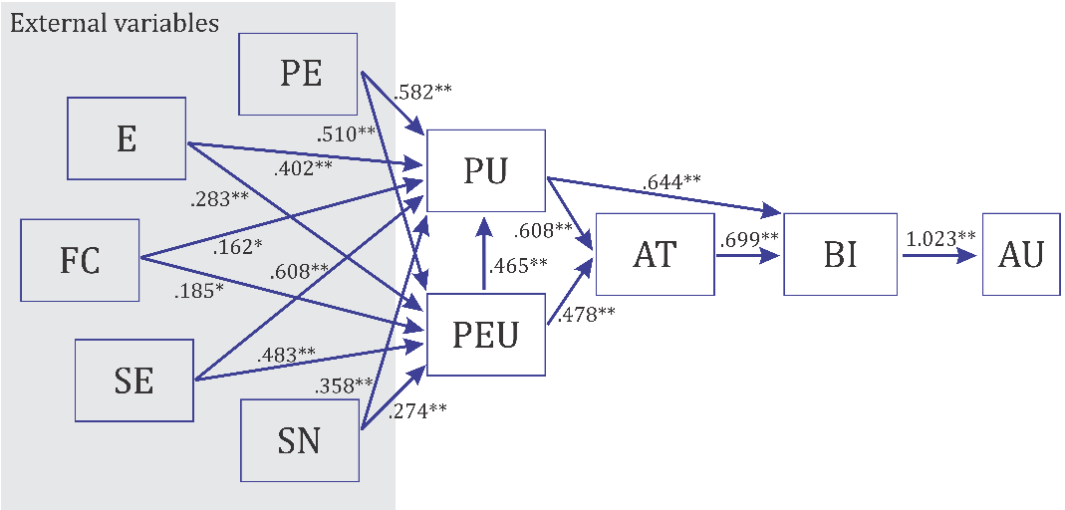

Figure 2. Results of testing the structural model (* p<0.05; ** p<0.001).

The results showed that the impact of PEU on PU ($\beta = 0.465$, $p < 0.001$) were significant, and impact of PEU on AT ($\beta = 0.478$, $p < 0.001$) were also significant. Thus, H1 and H2 were supported. The impact of PU on AT ($\beta = 0.608$, $p < 0.001$) were significant, and the impact of PU on BI ($\beta = 0.644$, $p < 0.001$) were also significant. Therefore, H3 and H4 were supported. The findings also revealed that the impact of AT on BI ($\beta = 0.699$, $p < 0.001$) were significant, and the impact of BI on AU ($\beta = 1.023$, $p < 0.001$) were also significant. Thus, H5 and H6 were supported. The impact of each external variables, PE ($\beta = 0.510$, $p < 0.001$), E ($\beta = 0.283$, $p < 0.001$), FC ($\beta = 0.185$, $p < 0.05$), SE ($\beta = 0.483$, $p < 0.001$), SN ($\beta = 0.274$, $p < 0.001$) on PEU were significant. Therefore, H7, H8, H9, H10 and H11 were supported. The impact of each external variables, PE ($\beta = 0.582$, $p < 0.001$), E ($\beta = 0.402$, $p < 0.001$), FC ($\beta = 0.162$, $p < 0.05$), SE ($\beta = 0.608$, $p < 0.001$), SN ($\beta = 0.358$, $p < 0.001$) on PEU were significant. Thus, H12, H13, H14, H50 and H16 were supported.

Discussion

The current research modified TAM particularly to confirm the relationship between the TAM basic variables as well as the effects of external variables suggested with this research. The findings of the current study are agreeing with the original TAM results (Davis et al., 1989).

The positive significant relationship between PEU and PU was found as hypothesized, which is aligned with results from prior studies (Moakofhi et al., 2019; Rai, 2019; Teo, 2017; Alharbi et al., 2014). Therefore, the more improved the Moodle's ease of use through multiple ways such as great design and by adding good instructions to users, the more improved students' PU of the Moodle. The result also indicated that PEU and PU are significantly correlated with AT. The relationship found between PEU and AT is consistent with some prior studies (Ziraba et al., 2020; Teo, 2019; Rai, 2019; Moakofhi et al., 2019). The relationship found between PU and AT is also consistent with some prior studies (Ziraba et al., 2020; Teo, 2019; Zain et al., 2019; Rai, 2019; Moakofhi et al., 2019; Teo, 2017; Esel, 2017). As predicted, when students perceived Moodle as easy to use and useful, they constructed a positive attitude towards using it.

The correlation discovered between PU and BI and between AT and BI is consistent with some prior researches (Teo, 2019; Almarabeh et al., 2014). Therefore, the research reveal that when students' PU enhances, the students' BI enhances accordingly. Similarly, the research reveal that when students' AT enhances, the students' BI enhances accordingly. The positive significant relationship between BI and AU was found as hypothesized, which is aligned with results from prior studies (Zain et al., 2019; Fathema et al., 2015; Al-Assaf et al., 2015).

This research helps to empirically verify TAM in Indonesia. Similar to previous research, such as McFarland & Hamilton (2006), one of the goal of this study was to integrate contextual factors to the TAM, and as proposed by TAM, this study integrated external variables including PE, E, FC, SE, and SN. Based on the result of this study, all of these external variables have significant effect on TAM. The beta value found between PE and PU was .582, which is consistent with some

prior researches such as Lee et al. (2013) β = .291, Purnomo & Lee (2012) β = .259, Wu & Gao (2011) β = .55. McFarland & Hamilton (2006) β = .5. According to Lee et al. (2013), "It can be believed that students use the information acquired by previous computer experience to interpret the system's user-friendliness and usability, which in turn improves their e-learning programs purpose".

The beta value found between PE and PEU was .51, which is consistent with some prior researches such as Abdullah et al. (2016) β = .421, Lee et al. (2013) β = .149, Purnomo & Lee (2012) β = .363, Rezaei et al. (2008) β = .286, McFarland & Hamilton (2006) β = .09 and Martin (2012). This means that students who have PE in using Moodle find Moodle easy to use and useful. Thus, the research reveal that when students' PE enhances the students' PEU and PU enhances accordingly.

The beta value found between E and PU was .402, which is consistent with some prior researches such as Abdullah et al. (2016) β = .365, Chen et al. (2007) β = .4 and Venkatesh (2000). The beta value found between E and PEU was .283, which is consistent with some prior researches such as Abdullah et al. (2016) β = .286, and Wu & Gao (2011). This implies students who are enjoy in using the Moodle do find the Moodle easy to use and useful. Therefore, the research reveal that when students' E enhances, the students' PEU and PU enhances accordingly. Depending on this relationship between E and TAM, Moodle creators and developers should concentrate more on making usage of e-portfolios fun to ensure student acceptance.

The beta value found between FC and PEU was .185, which is consistent with some prior researches such as Priyanto et al. (2017) β = .593, Teo et al. (2008) β = .24, and Ngai et al. (2007) β = .55. Between FC and PU, the beta value found was .185, which is consistent with some prior researches such as Teo (2010) β = .2 and Ngai et al. (2007) β = .37. This means that students who have the facilities and resources to use Moodle find Moodle easy to use and useful. Thus, the research reveal that when students' FC enhances, the students' PEU and PU enhances accordingly.

The beta value found between SE and PEU was .483, which is consistent with some prior researches such as Li (2020) β = .33, Fathema et al. (2015) β = .435, and Alenezi et al. (2010). Between SE and PU, the beta value found was .608, which is consistent with some prior researches such as Fathema et al. (2015) β = .239. This implies students who are confident in using the Moodle do find the Moodle easy to use and useful. Therefore, the research reveal that when students' SE enhances, the students' PEU and PU enhances accordingly.

The beta value found between SN and PEU was .274, which is consistent with some prior researches such as Abdullah et al. (2016) β = .157, Motaghian et al. (2013) β = .21, and Yuen & Ma. (2008) β = .32. The beta value found between SN and PU was .358, which is consistent with some prior researches such as Motaghian et al. (2013) β = .31 and Yuen & Ma. (2008) β = .42. This means that the social pressure that encourages the students to use Moodle affect students' PEU and PU of Moodle. Thus, the research reveal that when students' SN enhances, the students' PEU and PU enhances accordingly.

CONCLUSION

This study resulted in the empirical validation of the TAM research model in the context of Moodle. Thus, this study contributes to the research in the area of LMS acceptance and utilization in general. This study validates the relationship between the core variables used in TAM: PEU, PU, AT, BI and AU No unexpected findings were discovered regarding the TAM core variables.

As recommended by TAM (Davis, 1989), this research incorporates external variables including PE, E, FC, SE, and SN with Moodle usage. All of these external variables are found to influence the students' PEU and PU of Moodle. The best predictor of students' PEU is PE ($\beta = 0.510$, $p < 0.001$), followed by SE ($\beta = 0.483$, $p < 0.001$), and E ($\beta = 0.283$, $p < 0.001$), and SN ($\beta = 0.274$, $p < 0.001$) and FC ($\beta = 0.185$, $p < 0.05$). The best predictor of students' PU is SE ($\beta = 0.608$, $p < 0.001$), followed by PE ($\beta = 0.582$, $p < 0.001$), and E ($\beta = 0.402$, $p < 0.001$), and SN ($\beta = 0.358$, $p < 0.001$) and FC ($\beta = 0.162$, $p < 0.05$).

Future studies could be conducted to analyze TAM by expanding and/or modifying the model through the addition of external variables and/or by different sample of students and/or by different Moodle usage condition.

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