ATTITUDE TOWARDS INTENTION TO USE MOBILE-BASED TEACHING ASSESSMENT IN RELATION TO TECHNOLOGY ACCEPTANCE MODEL

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Abstract - The rapid growth of technology has ushered new applications which replace traditional methods. These include e-learning, e-health, etc. Mobile-Based Teaching Assessment (MBTA) has thus emerged as an alternative method for teaching assessment. The adoption of MBTA is driving by user's intention to apply teaching assessment through technology. The objective of this paper is to explore the attitude of users towards the use of MBTA based on the Technology Acceptance Model. The article uses Partial Least Squares (PLS). The data were collected from 75 students and academic support using convenient sampling method. The results show that attitude has a significant positive impact on the intention to use MBTA. They suggest that 75 % of the variation of user's intention to use MBTA is explained by the attitude, while the evidence proved that TAM had pronounced the adoption of mobile-based teaching assessment (MBTA) in context of the academic arena. These findings highlight the significance of the proposed model.

Keywords - Teaching Assessment in Mobile devices, Technology Acceptance Model, Partial Least Squares

I. INTERDUCTION

With global acceptance of technologies for the improvement of learning activities, various portable personal computing and communication devices (like Smartphone and tablets) made adoption of such technologies a reality. Also, the rapid growth of IT has led to new applications such as e-learning, e-health, etc. to replace traditional methods [1]. Mobile-Based Teaching Assessment (MBTA) has thus emerged as a complementary method for teaching assessment.

Mobile learning has become the common phenomenon among academics. Besides, it gets wider acceptable due to its accessibility as well as it offers users several features, such 3G and 4G networks [2]. In line with this, O' Malley et al.[3] defined m-learning as an alternative to learning that enables students to learn anytime and anywhere with the ability to perform mobile communication. Mobile technologies serve various activities in the education environment, including assessment practices dynamic, location-aware, context-aware, collaborative, peer and self-assessment [4]. However, the current teaching assessments are not designed as a mode of mobile terminals, but desktop computer performs the teaching assessments. ver shows that less attention is paid for students' convenience to use the system at anytime and anywhere. Hence, there is a need to use mobile devices in teaching assessment to enhance the services of the academics [5].

More specifically, the wide array of a proliferation of technology applications in education environment necessitates a mobile-based teaching assessment. However, learners' recognition of mobile-based teaching assessment has been overlooked, and the effectiveness of the adoption of MBTA raises a question among academics, practitioners and developers. To that end, special attention is given to the adoption of MBTA. Since the previous literature highlighted the suitability of assessing the computers [6, 7, 8]. While, other literature stated that mobile learning is encouraged to be adopted in an academic environment [9, 10]. Therefore, this gives ample space to investigate the attitude towards the intention to use Mobile-Based Teaching Assessment from the perspective of Technology Acceptance Model. In fact, the current study will be one of the first attempts to model the acceptance of Mobile-Based Teaching Assessment.

The paper is structured as follows: the background of Assessments by the mobile technology is presented in section two. Followed by and Technology Acceptance Model (TAM) in section three. Research model and formulation of hypotheses are reported in section four. A methodology is presented in section five. The data analysis is shown in section six. Section seven presents discussions and conclusion.

II. ASSESSMENTS ON THE BASIS OF MOBILE TECHNOLOGY

Technology innovation brought portable devices like tablets, notebooks, and Smartphones allowing academicians gain access to digital content in learning which leads to a new learning mode called mobile learning. In addition, technology innovation offered not only mobile learning but also enabled users to make communication, entertainment, and

multiple purpose information processing tools. Therefore, the usage of mobile devices in higher education improved due to conjunctions with near universal 3G/4G wireless connectivity. In addition to that, mobile learning has features that include ubiquity, portability, low cost, mobility and flexibility engaging users to use the mobile-learning [11]. On the other hand, mobile devices have a potential effect on improving the outcomes and motivations of the students besides the enhancement of their attitudes since mobile technology has already integrated into learning activities [12]. Consequently, the ubiquitous and mobility features at mobile devices plus the growth of technology enable to perform possible evaluations and create a new technique for the assessments, called Mobile-Based Testing (MBT).

Context-aware adaptation provides support to the educational activities in a mobile learning platform. Economides [13] demonstrates the essential features that affect the quality of using mobile learning devices. Adaptive mobile learning and mobile learner are two concepts in mobile technology, where the adaptive mobile learning serves as an engine that personalizes the educational activity at the specified context, while the mobile learner performs an educational activity. Moreover, mobile devices make a possible extension of services due to their mobility. For instance, mobile learning plays a vital role in various education-related activities, namely performing formative assessment or self-assessment [14]. For that reason, mobile technology can be alternatively adoptable in teaching assessment. Therefore, the mobile devices become inevitable in the adoption of the implications in a real world, and that renders mainly teaching evaluation to benefit them.

III. TECHNOLOGY ACCEPTANCE MODEL (TAM)

Due to technology applications proliferation in the academics, a new approach for mobile assessment was innovated to replace the existing traditional methods of evaluation such as paper-and-pencil based or web-based. The mobile devices can access the contents anytime and anywhere. Thus, it is imperative to explore student's acceptance of mobile-based teaching assessment adoption in academic institutions.

Various studies were conducted about users' the acceptance to adopt the information system for their lives [15, 16].

For example, a study by Hussein [17] revealed that intention to use the e-learning depends on users' attitude which has a significant part for making the system well performed.

This paper puts forward the technology acceptance model (TAM) to explain the relationship between the variables of interest. This theory has three constructs perceived ease of use (EoU), perceived usefulness (PU) and attitudes (ATT) which describe and predict system adoption. They have distinct meanings as the level to which a user believe using a particular system and consequently will enhance his/her job performance is captured by perceived usefulness (PU). The usefulness and effectiveness of mobile teaching assessment in academics are thus in accordance with this dimension. The second most important feature of such mobile teaching assessment is determined by its ease of understandability which corresponds to the ease of use (EoU) of TAM, since the ease of use refers the extent/degree to which a person has strong beliefs that he/she is able to use the system with effortless [18]. Finally, the third dimension of the theory sheds light on attitude of the users which drives him/her to towards the use of the mobile-based teaching assessment. The attitude plays an essential role in e-learning system; it refers the degree to which the user is interested in MBTA. Additionally, the adoption of MBTA in academics voluntarily is driven by behavioural intention which is influenced by attitude. The overall dimensions mentioned above predict user's intention to use the mobile to handle teaching related assessments easily and effectively. Thus, this paper investigates user's acceptance towards MBTA applying TAM. It is imperative to consider the explaining factors that drive MBTA depends on user's behavioural intentions and attitude either directly or indirectly to the adoption of a technology. Given that TAM is the theory that can validate the interrelationship among variable under this study. In other words, acceptance of mobile learning has already been utilized under the assessment of TAM with varying modifications and extension to include many external variables [10, 20]. However, there still exists a gap in literatures regarding the acceptance of mobile-based teaching assessment.

Moreover, the empirical existing literature about mobile based assessment by users shows contradictory results. Mobile users have positive attitude towards MBA according to Chen [21], while other show negative attitude towards MBA [22, 23]. Therefore, this study is first step forward by examining the users' (students and academic support) attitudes which lead to the behavioural intention which results in driving mobile-based teaching assessment.

IV. RESEARCH MODEL AND HYPOTHESES

For analyzing and discussing the acceptance of our study to adopt technologies we selected TAM as measurement [18]. Verifying and validating the effect of attitude on the intention to use mobile based teaching assessment is the main issue of the study. Therefore, we use TAM to predict and measure the impacts of attitude and perceived usefulness on the

usage of Mobile-based Teaching Assessment. ince The attitude and usefulness have a vital role in user's decision to adopt or intention to use the MBTA.

We illustrate that attitude in TAM is the feature that empowers to the user to be emotionally connecting to MBTA. The intention to use is responsible for predicting future system needs. Perceived ease of use construct refers to student's opinion towards the amount of effort that is required to use the system. Subsequently, the attitudes have a positive effect on intentions to adopt mobile based teaching assessment. Based on effects of Ease of Use, Usefulness on the intention to use Mobile devices in the context of learning has already applied by [24, 25, 10], while the studies of [6, 26] adopted on the computer assessments. Moreover, we selected these variables in our study and hypothesize as follows:

Hypothesis1: Ease of Use (EoU) has positive relationship with Perceived Usefulness (PU).

Hypothesis 2: The positive and significant relationship exists between Ease of Use (EoU) and the Attitude (ATT).

Hypothesis 3: The relationship between Perceived Usefulness (PU) and Intention to Use (IU) is positive.

Hypothesis 4: The relationship between Perceived Usefulness (PU) and Attitude (ATT) is a positive.

Hypothesis 5: Attitude (ATT) influences Intention to Use (IU) positively on the adoption of MBTA.

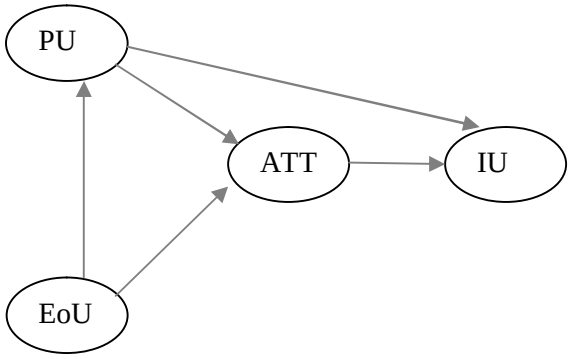


Figure 1 describes the study model to be adopted in this research.

V. METHODOLOGY

1. Participants

Random sampling technique was conducted to select participants for the survey. A Total of 75 participants were collected from undergraduates, graduates studies, and academic support of Universiti Putra Malaysia (UPM). In which 50 out of 75 making (66.67%) were students and 25 (33.33%) academic support, while males constituted of 46 (61.33%) and 29 females (38.67%).

2. Procedure and Instrument

A quantitative approach was conducted in this paper by using a survey. A questionnaire was formulated based on the TAM constructs from previously validated instruments. The English language was designed to build the survey questionnaire. All items were measured using 5-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree). For the Perceived Usefulness (PU) construct three items and Perceived Ease of Use with three items from [27]. To assesses Attitudes towards (ATT) and Intention to Use (IU) of Mobile-Based Teaching Assessment we used six items from [28], and we made a little upgrading of the items to express the present research context (mobile-based teaching assessment). The item "I intend to use e-learning in the future" was replaced by the item "I intend to use mobile devices for teaching assessment in the future." In addition to that, to describe and explain the features of the Mobile-Based Teaching Assessment, we have given to the participants 10 minute presentation before answering the questionnaire, and 15 minute to complete the questionnaires. To validate and analyzing data for the variables that effect the implementation of teaching assessment through mobile technologies. Smart PLS Version 3.0 software was used to test the measurement and structural model of this analysis.

VI. DATA ANALYSIS

To validate and verify the quality of the proposed model, we used Smart PLS Version 3.0 to provide the convergent and discriminant validity of the research model. Therefore, to assess the convergent validity to ensure the indicators of the constructs are valid. The validity of model must satisfy the measurement requirements: (1) constructs whose factor loadings greater than 0.700 are accepted; (2) each variable requires that reliability of composite should exceed 0.700 and (3) Average Variance Extracted (AVE) of each construct should also exceed 0.700.

Items	Factor loading (>0.7)	Cronbach's (>0.7)	Composite Reliability (>0.7)	Average Variance Extracted (>0.5)
EoU		0.746	0.856	0.665
EoU 1	0.799			
EoU 2	0.878			
EoU 3	0.764			
U		0.780	0.872	0.695
U1	0.755			
U2	0.878			
U3	0.863			
IU		0.841	0.904	0.760
BIU 1	0.816			
BIU 2	0.923			
BIU 3	0.873			

ATT		0.795	0.880	0.712
ATT 1	0.873			
ATT 2	0.942			
ATT 3	0.801			

EoU: Ease of Use, PU: Perceived Usefulness, IU: Intention to Use, ATT: Attitude.
Table 1 Convergent Validity of the Model

The results in table 1, indicates that all the measures for convergent validity passed and verified. In the factor loadings, the results of all variables are in between 0.755- 0.942 that means they exceed 0.700. Also, the Average Variance Extracted (AVE) values indicate that they are in the range of 0.665 to 0.760 (AVE > 0.5).

In addition, the values of root squared of AVE as shown in table 2 are greater than correlation of corresponding constructs. Thus, all AVE square root values are greater than the inter-correlation values between constructs. Therefore, both convergent and discriminant validity for the proposed research model are verified.

Item	**ATT**	**IU**	**EoU**	**PU**
ATT	**0.844**			
IU	0.764	**0.872**		
EoU	0.641	0.603	**0.815**	
PU	0.832	0.867	0.622	**0.834**

Bold values: the square root of the average variance extracted (AVE) of each construct.
Table 2 Discriminant Validity of the Model

We used PLS-Graph to complete the SEM by calculating the R-squared values and Path coefficients. We also tested whether hypotheses formulated are in line with the study expectations or not. Therefore, the results reveal that all hypotheses tested are in accordance with expected signs. These imply that relationships among variables are statistically significant and positive.

H	**Path**	**Path Coefficient**	**t statistics**	**Support**
H1	EoU -> PU	0.622***	8.124	Supported
H2	EoU->ATT	0.201***	2.071	Supported
H3	PU -> IU	0.554***	4.724	Supported
H4	PU -> ATT	0.707***	7.008	Supported
H5	ATT->BIU	0.754***	5.781	Supported

*** p<0.1, **p <0.05,***p<0.01**
Table 3 Hypothesis Testing Results

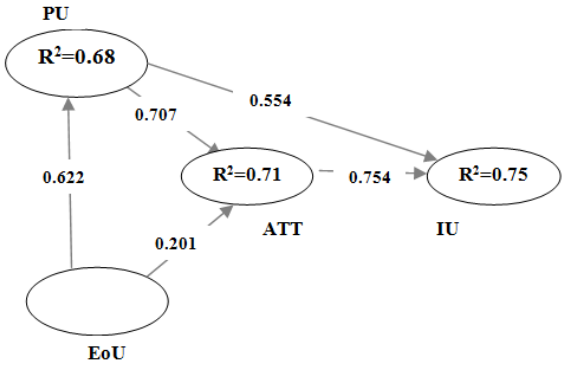


Figure 2: The structural model results

DISCUSSION AND CONCLUSION

The current study examines the acceptance of Mobile-Based Teaching Assessment applying Technology Acceptance Model (TAM). This review is a pioneer to employ Technology Acceptance Model (TAM) in the adoption of Mobile-Based Teaching Assessment. It further extends theoretical literature in the field of mobile applications. As the theory postulates the attitude is the crucial factor that has a direct effect on the user's intention to use MBTA, interestingly. The result indicated that the attitude has positive and significant impacts on user's intention to use MBTA, suggesting that the attitude explains 75 % of the variation of user's intention to use MBTA. It concludes the user's intention determines adoption of mobile-based teaching assessment (MBTA) because positive attitude inspires higher intention regarding the use of mobile-based teaching assessment (MBTA).

Furthermore, these findings support both theories, and prior studies reported that intention to use of e-learning system depends strongly on the user's attitude [29, 30]. Thus, the evidence proved that TAM has a high predictive power in explaining the adoption of mobile-based teaching assessment (MBTA) in context of the academic arena. In particular, TAM states intention of users of mobile-based teaching assessment (MBTA) varies with their attitudes. Therefore, The success of such model in education environment demands highest attention must be given users' attitudes and other related factors that can increase or decrease user acceptance of online educational tools. Since TAM incorporated attitude as the most influential key explanatory variable, but the paper urges factors that raise attitude to be as future research.

The ease of use has a significant positive effect on the intention to use through the mediation of attitude. As the students and academic support group understand the mobile applications in teaching assessments efficiently, they gain strong propensity to use MBTA with effortless.

The perceived usefulness (PU) impacts positively directly the intention to use to MBTA. A more profound belief of students and support group enhances the adoption of mobile applications in teaching assessment as an alternative or complementary method to paper-based and computer-based assessment delivery mode that can be implemented either inside the classroom or outside of the school.

The implications of this study include motivation of both students and academic support groups to perform the teaching assessment for their convenience and encourage developer should design mobile applications that appeal needs of students and academic support groups on one side and education administration on the other. Implementation of teaching assessment based on mobile applications depends on the positive attitude of the administration. Since the present study is an early attempt at the development of MBTA acceptance; nonetheless, this study does not mean that it has no limitations. The present proposed model calls to be tested to other theories than TAM. It further needs to account for individual differences among users of mobile applications in teaching assessment. For future research, proposed model calls for applying in other settings as well as adding additional variables.

REFERENCES

[1] Fulness oAlsabawy, Ahmed Younis, Cater-Steel, Aileen, & Soar, Jeffrey. (2016). Determinants of perceived usef e-learning systems. Computers in Human Behavior, 64, 843-858.

[2] Cerratto-Pargman, Teresa, Järvelä, Sanna M, & Milrad, Marcelo. (2012). Designing Nordic technology-enhanced learning. The internet and higher education, 15(4), 227-23

[3] O'Malley, Claire, Vavoula, Giasemi, Glew, JP, Taylor, Josie, Sharples, Mike, Lefrere, Paul, . Waycott, Jenny. (2005). Guidelines for learning/teaching/tutoring in a mobile environment

[4] Berge, Zane L, & Muilenburg, Lin. (2013). Handbook of mobile learning: Routledge.

[5] Tulloch, Marian, Judd, Madelaine, Naidu, Vishen, Kinash, Shelley, Fleming, Julie, Nair, Sid, Tucker, Beatrice. (2015). Case studies to enhance online student evaluation: Charles Sturt University–Evaluation, analytics and systems integration.

[6] Terzis, Vasileios, & Economides, Anastasios A. (2011). The acceptance and use of computer based assessment. Computers & Education, 56(4), 1032-1044.

[7] Terzis, Vasileios, Moridis, Christos N, & Economides, Anastasios A. (2013). Continuance acceptance of computer based assessment through the integration of user's expectations and perceptions. Computers & Education, 62, 50-6 1.

[8] Terzis, Vasileios, Moridis, Christos N, Economides, Anastasios A, & Mendez, Genaro Rebolledo. (2013). Computer based assessment acceptance: A cross-cultural study in greece and mexico. Journal of Educational Technology & Society, 16(3), 411

[9] Abu-Al-Aish, Ahmad, & Love, Steve. (2013). Factors influencing students' acceptance of m-learning: an investigation in higher education. The International Review of Research in Open and Distributed Learning, 14(5)

[10] Park, Sung Youl, Nam, Min-Woo, & Cha, Seung-Bong. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. British Journal of Educational Technology, 43(4), 592-605.

[11] Cheung, Wing Sum, & Hew, Khe Foon. (2009). A review of research methodologies used in studies on mobile handheld devices in K-12 and higher education settings. Australasian Journal of Educational Technology, 25(2)

[12] Hwang, Gwo-Jen, & Chang, Hsun-Fang. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. Computers & Education, 56(4), 1023-1031

[13] Economides, Anastasios A. (2008). Requirements of mobile learning applications. International Journal of Innovation and Learning, 5(5), 457-479.

[14] Huang, Yueh-Min, Lin, Yen-Ting, & Cheng, Shu-Chen. (2009). An adaptive testing system for supporting versatile educational assessment. Computers & Education, 52(1), 53-67.

[15] Hsu, Hsiao-hui, & Chang, Yu-ying. (2013). Extended TAM model: Impacts of convenience on acceptance and use of Moodle. Online Submission, 3(4), 211-218.

[16] King, William R, & He, Jun. (2006). A meta-analysis of the technology acceptance model. Information & management, 43(6), 740-755

[17] Hussein, Zuhal. (2017). Leading to Intention: The Role of Attitude in Relation to Technology Acceptance Model in E-Learning. Procedia Computer Science, 105, 159-164.

[18] Davis, Fred D, Bagozzi, Richard P, & Warshaw, Paul R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management science, 35(8), 982-1003

[19] Saadé, Raafat George, & Galloway, Ian. (2005). Understanding intention to use multimedia information systems for learning. Informing Science: International Journal of an Emerging Transdiscipline, 2, 287-296

[20] Liu, Yong, Han, Shengnan, & Li, Hongxiu. (2010). Understanding the factors driving m-learning adoption: a literature review. Campus-Wide Information Systems, 27(4), 210-226.

[21] Chen, Chao-hsiu. (2010). The implementation and evaluation of a mobile self-and peer-assessment system. Computers & Education, 55(1), 229-236.

[22] Huff, Kyle C. (2015). The comparison of mobile devices to computers for web-based assessments. Computers in Human Behavior, 49, 208-212

[23] Wang, Yi-Shun, Wu, Ming-Cheng, & Wang, Hsiu-Yuan. (2009).Investigating the determinants and age and gender differences in the acceptance of mobile learning. British journal of educational technology, 40(1), 92-118

[24] T.L. Ju, W. Sriprapaipong, & D.N. Minh. 2007. "On the success factors of mobile learning", Paper presented at 5th International Conference on ICT and Higher Education, Bangkok

[25] Y. Wang, M. Wu, & H. Wang. 2009. "Investigating the determinants and age and gender differences in the acceptance of mobile learning", British Journal of Educational Technology, vol. 40, no.1, pp. 92-118

[26] V. Terzis, C. N. Moridis, & A. A. Economides. 2012. "The effect of emotional feedback on behavioral intention to use computer based assessment", Computers & Education, vol. 59, no. 2, pp. 710–721.

[27] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425e478.

[28] Chang, H. H. (2010).Task-technology fit and user acceptance of online auction. International Journal of Human-Computer

Studies,68(1e2),69e89.http://dx.doi.org/10.1016/j.ijhcs.2009.09.010

[29] Altawallbeh, M., Soon, F., Thiam, W. and Alshourah, S., "Mediating Role of Attitude, Subjective Norm and Perceived Behavioural Control in the Relationships between Their Respective Salient Beliefs and Behavioural Intention to Adopt ELearning among Instructors in Jordanian Universities", Journal of Education and Practice, vol. 6(11), 2015. pp. 152-159

[30] Sujeet, K.S. and Jyoti, K.C. (2013) 'Technology acceptance model for the use of learning through websites among students in Oman', International Arab Journal of E-Technology, Vol. 3, No. 1, pp.44–49, 2013.

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