

Mobile Learning Readiness in Higher Education Based on the Theory of Planned Behavior

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Abstract: *The development of Information and Communication Technology (ICT), as well as the growing use of mobile devices, have influenced many aspects of life including in the field of learning. The use of mobile devices provides a positive influence on learning with electronic learning (e-learning) and can involve students in the learning process. Students in the class change from passive students to students who are truly involved and behave, intellectually and emotionally involved in learning. The application of mobile learning in must be prepared and designed and takes into account the level of readiness of current student. This study aims to assess the readiness of students in the applying mobile learning by using Theory of Planned Behavior (TPB). The result of this study shows that students are ready to apply the mobile learning application in their learning process with positive influences from attitudes, subjective norms and behavioral control. This study also shows students Perceived Behavior Control on Intention to adopt mobile learning.*

Keywords: *m-learning, Theory of Planned Behavior, e-readiness*

I. INTRODUCTION

Information and Communication Technology (ICT) continues to grow and affect many areas of life that provide challenges and opportunities, likewise in the field of learning. "The challenge facing each country to become a learning community and ensuring that its citizens are equipped with the knowledge, skills, and qualifications they need in the 21st century." [1]

Utilization of the use of information and communication technology is expected to facilitate the learning/training process which in turn can ultimately improve the ability of students. The use of communication devices (mobile phones) by people aged 10-34 years in Indonesia exceeded 75% (APJII Bulletin Edition-05 2016) while the overall smartphone users reached 92 million ("Smartphone Users in Indonesia 2016-2019 – Databooks" n.d.) [2]. This communication device or smartphone can be used as a learning tool known as mobile learning (m-learning).

Mobile learning (m-learning) - learning using web-enabled mobile devices such as mobile phones or tablets - provides hope as a platform for delivering relatively easy and inexpensive learning programs. The use of mobile devices becoming more popular with the expansion of technology and also the availability of internet access. M-learning has been widely used in various countries such as the United States, South Korea, Japan, Britain, Singapore,

Taiwan, and the European Union, the Gulf Cooperation Council (GCC) with various challenges faced. [3]

The use of mobile devices provides a positive influence on learning with e-learning [4]. M-learning activities can involve more students in the learning process. Students in the class change from passive students to students who are truly involved and behave, intellectually and emotionally involved in their learning assignments [5]. The application of m-learning must be prepared and designed. Universities must implement strategic efforts to develop m-learning implementation plans, such as design guidelines, development phases and implementation norms, and consider the current level of readiness of current students [6]. Apart from the advantages of mobile use for learning there are limitations to learning, due to several technical problems such as small screens with small resolution, inadequate memory, network speed, and lack of standards and comparability [4], [5], [7].

Based on the needs and tools/technologies available and the limitations that exist, it is important to consider whether students can accept and apply distance learning using existing tools so that their skills and professionalism can be continuously improved. This study focuses on analyzing the readiness to use mobile devices for competency enhancement, strive to measure the readiness of professionals in using mobile devices for learning and identifies key factors of m-learning adoption for competency development and how they affect m-learning.

II. LITERATURE REVIEW

1. Mobile Learning

Many factors influence the understanding of mobile learning which will affect the progress, and direction of mobile learning and its perception and acceptance by the wider education community [8], some of which include, Mobile learning is "any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, the mobility of students and the mobility of learning. It makes learning portable, spontaneous, personal and exciting. [9] [10] [11] [12]

Mobile learning offers many opportunities and advantages in learning process.

The advantages of mobile learning are [13] [14] [15]: Life-long learning, Unwittingly learning, Learning for immediate needs, Independent learning without time and

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place problem (Enable personalized learning), Learning according to location and the conditions (learn on the go, support alternative learning environments), Motivate Students, Improve higher-order thinking skills

Along with the benefits gained from m-learning there are also challenges and difficulties, for instance: Differentiated access to devices and internet, Use must be monitored, Attitudes and prejudices that apply to use of technology for instruction, Limiting physical attributes, Mobile devices are shared among group, Way in which the devices are implemented impacts the effectiveness of them

2. E-Readiness

E-Readiness is a level where a community is prepared to participate in the global network (David Little-2004). It measures the willingness or readiness of a community to benefit from information and communication technology (ICT)[16]. In line with that view, E-readiness can be defined as the level of readiness of a community or organization to access networks and technologies [17]. Another view defined 'E-Readiness' as the ability to pursue value creation opportunities facilitated by the use of Internet.[17]

3. Theory of Planned Behaviour (TPB)

Theory of Planned Behavior (TPB) provides a conceptual framework that is practical for dealing with the complexity of human social behavior. This theory combines some central concepts in social and behavioral issues, and defines them in a way that enables predictions and understanding of specific behaviors in a particular context. TPB indicates that individual behavior is driven by behavioral intention, where behavioral intention is a function of three determinants; individual attitudes toward behavior, subjective norms, and perceived behavioral control over behaviors that are usually found to predict behavioral intentions with a high degree of accuracy. [18] Attitudes toward behavior are about individual positive or negative feelings about behavior. The subjective norm is about the individual's perception that a person who is important to the individual must act the intended behavior. The perceived behavioral control is defined as an individual's perception of difficulty or ease of conduct. TPB has been applied in a variety of contexts such as technology, health care, and politics, and has explained individual adoption behavior quite well[6].

The formulation of this research model uses TPB, taking into account the following three points:

- a. Distinguish control of perceived behavior from conceptual attitude. As Ajzen has pointed out [19], the control of personal behavior does not indicate the possibility that conducting behavior will produce certain results but refers to the level of subjective control over behavioral performance. Thus, perceived behavioral control is the ease or difficulty students experience when involving m-learning.
- b. Using intentions as the last dependent variable of intent is assumed to capture the motivational factors affecting the behavior, the stronger the intention to perform the behavior, the more likely the individual is to carry-out the actual behavior,[16]
- c. Attract external trust in three construction categories including attitude, normative, and control of the m-

learning context. Because beliefs stand out depending on the context.

4. An attitudinal and behavioral intention

Attitude refers to the extent to which a person has a favorable or unpleasant feeling about performing a particular behavior. Previous studies have found that attitudes are a strong predictor of intent.

Subjective norm relates to one's perception of the social environment around behavior. In other words, the opinions of important people are important in shaping the individual's intention to use new technology, because the individual is context-dependent. In this way, subjective norms are related to behavioral intent.

Finally, behavior control refers to a person's perception of control over a particular behavior. One's perception of behavior control is directly related to their intention to engage in a behavior. Behavior control increases when individuals feel that they have more resources and confidence that the expected obstacles.

5. Attitudinal beliefs toward an attitude

The precedent that precedes the first attitude construct is actual belief. TAM argues that there is a causal relationship between perceived ease of use, perceived usefulness, attitudes toward the new system, and behavioral intent to use the system. Thus, two perceptions (ie, ease of use and usefulness) are used as beliefs of attitude.

6. Normative beliefs against subjective norms

Subjective norms are determined by acceptable normative beliefs that explain the expectations of others as important determinants of behavioral intentions). Normative beliefs can be broken down into several reference groups because each group may have different views. Normative beliefs are usually measured when new systems are introduced or tested. This study measures normative beliefs as participants' perceptions of the extent to which others support the use of cellular devices in learning, normative beliefs of students and instructors are precursors of subjective norms.

7. Control beliefs on perceived behavior control

The perceived behavioral control refers to individual perceptions of their ability to perform certain behaviors, and it is compatible with the concept of self-efficacy. In other words, a person's belief in performing a particular task significantly affects behavior. Self-efficacy refers to individual beliefs about their ability and motivation to perform certain tasks. More specifically, individuals who believe they can master a particular skill or activity tend to have higher intentions to perform skills or perform activities. Previous research has found that higher levels of self-efficacy with respect to computers lead to higher levels of behavioral intent and use of information technology.

This study uses learning autonomy as a second antecedent. While self-efficacy represents an assessment of the general ability to conduct behavior, student autonomy is

the extent to which students are responsible and have control over the learning process with mobile devices. Autonomy has proven to be a major contributor to the acceptance of the system. Although m-learning can provide more mobility and flexibility, it requires Students to self-motivate and self-discipline.

III. METHOD

This research is adapted from Cheon's mobile learning readiness that examines factors affecting high school students' intentions to use m-learning based on Theory of Planned Behavior (TPB) and how these factors are linked to assist in the design of more acceptable m-learning systems by the user. The research population is students in the Faculty of Information Technology Banking and Students of Perbanas Institute as a professional candidate in the field of Banking[5].

This research used a simple random sampling technique. In simple random sampling, researchers select participants (or units, such as schools) for samples so that each individual has the same probability of being selected from the population. The purpose of simple random sampling is to select individuals to be sampled to represent the population [20]. Participants in the study were undergraduate students at Perbanas Institute.

The research instrument that used to obtain the data was questionnaire with Likert scale (1-5). Questionnaires were distributed in electronic form using google form to be filled by respondents, the result will be changed in database form which can be analyzed data used is by using SPSS. The steps taken in analyzing the data are as follows:

1. Data from the calculation of respondents' answers are grouped into the table in accordance with the aspect of the assessment of m-learning.
2. All data result of the answer then processed using SPSS to test the validity and reliability. From the results of validity and reliability test knew that there are items that are not valid and valid.
3. Scores for each item of inquiry for all respondents are summed and taken averages as scores for the item. The number of scores for each aspect is averaged to determine the level of readiness in each aspect. The number of scores for all aspects is then summed to take the overall average to determine the general level of readiness.
4. Based on the results of the calculation as a whole, it can be done analysis and interpretation of data as the basis for drawing conclusions and make suggestions improvement based on research conducted.

IV. RESULT

There is a causal relationship between perceived Ease of Use and perceived Usefulness to Attitude as in the Technology Acceptance Model theory of Davis 1989. For this reason the, we constructing our hypothesis are:

H1: Student's perceived Ease of Use and Perceived Usefulness towards m-learning by students is perceived to positively influence their attitude towards m-learning

Subjective Norm determined by acceptable normative beliefs that explain other people's expectations as important

determinants in behavioral intentions [18]. Subjective Norm could measured by the learner's perception and its readiness to use technology represented by several different groups. Based on this, the Instructor Readiness and Student Readiness were examined, and a hypothesis constructed, namely:

H2: The perceived instructional readiness for m-learning and student readiness positively influences Subjective Norms for m-learning

Perceived behavioral control refers to the individual's perception of their ability to do certain behaviors, and it is compatible with the concept of self-efficacy. perceived Self-efficacy, that is beliefs about their abilities and motivations to do something. Learning Autonomy is how far learners are responsible and have control over the learning process with mobile devices. For this reason, the researcher wants to know how perceived Self Efficacy and Learner Autonomy affect perceived Behavioral Control simultaneously. So our hypothesis is as follows:

H3: Student's perceived self-efficacy toward learning m-learning and autonomy of students' learning is perceived to positively influence their Perceived Behavioral Control with m-learning.

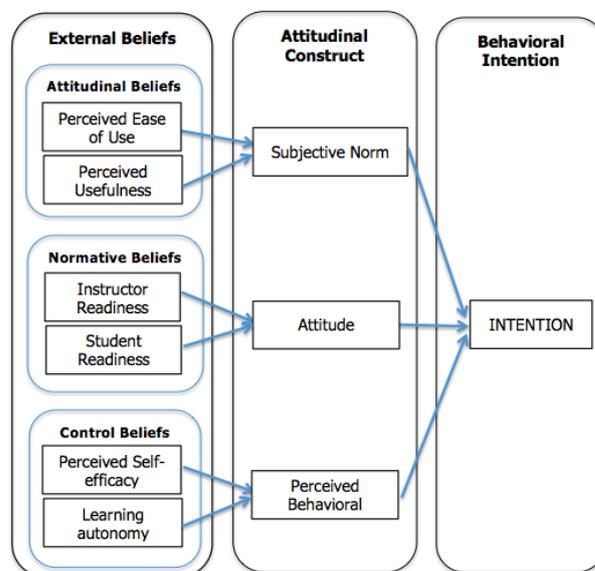


Fig 1: The Scheme of Readiness In Higher Education Based On The Theory Of Planned Behavior

Attitude refers to the extent to which a person has a good or not feeling about certain behavioral performance, and Subjective Norm related to one's perception of the social environment around behavior, while perceived Behavioral Control is a person's perception of control over certain behaviors. For this reason the researchers' hypothesis for this matter wants to see the perceptions of the three of them on Behavioral Intention.

H4: Student's Attitudes, Subjective Norms and Perceived Behavioral towards m-learning positively affect their attention to adopting m-learning.

1 Reliability And Validity Test Of Research Variables

In the test, the validity of the research instrument variables was tested by comparing the calculated R value with R table at a significant level of 5%. For data N = 39 is 0,316 (0,3081) then the decision:

Variables are considered valid if R count > R table or variable is considered valid if the value of Sig > α (0,05)

Table 1: Validity Test OF Research Variable Result

| Variable | Instrument | result |
|----------|--------------|--------|
| PEOU | PEOU1- PEOU3 | valid |
| PU | PU1-PU3 | valid |
| IR | IR1-IR3 | valid |
| SR | SR1-SR3 | valid |
| SE | SE1-SE3 | valid |
| LA | LA1-LA3 | valid |
| ATT | ATT1-ATT3 | valid |
| SN | SN1-SN3 | valid |
| BC | BC1-BC3 | valid |
| INT | INT1-INT3 | valid |

Based on the validity tests performed, it was concluded that all questionnaire variables were valid, as shown in the table I.

2. Reliability test

Reliability Analysis is done to find out whether the answers to questionnaires are obtained are reliable or reliable. Reliability testing also uses a tool that is SPSS 20.0 software. The reliability test was determined by the reliability test by determining the alpha Cronbach's value of 0.60 (Nunnaly, 1978). The reliability test results for all variables are greater than 0.60, so all of these research variables are reliable.

Table 2: Reliability Test Of Research Variable Result

| Variable | Cronbach's Alpha | Result |
|----------|------------------|----------|
| PEOU | 0.793 | Reliable |
| PU | 0.806 | Reliable |
| IR | 0.845 | Reliable |
| SR | 0.899 | Reliable |
| SE | 0.758 | Reliable |
| LA | 0.879 | Reliable |
| ATT | 0.863 | Reliable |
| SN | 0.906 | Reliable |
| BC | 0.828 | Reliable |
| INT | 0.894 | Reliable |

3. Classic Assumption Test

Classical Assumptions Test are multicollinearity, autocorrelation, heteroskedasticity, and normality

a. Multicollinearity

VIF values for variables that are not greater than 10 or 5 cannot be done not multicollinearity in the two independent variables, according to the linear regression style with OLS, then a good linear regression model is free from the presence of multicollinearity. Thus, the above model has been freed from the presence of multicollinearity.

Table 3: Collinearity Statistics Result

| Model | Collinearity Statistics | |
|------------------------------|-------------------------|-------|
| | Tolerance | VIF |
| Perceived Ease of Use | 0.586 | 1.705 |
| Perceived Usefulness | 0.586 | 1.705 |
| Instructor readiness | 0.257 | 3.885 |
| Student readiness | 0.257 | 3.885 |
| Perceived self-efficacy | 0.463 | 2.158 |
| Learning Autonomy | 0.463 | 2.158 |
| Attitude | 0.449 | 2.227 |
| Subjective Norm | 0.408 | 2.451 |
| Perceived Behavioral Control | 0.248 | 4.031 |

b. Autocorrelation

Autocorrelation test was carried out using the Durbin Watson Test, with a sample of 39.

c. Heteroskedasticity

In the heteroscedasticity, test the distribution of dots does not form a particular pattern or plot, this model is free from heteroscedasticity.

d. Normality

The criteria for a (data) residual are normally distributed or not with the **Normal P-P Plot** approach. The plot is done by looking at the distribution of the points in the picture. The results of this model are the distribution of these points approaching or meeting in a straight line (diagonal) so that it is said that the residual (data) is normally distributed.

Table 4: Autocorrelation Result

| Model | Durbin Watson (DW) Test | | | |
|---|-------------------------|--------|--------|-------|
| | dL | dU | 4-dU | DW |
| k=2 | | | | |
| Perceived Ease of Use | 1.3821 | 1.5969 | 2.4031 | 1.593 |
| Perceived Usefulness | | | | |
| Because the results of the DW calculation are between dU and 4dU then 1.5969 < 1.593 < 2.4031 is concluded that there is no autocorrelation on the test data. | | | | |
| k=2 | | | | |
| Instructor readiness | 1.3821 | 1.5969 | 2.4031 | 2.173 |
| Student readiness | | | | |
| Because the results of the calculation of DW are between dU and 4dU then 1.5969 < 2.173 < 2.4031 it is concluded that there is no autocorrelation on the test data. | | | | |
| k=2 | | | | |
| Perceived self-efficacy | 1.3821 | 1.5969 | 2.4031 | 2.233 |
| Learning Autonomy | | | | |



| | | | | |
|---|--------|--------|--------|-------|
| Because the results of the calculation of DW are between dU and 4dU then $1.5969 < 2.233 < 2.4031$ it is concluded that there is no autocorrelation on the test data. | | | | |
| k=3 | | | | |
| Attitude | | | | |
| Subjective Norm | 1.3283 | 1.6575 | 2.3425 | 2.257 |
| Perceived Behavioral Control | | | | |
| Because the results of the DW calculation are between dU and 4dU then $1.3283 < 2.257 < 2.3425$ then it is concluded that there is no autocorrelation on the test data. | | | | |

4. Hipotesa Test

a. H1: Hypothesis 1:

Student's perceived Ease of Use and Perceived Usefulness towards m-learning by students is perceived to positively influence their attitude towards m-learning.

$$ATT = \beta_1 PEOU + \beta_2 PU + \alpha_1$$

$$ATT = 0.413 PEOU + 0.236 PU + 3.045$$

The PEOU coefficient has a sig value of 0.157. This is greater than the probability value of 0.05, or $0.157 > 0.05$, and that means H1 is rejected. PU having a sig value of 0.328. The sig value greater than the 0.05 probability value, or $0.328 > 0.05$, then H1 is rejected. Based on the test results can be concluded Perceived Ease of Use and Perceived Usefulness have no significant influence on Attitude.

b. H2: Hypothesis 2:

The perceived instructional readiness for m-learning and student readiness positively influences Subjective Norms for m-learning.

$$SN = \beta_3 IR + \beta_4 SR + \alpha_2$$

$$SN = 0.281 IR + 0.505 SR + 2.521$$

Based on the test results can be concluded Perceived Ease of Use and Perceived Usefulness have no significant influence on Attitude the Coefficients column there is an IR having a sig value of 0.138. The sig value is greater than the 0.05 probability value, or $0.138 > 0.05$, then H2 is rejected.

The SR coefficients has a sig value of 0.12, the sig value greater than the 0.05 probability value, or $0.012 > 0.05$, and that means H2 is rejected. Based on the test results can be concluded that the Instructor Readiness and Student Readiness have no significant influence on the Subjective Norm

c. H3: Hypothesis 3:

Student's perceived self-efficacy toward learning m-learning and autonomy of students' learning is perceived to positively influence their Perceived Behavioral Control with m-learning.

$$BC = \beta_5 SE + \beta_6 LA + \alpha_3$$

$$BC = 0.401 SE + 0.188 LA + 4.955$$

Based on the test results can be concluded that Perceived Ease of Use and Perceived Usefulness have no significant influence on Attitude the Coefficients column there are SEs with a sig value of 0.008. The sig value is greater than the 0.05 probability value, or the value of $0.008 > 0.05$, then H3 is rejected. The Coefficients of LA has a sig value of 0.198.

The sig value is greater than the 0.05 probability value, or $0.198 > 0.05$, then H3 is rejected.

So it can be concluded that Self Efficacy and Autonomous Learning have no significant effect on Perceived Behavior Control.

d. H4: Hypothesis 4:

Student's Attitudes, Subjective Norms and Perceived Behavioral towards m-learning positively affect their attention to adopting m-learning.

$$INT = \beta_7 ATT + \beta_8 SN + \beta_9 BC + \alpha_4$$

$$INT = 0.086 ATT + 0.307 SN + 0.428 BC + 2.505$$

Based on the test results, the ATT Coefficients has a value of 0.571. The sig value is greater than the 0.05 probability value, or the value of $0.571 > 0.05$, and that means H4 rejected. SN Coefficients has a sig value of 0.018. The sig value is greater than the 0.05 probability value, or $0.018 > 0.05$, then H1 is rejected. The BC has a sig value of 0.005. The sig value is greater than the probability value 0.005, or the value of $0.005 > 0.05$, then H1 is accepted and Ho is rejected.

Based on the results it can be concluded that Attitude, Subjective Norm does not have a significant influence on Intention. But there is a significant effect of Perceived Behavior Control on Intention

V. CONCLUSION

The application of m-learning is a technical and cultural challenge for higher education institutions. Emerging technologies can overcome the technical limitations of mobile devices, such as lower resolutions, network speeds, and platform comparability, however, it can be difficult to transform the pedagogical culture into a mobile format. Research conducted on several students concluded that Self efficacy and autonomous learning have no significant effect on Perceived Behavior Control. Instructor Readiness and Student Readiness have no significant influence on the Subjective Norm. Perceived Ease of Use and Perceived Usefulness have no significant influence on Attitude. Students have the willingness to adopt m-learning with perceived behavioral control in Intention to adopt mobile learning, so it is necessary to pay attention to this factor in implementing mobile learning.

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