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MANAGING THE INFLUENCING FACTORS AND INTEGRATION OF MUSEUM MOBILE LEARNING APPLICATION AMONG PRE-SERVICE TEACHERS

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ABSTRACT

Museums are one of the educational places where people can discover displayed artefacts and expand their knowledge. Museums manage to deliver information to museum visitors through a variety of communication modes. The rapid development of technology has brought to the usage of mobile learning to ensure visitors able to gain meaningful experiences and facilitate their exploration in museum. The objective of this study is to manage the influencing factors and integration of Museum Mobile Learning Application (MMLA). In term of methodology, this study involved pre-service teachers from two public universities in Malaysia. All the respondents were asked to explore MMLA before respond to the questionnaire. The adapted Technology Acceptance Model is used as a grounded theory of this study. All the core construct of TAM posits a significant effect through the designed path. The study results indicate that perceived ease of use plays a major role in determining pre-service teachers' attitude. This contribution directly led to the pre-service teachers' positive attitude and thus increase their tendency toward the acceptance of using MMLA. These findings provide theoretical support for managing pre-service teachers' acceptance of Museum Mobile Learning Application.

Keywords: **Mobile learning, Technology Acceptance Model, Museum, Pre-service teachers**

INTRODUCTION

A classic museum exhibit consists of a glass cabinet and a few instructions. Cultural relics are usually displayed in cases, and a brief text description on the image plate can help people understand historical artefacts significantly. Today's museums serve more purposes than just preserving and displaying artefacts. The local and regional creative economy is significantly boosted by museums (UNESCO, 2020). Also, museums are becoming more socially active, acting as a forum for discussion and debate, tackling complex societal issues, and encouraging public participation. Besides that, the most progressive museums are embracing, declaring the cultural diversity, and value of the displayed artefacts and its attribution (Evans, 2020).

Museums are not only one of the most trustworthy sources of information, but they are also instructive. The number of museums worldwide has increased over the past few decades from 22,000 in 1975 to 95,000 today, paralleling the significant growth in cultural tourism in recent decades According to Statista Research Department (2022), Malaysia received an average of 26 million tourists each year, with 29% of visitors, both young and elderly, visiting local museums to learn further about our culture and tradition. In Malaysia, there are over 30 museums for culture and history in Kuala Lumpur alone, including National Museum of Malaysia, Islamic Arts Museum Malaysia, and Bank Negara Malaysia Museum and Art Gallery.

During the COVID-19 pandemic struck, our life completely changed, and no exception applies to our educational instructions. With these unexpected changes in education, both educators and students have been shifted face to face teaching and learning process to mobile learning (Mphahlele et al., 2021). This inevitable alternative raises several concerns, including a degradation the quality of education and the students' future (Usak et al. 2020). Despite the arguments mentioned in previous studies that mobile learning will negatively affect education overall, educators are actively seeking obstacles (Hill & Fitzgerald, 2020). Policymakers and educators should appraise the capabilities of technology, pedagogy, and organisational support in order to achieve meaningful learning, especially when dealing with mobile or distance learning (Yoon, 2003). Here is where museums can contribute as they serve an educational purpose that needs to be developed and used as a source, a medium, and a location for learning as part of an educational co-curricular programme (Prasetyo et al., 2021). A museum offers a lot of potential to help educators enhance their lesson plans and learning modules. By including interactive systems that encourage learning through physical and psychological interaction, it can also be used as an educational development setting (Bahamon, 2020). As an example, Insaf (2019) yielded that museum provide a significant contribution to education in the broadest sense.

Undoubtedly, there are many factors contributing to student's decision to integrate mobile learning into their learning process. Although currently, successful integration of mobile learning was named as one of the most crucial and critical issues in higher education, especially during the pandemic situation (Biswas et al., 2020). Nonetheless, comprehensive published local studies on similar research objectives are very limited. More in-depth study needs to be done, as it is varied and might be different for each context and situation. There are limited mobile learning application resources especially in a museum context of study (Hammady et al., 2020). This issue led to the inadequate information proving a clear insight onto the influencing factors towards the acceptance of mobile learning in museum. Although the success to integrate mobile learning in museum is expected, there is barriers reinforcement the uptake of mobile learning, which reflects students' acceptance. It includes the difficulty in using the technology (Natasia et al., 2021), lack of support facilities (Shang & Wu, 2017) and students' negative behaviour (Yilmaz & Sahin, 2019). The inconsistent research findings indicated that the influencing factors towards the usage of mobile learning have not yet been identified properly. Therefore, the present study attempts to convey a clearer picture of students' acceptance in integrating mobile learning application in their learning process, specifically in museum context of learning.

LITERATURE REVIEW

Mobile Learning and Museum
With the robustness of technological development, students began to gaze at other learning opportunities by using mobile devices; namely mobile learning (Criollo-C et al., 2021). Mobile learning or "M-learning", is the acquisition of any knowledge and skill through the use of mobile technology. Online devices such as mobile phones, tablets, and laptops, that can be use literally anywhere and anytime at students' convenience. Mobile learning extends learning outside the classroom by supporting contextual, collaborative, personalised, and interactive educational environments in which students' access to learning materials is no longer disrupted by distance and time constraints (Miladi, et al., 2022)

The concept of mobile learning is not new, but it has received special attention most recently due to its features of mobility and accessibility to the internet through smartphones (Chee et al., 2017). Many researchers have attempted to conceptualise mobile learning to comprehend what has been explored in this field thus far (Alawani & Singh, 2017). Despite emerging studies on mobile learning, its theoretical foundations have not yet evolved and research on mobile learning adoption in Malaysia is still limited (Masrek & Shahibi, 2019). In light to this, museum initiated the technological innovation, aimed to promote public appreciation and accessibility. The value of the museum lies not only in the preservation of national treasure artefacts, but also as a source of knowledge for a holistic perspective of all forms of living. Numerous strategies of communication have been employed to provide information to museum visitors, making the museum one of the most essential sources and educational hubs for people to learn more (Nizar & Rahmat, 2018).

The materials that we can find in museums will encourage a meaningful learning experience. Students understand and absorb the concept easier when the artefact is presented in real life (Hammady et al., 2020). In other words, museum have a huge potential in providing divers learning method and opportunities for learners through the integration of mobile learning. Museums today serve more than just aesthetic or academic research purposes; they also play an essential part in education. Several local museums such as National Museum and Islamic Art Museum started to integrate the use of mobile learning to enhance their visitors' experience. However, the exploration of mobile learning is not fully utilized and somehow the displayed content is not attractive enough and still at the old notch. Due to the rapid development of technology, it is hope that the use of mobile phone in museum setting can be expanded.

System Design
Due to the limited resources of mobile learning content in museum. A self-designed mobile learning application was used as an experimental tool in identify the factors that influence pre-service teachers' decision toward the acceptance of Museum Mobile Learning Application (MMLA). The design and development of MMLA based on Cognitive Theory of Multimedia Learning (Mayer, 2014). All the pre-service teachers who also the museum visitors were asked to explore the content to fully experience to what extend the integration of mobile learning can be placed in museum. Figure 1 shows an example of content in MMLA. This application integrates the augmented reality approach together with the 3-dimensional model and multimedia elements (e.g., text, graphics, audio). The users also can discover the located artefacts through the map provided in MMLA.
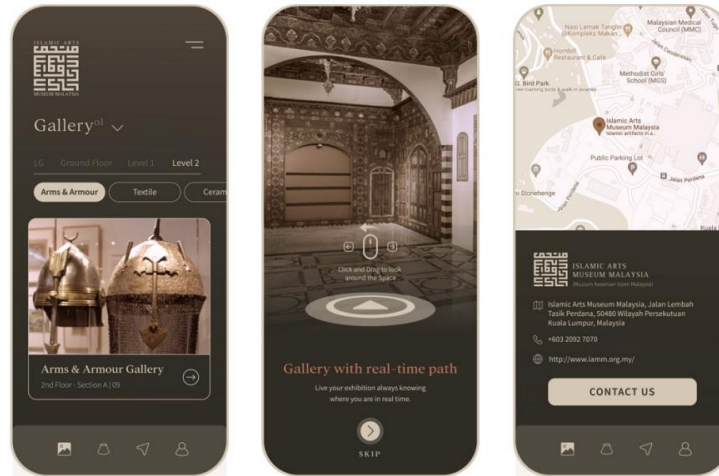
Figure 1. *User Interface Design of MMLA*

User interface is an external variable for this study. The decision in choosing user interface because of it is an important factor in developing an effective and visibility of mobile learning application. However, certain user interface control lack of visible properties (Hosking & Clarkson, 2017). They said, user interface is essentially 'missing' from a visibility standpoint. In addition, even if an element is present, it could be 'missing', and even if it is visible, the user might 'misunderstand' it. Information presentation on visual display, such as mobile learning application, is meaningful when it is concise. Conciseness focusses on the need for simplification and the selection of what is significant in human vision. This assertation is in line with Mayer's Cognitive Theory of Multimedia Learning, which holds that students actively choose and organise materials.

Figure 2. *Visualization of MMLA*

Figure 2 presents the example of expressive visualisation approach which strategically point the user's eye direction to the most important information to maximize the visual information in the MMLA. This is achieved through dynamic changes in visual presentations, deformations, or adjusting the content's components. Aside from visual, the use of font, colour, and call-to-action buttons also play an important role to influences how users would interact

with certain pages in MMLA. The contrast in colour, shape, and form facilitates users' eye movement to which information to read first and what next. This strategy may also refer to "The Art of Seeing" which forces the users to act in a certain way in accordance with researchers' objectives and this strategy has widely been use in other industries, particularly those who deal with marketing and entertainment.

Technology Acceptance Model (TAM)

This present study employed Technology Acceptance Model (TAM) (Davis, 1989) as a grounded theory in exploring the influencing factors towards the Museum Mobile Learning Application acceptance. TAM posits that perceived usefulness and perceived ease of use are the determined factors explaining any technology's acceptance. In addition, TAM also highlighted the importance of external variables such as interface design, social influence, and etc as a factor that could influence perceived usefulness and perceived ease of use. As demonstrated in TAM, attitude act as a mediator variable for behavioural intention and indirectly lead to acceptance of technology usage. Behavioural intention is more likely will predicted behaviour of individual will be performed before using any proposed technology, while actual use or acceptance in TAM posit actual behaviour. For the purposes of this study, behavioural intention excluded as the respondents were asked to use and explore Museum Mobile Learning Application. In other words, respondents were given a chance to explore the application. Thus, they are not categorized under behavioural intention.

TAM also suggested the use of external variables as predictors in determining the perceived of use and perceived usefulness of projected technology. External variables could be different according to the contexts of study. As example, Fan (2020) use learning motivation, job relevance, learning efficiency and user characteristics as external variables to build the relationship between perceived usefulness and perceived ease of use. Rad et al. (2022) emphasized on perceived enjoyment and Zhang et al. (2022) focussed on the perceived playfulness. In this study, the development of Museum Mobile Learning Application (MMLA) involved the comprehensive design structure. Therefore, the use of user interface was employed to represent the external variable.

This model extensively been used in previous studies. As example, a study conducted by (Natasia et al., 2022) posits the positive relationship between perceived usefulness and attitude, which the benefits provided in e-learning platform create a feeling of satisfaction and comfort for teachers. However, their study does not found relationship between perceived ease of use and attitude. This is because due to the fact that the developed e-learning platform is still lacking and some of teachers having difficulties to understand how it operate. In contrast, Zhang et al. (2022) revealed that perceived usefulness and perceived ease of use are the significant predictors to determine individual's positive attitude in using virtual reality technology. Their study also reported that, the integration of playfulness in developing virtual reality technology plays important role in promoting the acceptance of virtual reality technology and thus increase individual tendency in using the technology. The inconsistent findings in previous studies urged researchers to discover the acceptance of Museum Mobile Learning Applications.

Several technology acceptance theories are relatively well known and used throughout the world, including Technology Reasoned Action, Theory of Planned Behaviour, and Unified Theory of Acceptance and Use of Technology. In gathering general information about individuals' perception on using technology especially in tourism-related research, TAM is a valid and robust model. This was revealed based on the TAM meta-analysis research conducted by Ozekici (2022). Museum are categorized as tourism place, hence the selection of TAM as a grounded theory in assessing MMLA's acceptance is essential.

Perceived Usefulness

Perceived usefulness can be described as an individual's tendency to use an application to support their job be improved (Davis, 1989). In this study, perceived usefulness is used to determine pre-service teachers believe that using MMLA able to enhance their learning performance.

Perceived Ease of Use

Perceived ease of use is measured according to the individual's understanding and easiness in using the technology (Davis, 1989). In this study, perceived ease of use measured pre-service teachers understanding and to what extend they perceived the easiness of using MMLA.

Attitude

Attitude refers to an effect, and action operates partly through internal values and evaluation reactions to an individual's' behaviour (Bandura, 2001). In this study, attitude reflects how pre-service teachers perceived the positive or negative feelings while using MMLA which affect their tendency (increase or decrease) to accept the use of MMLA.

Acceptance (Actual System Use)

The actual use of the system is considered when individuals satisfied with using the system, thus reflects the actual conditions of use (Turner et al., 2010) In this study, the actual use reflects pre-service teachers' acceptance when they satisfied with using MMLA to increase their productivity in learning.

RESEARCH MODEL

The research model for this study based on the adoption of TAM. The proposed framework has five variables namely user interface, perceived usefulness, perceived ease of use, attitude, and acceptance (Figure 3). The model introduces user interface as external variable. Perceived usefulness and perceived ease of use are independent variables, while acceptance is the dependent variable. Attitude was designated as mediator variable. All hypothesized paths will be tested to determine their relationship.
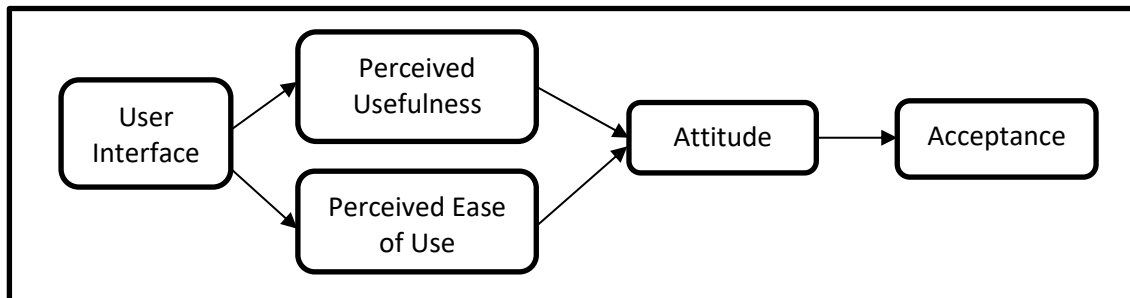

Figure 3. Research Model of MMLA's Acceptance

METHODOLOGY

Research Design

This study involved an investigation on pre-service teachers' decision in accepting the use of Mobile Learning Application in Museum setting based on their opinion on MMLA's user interface, perceived usefulness, perceived ease of use and attitude. To achieve the research objectives, this study employed a quantitative research approach through cross-sectional survey design to collect data.

Population and Sampling

A survey was conducted on 211 pre-service teachers at two selected public universities in Malaysia through face-to-face data collection. The respondents were selected based on two-stage sampling technique. Two public universities in Malaysia that provide programmes in education and teaching were chosen randomly for the first stage. Volunteerism served as the basis for the second stage of selection. Throughout of this process of sampling, a total

of 211 respondents were successfully participated in this study**.**

Data Collection Procedure and Instrument

The data collection process in this study was conducted through survey questionnaire. It consisted of items related to five variables (user interface, perceived usefulness, perceived ease of use, attitude, and acceptance) and each of the variables have 5 items. Respondents who are pre-service teachers were asked to explore Museum Mobile Learning Application (MMLA) before respond to the questionnaire. They are required to answer four-point Likert scale where a score of one indicated strongly disagree, score of two indicated disagree, score of three indicated agree and score of four indicated strongly agree. The items of perceived usefulness and perceived ease of use were adapted from Technology Acceptance Model (Davis, 1989). In addition, the items for interface design, attitude and acceptance were adapted from Taber (2014).

A pilot study was conducted to establish the validity and internal consistency was analysed through the Cronbach's alpha value. The value was analysed using IBM SPSS Statistics software. For indicator internal consistency, the Cronbach's alpha is greater than 0.7 indicates an acceptance level of reliability and greater than 0.8 is a very good level of reliability (Ursachi et al., 2015). However, value greater than 0.95 are not recommended as it have a tendency of redundance (Hulin et al., 2001). As can be seen from Table 1, all the items in five variables satisfied the threshold value. The value of Cronbach's alpha for interface design, perceived usefulness, perceived ease of use, attitude and acceptance were 0.887, 0.842, 0.893, 0.899 and 0.868, respectively. This value indicated that the Cronbach's Alpha value for all construct in a very good reliability (>0.8 α <0.95)

Table 1: *Cronbach's Alpha Value for Five Constructs.*

Construct	Cronbach's Alpha (α)	No of Items
Interface Design	.887	5
Perceived Usefulness	.842	5
Perceived Ease of Use	.863	5
Attitude	.899	5
Acceptance	.868	5

Data Analysis

Data gathered from the respondents was analysed using Structural Equation Modelling to obtain the structural relationship of the hypothesized path. The statistical data was used to answer the research objectives and hypotheses of this study. The data analysis involved both descriptive and inferential statistics.

RESEARCH FINDINGS

The path analysis of the projected framework was analysed with 500 bootstrap samples with a confidence interval of 95 percent. The result of the tested hypothesis was summarized in Table 2. The following are the hypotheses:

H_1: There is a significant relationship between user interface and perceived usefulness.
H_2: There is a significant relationship between user interface and perceived ease of use
H_3: There is a significant relationship between perceived usefulness and attitude
H_4: There is a significant relationship between perceived ease of use and attitude
H_5: There is a significant relationship between attitude and acceptance

It can be seen from the statistical output in Table 2 that, the relationship of hypothesized path was assessed based on the B value, t-statistic, and significant value (p-value). The β-value reflects the degree of changes in the dependent variable for every 1-unit of change in the independent variable and the value can be negative or positive. In term of t-statistics, the closer value is to zero, the more likely there is not a significant difference. The p-value is 0.05 or lower, the outcome is trumpeted as significant path.

There was a statically significant relationship between interface design and perceived usefulness with β=0.456, t-statistic=7.054 and p-value is highly significant. The β-value indicated that the Hence, hypothesis 1 was accepted. There was a positive relationship between interface design and perceived ease of use with B=0.581, t-statistic=10.096 and p-value is 0.000. Thus, hypothesis 2 was accepted. There was a significant relationship between the perceived usefulness, perceived ease of use and attitude with β=0.307, t-statistic=5.591 and p-value is highly significant. Hence, hypothesis 3 hypothesis 4 were accepted. The relationship between attitude and acceptance with β=0.677, t-statistics=8.226 and p-value is 0.000. Thus, hypothesis 5 was accepted. In conclusion, all the hypotheses in Table 2 were accepted as all the p-value are highly significant.

Table 2: *Results of Hypotheses Path*

Independent Variable	Dependent Variable	β	t-statistic	p-value	Result
User Interface	Perceived Usefulness	.456	7.054	.000	Accepted
User Interface	Perceived Ease of Use	.581	10.096	.000	Accepted
Perceived Usefulness	Attitude	.307	5.591	.000	Accepted
Perceived Ease of Use	Attitude	.463	8.226	.000	Accepted
Attitude	Acceptance	.677	14.912	.000	Accepted

The hypotheses for structural model for perceived usefulness, perceived ease of use, attitude and acceptance were assessed based on the R^2 value and p-value. The result in Table 3 answer for hypothesis 6, hypothesis 7, hypothesis 8 and hypothesis 9. The following are the hypotheses:

H_6: The structural model for perceived usefulness reflects the hypothesized path.
H_7: The structural model for perceived ease of use reflects the hypothesized path.
H_8: The structural model for attitude reflects the hypothesized paths.
H_9: The structural model for acceptance reflects the hypothesized path.

Table 3: R^2 *for the Models*

Models	R^2	Adjusted R^2
Perceived Usefulness	.192	.188
Perceived Ease of Use	.328	.325
Attitude	.535	.531
Acceptance	.515	.513

The goodness of model was established by the strength of each hypothesized path determined by the R^2 value for the dependent variable and the R^2 value should be equal to or more than 0.1. The first structural model for perceived usefulness as the dependent variable showed that the R^2 value is 0.192. This indicates that 19.2 percent proportion of the variance in perceived usefulness could be attributed to the interface design as independent variable. The second structural model with perceived ease of use as dependent variable, shows that R^2 value is 0.328. This value indicated that 32.8 percent of changes in perceived ease of use could be attributed to the interface design. The third

structural model of attitude as dependent variable shows that R^2 value is 0.535. This value indicated that 53.5 percent of changes in attitude could be attributed to the independent variables of perceived usefulness and perceived ease of use. The fourth structural model with acceptance as dependent variable, showed that R^2 value is 0.515. This R^2 value indicated that 51.5 percent changes in acceptance could be attributed to the attitude as independent variable. All the four structural model showed R^2 value is more than 0.1. Thus, the predictive statistical measure of fit is established.

Mediation Analysis

The mediation analysis was conducted to analyse the indirect effect of perceived usefulness, perceived ease of use, attitude, and acceptance. In this path, attitude act as a mediator variable. Data from Table 4 shows that the value of p<0.05 and t=5.591 for perceived usefulness as independent variable. In term of perceived of use, the value of t-statistic=8.226 and p=0.00. These results indicated that the mediator path was significant for both perceived usefulness and perceived ease of use.

Table 4. *Indirect Effect of the Structural Model*

Independent Variable	Mediator Variable	Dependent Variable	t-statistic	p-value
Perceived Usefulness	Attitude	Acceptance	5.591	.000
Perceived Ease of Use			8.226	.000

It is apparent the direct effect of the structural model in Table 5 was significant. The t-statistic is 14.912 and p-value is highly significant. This provided sufficient evidence to conclude that attitude was attributed as mediator variable (indirect effect) and the independent variable (direct effect) towards acceptance. Figure 4 presented the structural model, β value and R^2 value for all hypothesized path in this study.

Table 5. *Direct Effect of the Structural Model*

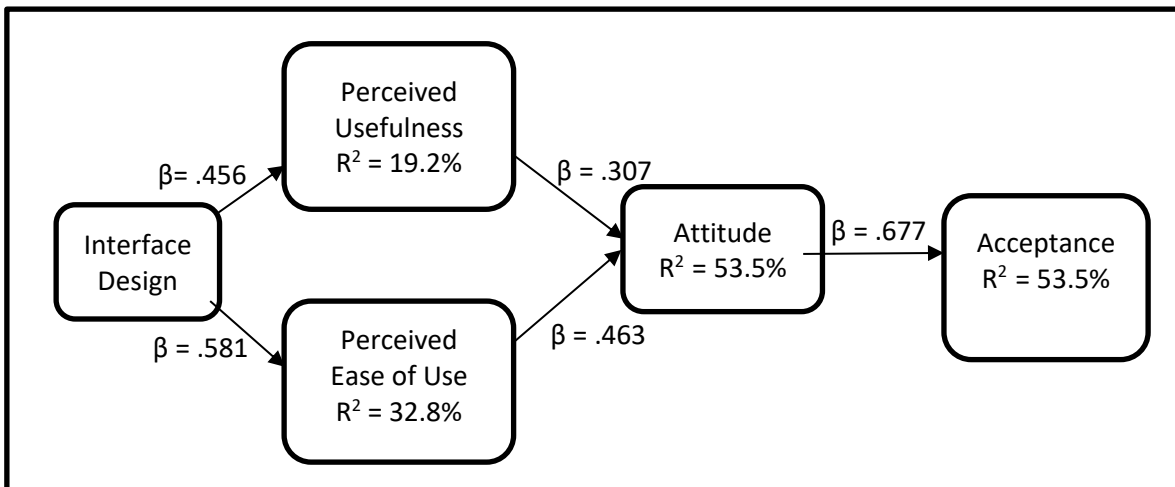| Independent Variable	Dependent Variable	t-statistic	p-value
Attitude	Acceptance	14.912	.000

Figure 4. *Structural Model of Acceptance for Museum Mobile Learning Application*

DISCUSSION AND RECOMMENDATIONS

Numerous technology acceptance models and theories (e.g., Theory of Reasoned Action, Unified Theory of Acceptance and User Technology, Theory of Planned Behaviour) have established several factors that influence user' acceptance towards technology. All these models and theories presented the different types of technology according to their research's purposes. In this present study, Museum Mobile Learning Application (MMLA) serves as a proposed technology to determine factors that influence pre-service teachers' acceptance of MMLA. Findings from this study help to explain the idea on how pre-service teachers' behaviours towards the use of MMLA based on the adaption of Technology Acceptance Model (TAM). There are five factors were hypothesized and tested in this study: user interface, perceived usefulness, perceived ease of use, attitude, and acceptance.

The consideration of user interface in MMLA development plays essential role in providing meaningful learning experiences to the pre-service teachers. The human brain has a limited capacity for information processing, and we actively construct mental representations to make sense of received information (Yufik, 2019). By implementing Cognitive Theory of Multimedia Learning (Mayer, 2014) in the development process, design principles such as presenting information in a logical sequence (both verbally and visually), facilitates students to reduce the cognitive load on a single processing channel and concentrating on the most crucial details. The incorporation of text, graphics, animation, and augmented reality features in MMLA strengthened students' learning process, which does not reduce their acceptance towards the application. Learning does not occur by passive information absorption. Individuals must instead engage active cognitive processes including identifying and choosing pertinent information, organising it into verbal or visual models, and fusing those new models with their prior knowledge (Petrusel et al., 2017). This scenario correlates with the idea of MMLA since it allows pre-service teachers to interact with real world objects in real-time integration and thus increase their learning engagement. The use of MMLA allows pre-service teachers to interact closely with the artefacts in museum and at the same time, MMLA serves as an additional application for them to obtain more information about the artefacts. The consideration of all mentioned regarding the user interface also influence their performance in learning (perceived usefulness) and how they able manage the use of the application (perceived ease of use).

In the findings of this study, the respondents were also asked about their believe in perceived usefulness and perceived ease of use towards their attitude in accepting MMLA. Data indicated that, students had gained performance in learning and feel easier in using the application. These findings directly posit their positive attitude in using the application. It is reasonable to state that perceived usefulness will boost the students' confidence in the application ability to perform the required functions, and thus indirectly increase their level of acceptance. Meanwhile, perceived ease of use will inspire confidence in the user's ability to perform the application successfully and provide satisfaction. Based on TAM, those who does not have experience in exploring the similar application will have more concern on the ease of use. This is because they need become familiar and know the basic on how the application works before use it for learning purpose. In the meantime, those who have an experience with similar application will concentrate more on to what extend the application is able to expand their performance in learning and how useful the application in facilitating their learning process. It is due to the fact that, the easiness of the application is not in their concern anymore because they know how the application works. Thus, the usefulness of the application become their major concern. In short, in order to increase pre-service teachers' acceptance of the MMLA, having an appropriate ease of use combined with usefulness are essential.

Pre-service teachers are expected to posit a positive attitude while using MMLA in their personalized learning process after they have learned the necessary skills to effectively manage their performance in learning. The significant relationship between attitude and acceptance indicates that the pre-service teachers' satisfaction in using MMLA. The explained variance of acceptance (53.5%) appears as high. This variance does not indicate the model fit of the data, instead that all the variability of the response data around its mean and attitude construct highly influence pre-service teachers' acceptance of MMLA. In addition, the pre-service teachers also responded that, they

become more confident in using the application and become more knowledgeable after using it. This scenario also can be concluded that there is a high tendency from pre-service teachers to continue using MMLA in the future.

Based on the outcome of this study as well as feedback from the pre-service teachers, several aspects need to be improved so that the value of acceptance of the MMLA can be increases. The recommendations that can be given are exploring the adaption of other variables such as social influence, facilitating conditions and moderator variables as projected in Unified theory of Acceptance and User Technology (UTAUT) to obtain broad understanding in related museum mobile learning application as this study focussed on TAM. Although pre-service teachers yielded that MMLA is easy to use, but there are few of them are not fully understand how MMLA works. Therefore, conducting intensive and comprehensive training for pre-service teachers regarding the use of mobile learning application is needed. As for the researchers, several aspects need to be considered such as adding more information of artefacts and reducing the waiting time of loading information. Even though somehow this situation correlates with the speed of internet connection, but the content in MMLA itself takes time to appear especially for those who are using basic tier smartphones.

CONCLUSION

The results showed that all the five hypotheses proposed to determine the acceptance of Museum Mobile Learning Application (H1, H2, H3, H4, H5) and the four hypotheses for structural model (H6, H7, H8, H9) were accepted. From these results, it can be concluded that the acceptance of MMLA is equitably good and thus reflects the visitor's acceptance in using mobile learning during museum's visit. Although most of pre-service teachers dedicated that the use of MMLA is easy but intensive training should be conducted for better understanding to provide meaningful experiences among pre-service teachers and museum's visitors. To expand broad understanding of MMLA's acceptance, future researchers are suggested to explore more independent variables (facilitating conditions, social influences) and moderator variables (gender, experience, age, voluntariness of use) as well as relevant theories such as Unified theory of Acceptance and User Technology (UTAUT).

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