The Acceptance Model of Information and Communication Technology through the Teaching of the 21st Century in Malaysia

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ABSTRACT
This study was conducted to develop a model of acceptance of information and communication technology (ITC) in 21st Century Teaching for Islamic Education subjects. The study model was developed based on the integration of the Technology Acceptance Model with external factors. In addition, a study was also conducted to identify the level of readiness of teachers to integrate technology based on the Substitution Augmentation Modification Redefinition (SAMR) Model. A survey was conducted on teachers in 50 schools. A total of 200 respondents determined through a random sampling method were involved in study one. The research questionnaire contains two parts. Part A contains six instruments to measure the enablers of the study, namely the notion of ITK being easy to use (TMG), convenience conditions (KM), self-efficacy (EK), attitude towards ITK (SK), the usefulness of ITK (TM) and the desire to integrate ITK in PdPc (ING). Part B contains the demographic information of the respondents. The study model was analyzed using Partial Least Square - Structural Equation Modeling (PLS SEM). The findings of the study show that TM has a significant direct effect on ING. In addition, the individual factor that is EK has a direct effect on ING, TM and TMG. KM environmental factors were also found to have a direct effect on SKP and TM. Through study two, a total of 50 teachers were asked to suggest activities for the integration of ICT in classrooms at school. The analysis is carried out descriptively in the form of a percentage based on the level of the SAMR model. The findings of the study show that the majority of proposed ICT integration activities for students are still at a low level. This study can provide input for improving the development of teacher education, especially in the field of Islamic Education to empower 21st Century Teaching.

Keywords: Information and Communication Technology, Technology Acceptance Model (TAM), Islamic Education, 21st Century Pedagogy.

1. INTRODUCTION
Discussions about 21st Century Pedagogy are often associated with Digital Pedagogy Practices (Bauder, & Simmons, 2017; Azman, 2018). From another aspect, information and communication technology skills are considered to be the main components that need to be mastered in the skills of the 21st century (van Laar, van Deursen, van Dijk, & de Haan, 2017). The Malaysian Ministry of Education has implemented various initiatives to realize 21st Century Education (KPM, 2018). Nevertheless, studies show that the success of the integration of ICT in education depends on the acceptance and involvement of teachers (Gibson, Stringer, Cotten, Simoni, O'neal, & Howell-Moroney, 2014). Islamic Education teachers face various challenges to integrate ICT in PdPc. Previous studies have shown that Islamic education teachers' acceptance of ICT integration is influenced by several factors including personal factors, technical factors and environmental factors (Azman, Zahari, Mushaddad, Ahmad Anis Muhd Fauzi, Muhammad Zulhilmi, Muhammad Najib &Mursyid Junaidi Mohd Faisal, 2018).
However, since the implementation of technology among Islamic education teachers is still not complete from the aspect of acceptance of ICT, it is appropriate for this research to include elements of readiness in the instrument to use ICT when delivering PdPc (Lednor, P. W. 2019). Evaluation of the factors that influence this readiness is essential to shape the improvement of teacher training programs (Baydas &Goktas, 2016). Therefore, this study aims to identify the factors that influence the readiness of

integration through the development of a ICT Acceptance Model in 21st Century Teaching. In addition, further research was also carried out to identify the level of implementation of Islamic education teachers to integrate TMK in PdPc.

2. LITERATURE STUDY

This study uses the Technology Acceptance Model (TAM) for the formation of the conceptual framework of study one. While the Substitution, Augmentation, Modification, Redefinition (SAMR) Model is used as a guide for determining the level of readiness of students to integrate ICT in study two. Technology Acceptance Model (Technology Acceptance Model - TAM) TAM is one of the earliest models that integrates psychological factors to form acceptance of technology use (Davis, 1986) based on the Theory of Causal Action (TRA) (Ajzen & Fishbein, 1980). This model was chosen because it focuses on the desire to use technology in the future which is influenced by three main factors, namely the notion of technology being easy to use (TMD, notion of usefulness (TM), attitude towards the use of technology (ING)) (Teo, 2009) TM refers to an individual's level of confidence in the ability of technology to benefit work performance improvement (Davis, Bagozzi, & Warshaw, 1989).

Whenever TMD refers to the level of individual belief in the ability to use a technology (Venkatesh et al., 2003). These two levels of trust directly and indirectly affect ING (Baydas &Goktas 2016; Teo, 2009; Teo, Milutinović, & Zhou, 2016). Attitude towards the use of technology (SKP) is defined as an individual's affective reaction such as fun and interest in the use of technology (Venkatesh et al., 2003). TM and TMD are stated to be able to affect the effect of SKP (Jan & Con-treras, 2011; Teo, 2010, Teo & van Schaik, 2012) which ultimately also affects ING (Teo, 2016).

Based on the TAM studies mentioned, the hypothesis is as follows

1. Hypothesis 1: SKP has a significant effect on ING
2. Hypothesis 2 : TM has a significant effect on ING
3. Hypothesis 3 : TM has a significant effect on SKP
4. Hypothesis 4 : TMD has a significant effect on TM
5. Hypothesis 5 : TMD has a significant effect on SKP

This study also tested technology, user and environment factors to explain in more detail the acceptance of technology among students by referring to Teo's (2009) study which was conducted on pre-service teachers in Singapore. The technology factor in terms of technology elaboration (PT) refers to an individual's assumption of the level of difficulty in understanding and using technology (Thompson, Higgins, & Howell, 1991). Past studies related to the adoption of technology in education show that PT has a significant effect on TMD (Cheung & Huang, 2005; Teo, Huang & Hoi, 2017) and TM (Lu, Yu, Liu, & Yao, 2003).

6. Hypothesis 6 : PT has a significant effect on TM
7. Hypothesis 7 : KT has a significant effect on TMD User factors related to self-efficacy (EK) were highlighted by Bandura (1977) which is an individual's assessment of his ability to perform a task.

A person with a high EK will be positive and always try to overcome the obstacles that arise in the use of a technology and respond to TM (Gong, Xu, & Yu, 2004; Kulviwat, Bruner II, &Neelankavil, 2014). EK has been identified as having an impact on TMD among service teachers (Teo, 2009) and towards ING (Sang, Valcke, van Braak, &Tondeur, 2010).

8. Hypothesis 8 : EK has a significant effect on TM
9. Hypothesis 9 : EK has a significant effect on TMD
10. Hypothesis 10 : EK has a significant effect on ING Environmental factors refer to the level of individual trust in the conditions of facilities (KM) provided to support the use of technology.

Imperfect facilities discourage teachers from using ICT in the classroom (Lim & Khine, 2006). For that, good KM will have a positive effect on SKP and TMD (Teo, 2009) as well as facilitate a task to be carried out (Teo & Noyes, 2014).

11. Hypothesis 11 : KM has a significant impact on TM
12. Hypothesis 12 : KM has a significant effect on TMD
13. Hypothesis 13 : KM has a significant effect on SKP SAMR Model (Substitution, Augmentation, Modification, Redefinition)

The SAMR model is a four-level model that is a reference for choosing, using and evaluating the integration of technology in the educational environment (Puentedura 2013). Based on the SAMR model, students or teachers can increase their level of understanding regarding the use of technology and modern technology software in building 21st century skills. (Cummings, 2014). The first and second levels in this model, which are Substitution and Augmentation, are grouped in the improvement category. Technology at this stage is only intended to replace or increase the use of existing technology tools with

additions during learning activities. At both levels, teaching and learning activities teaching and learning activities can still be carried out without the presence of the technology.

However, if technology technology is only used to replace existing teaching methods without bringing pedagogical changes, this will not have a positive effect on students (Kim et al., 2013). The level of Modification and Redefinition is categorized as Transformation which refers to new learning opportunities that cannot be implemented without the existence of technological facilities (Kirkland, 2014).Modification allows an existing task to be modified in a new form, for example the task of writing an article on a blog.While Redefinition refers to the formation of a new task that can be imagined before, for example results writing is presented in the form of a video uploaded on YouTube or presented in reality

3. RESEARCH METHODOLOGY
Research design
This study involves two levels of data collection. The first study was conducted based on a quantitative approach using a cross-sectional study design. A questionnaire was used as an instrument to survey the views of secondary school students around the state of Perak on the acceptance of ICT integration in 21st Century Pedagogy. The second study was conducted by asking students open questions to suggest teaching and learning activities that integrate ICT.

Sampling and Data Collection Methods
The study population is high school students in the state of Perak. This research model involves 11 relationships between independent variables and dependent variables. Therefore, to achieve a statistical strength of 80%, at a significant level of 5% and achieve a minimum R2 of 0.25, 96 respondents are required (Hair et al., 2014). For this study, 200 questionnaires were distributed to 10 classes which were carried out in a simple random manner. Forms are distributed through selected group leaders involving 20 randomly selected students for each class. After the review process was made, a total of 185 were accepted for analysis. For the second study, 30 students from two class groups were asked voluntarily to give suggestions for the integration of ICT.

Instrument
A research questionnaire that contains two parts is used as a research instrument. Part A contains seven constructs that form the conceptual framework of the study. The items of this study were adapted from Teo (2009) which consists of self-efficacy (EK) (3 items), technology complex (KT) (3 items), convenience condition (KM) (4 items), notion of usefulness (TM) (4 items), perception of ease of use (TMD) (3 items), attitude towards the use of IT (SKP) (3 items) and desire to integrate IT in PdPc (ING) (3 items). A seven-level scale that is 1=strongly disagree to 7=strongly agree is used to measure these variables. Part B, on the other hand, contains general information about demographic variables such as gender, age, semester of study and the method of learning TMK by using nominal measurement scales and ratios. Study two involves an open question which is "Describe an example of the integration of ICT in the 21st Century Pedagogy PdPc activities that you carry out in class".

Data Analysis
Study 1 data was analyzed using descriptive statistics to describe the profile of study respondents with the help of IBM SPSS 19.0 software. While inferential statistics are used to test the research hypothesis using the advanced analysis technique of Partial Least Squares Structural Equation Modeling (PLS-SEM) with the help of SmartPLS 3.0 software. Analysis of research data is based on reflective measurement model and structural model. The data of study 2 was analyzed descriptively according to the level based on the SAMR Model.

4. RESEARCH FINDINGS
The findings of the study are discussed based on two phases of the study, namely PLS-SEM structural equation modeling analysis and descriptive analysis based on SAMR Technology.

4.1 Study 1: Technology Integration Model
Respondent Profile This study involved 200 respondents consisting of 29 (22.8%) male students and 98 (77.2%) female students.The majority of respondents, 69 (54.3%) were aged between 20 and 21 (n=43, 33.9%).The majority of respondents are from level 4, which is 90 (70.9) and the rest are from level 5 students. There are various ICT learning methods used by respondents.The method that is often used to

learn TMK is through friends ( ) students ( ) and through lecturers (n=115 people, 90.6%).A total of 103 (81.1%) respondents also use Internet facilities to carry out self-learning related to ICT.

Table 1: Demographics of Study Respondents

No	Description	Frequency	Percent (%)
1.	**Gender**	**200**	**100**
	Male	112	56
	Female	88	44
2.	**Age**	**200**	**100**
	16	110	55
	17	90	45
3.	**Form**	**200**	**100**
	4	110	55
	5	90	45
4.	**Methods of learning TMK**	**200**	**100**
	Learn from the teacher	45	22.5
	Learn through the internet	65	32.5
	Read books, magazines and articles	57	28.5
	Follow online courses	32	16
	Workshops organized by external parties	13	6.5
	Learn from friends	41	20.5

4.2 Descriptive analysis

Descriptive analysis in Table 2 shows a high value of agreement tendency for each variable which is KM (min=6.234, S.P=.695), SKP (min=6.241, S.P=.726), TM (min=6.118, S.P=.755), ING (mean=6.089, S.P=.851), EK (mean=5.892, S.P=.847), TMD (mean=5.347, S.P=1.081) and KT (mean=5.436, S.P=1.103).

4.3 Measurement Model Evaluation

The assessment of the measurement model is based on four aspects, namely (1) Internal consistency measured based on Cronbach's alpha (2) Reliability of each indicator based on factor loading values, (3) Convergent validity based on Average Variance Extracted (AVE) values, and (4)) Discriminant validity based on cross loading values (Hair, Hult, Ringel & Sarstedt, 2014). The evaluation of internal consistency (refer to table 2) shows that the Cronbach's alpha value (α) for the seven study constructs is above 0.7, which indicates good internal consistency. The reliability of each indicator is also achieved based on factor loading values exceeding 0.7. Convergent validity assessment found that the AVE value of this research construct was accepted for each variable.

Table 2 : Measurement Model Results

No	Latent Variable	Item	Min	Mean Standard Division	Factor Weghting	Mean Varians Abstract	Composite Reability
1.	Self-efficacy	EK 1	5.891	.847	0.848	0.710	0.880
.		EK 2			0.855		
		EK 3			0.827		
2.	Technology Complex	KT 1	5.435	1.103	0.704	0.635	0.837
		KT 2			0.864		
		KT 3			0.786		
3.	Facility Conditions	KM 1	6.234	.695	0.865	0.701	0.932
		KM 2			0.874		
		KM 3			0.834		
4.	Notion of Expediency	TM 1	6.119	.755	0.854	0.765	0.812
		TM 2			0.786		
		TM 3			0.894		
5.	Feedback is used	TD 1	5.345	1.081	0.786	0.757	0.826
		TD 2			0.812		
		TD 3			0.821		
6.	Attitude on TMK	SK 1	6.239	.726	0.764	0.789	0.912

		SK 2			0.923		
		SK 3			0.865		
7.	Desire to Integrate	KG 1	6.088	.851	0.789	0.858	0.845
		KG 2			0.929		
		KG 3			0.764		

Discriminant validity is also achieved when the value for each indicator (in bold in Table 3) has the highest value compared to the value with other constructs.Discriminant validity is also achieved based on the results of the Fornell-Larcker evaluation analysis where all AVE values exceed the squared correlation value (Table 4).

Table 3: Fornell-Larcker assessment criteria

No	Factor	EK	ING	KM	KT	SKP	TM	TMD
1	Self-efficacy	0.841						
2.	Desire to integrate TMK	0.496	0.925					
3.	Facility Conditions	0.465	0.583	0.834				
4.	Technology Complex	0.591	0.335	0.215	0.795			
5.	Attitudes towards the use of ICT	0.595	0.526	0.525	0.381	0.85		
6.	Feedback on the usefulness of TM	0.5331	0.553	0.554	0.361	0.701	0.871	
7.	Easy Response	0.541	0.451	0.321	0.372	0.391	0.491	0.871

4.4 Structural Model Evaluation

The structural model of the study is shown in Figure 1. The findings show that six study variables can directly and indirectly explain ING by 36.3%.SKP is explained as much as 51.3% by the determinant variables of the study.Meanwhile, the other two endogenous variables, namely TM and TMD, were explained by 43.9% and 28.7%.
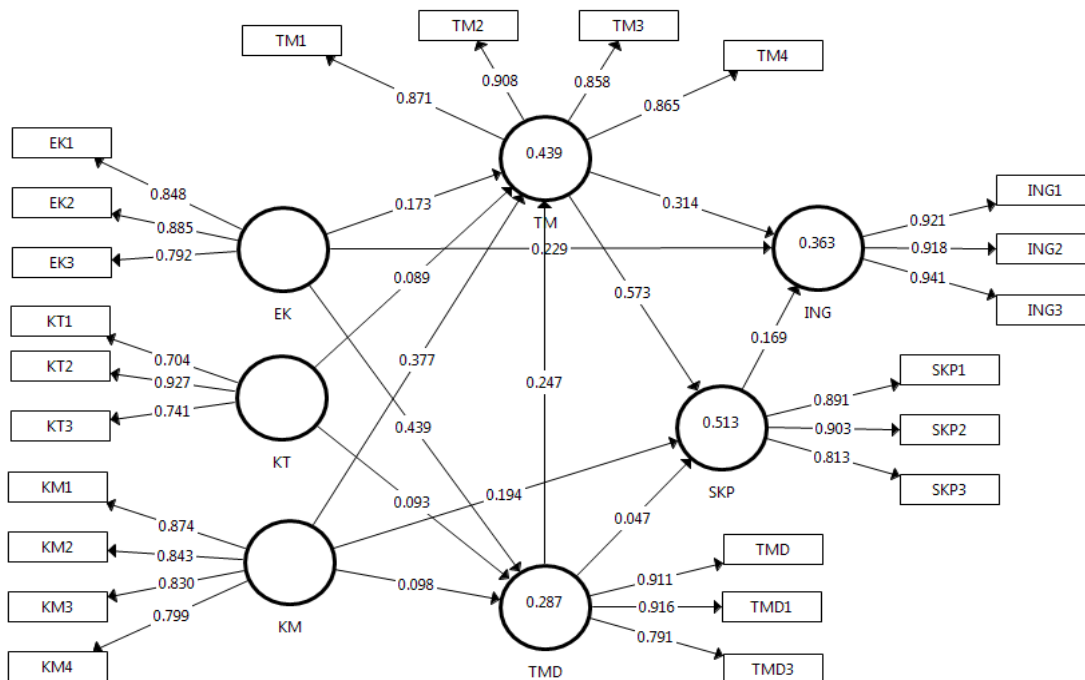

Figure 1: Structural Model of Acceptance of Information and Communication Technology in 21st Century Teaching

4.5 Hypothesis Testing

The findings of the hypothesis testing analysis are shown in Table 4. The findings of the study found that four of the five hypotheses based on the Technology Acceptance Model (H1-H5) were accepted. Hypotheses 2 and 3 show that TM has a significant influence on ING (p =0.314, p<.05) and SKP (p =0.573, p<.001). While hypothesis 4 shows that TMD also has a significant influence on SKP (p =0.573, p<.001). Hypothesis 1 is accepted, which is the influence of SKP on ING (p =0.569, p>.05). While Hypothesis 5 is

rejected, that is, TMD has a non-significant influence on SKP (p=0.047, p>.05). Analysis of external factors showed that EK had a significant influence on TMD (p=0.0419, p<.001) and ING (p=0.219, p<.05). KM has a significant influence on TM (p=0.367, p<.05) and SKP (p=0.191, p<.05). There are four hypotheses related to external factors rejected based on the data of this study. Hypotheses 7 and 12 show that KT and KM have a non-significant influence (p>.05) on TMD with values of p=0.093 and p=0.098. While hypothesis 6 and 8 show that EK and KM have a non-significant influence (p>.05) on TM with values of p=0.087 and p=0.168.

Table 4 : Hypothesis Testing Results

Bil	Hipotesis	Laluan	PekaliKoefisien	t-value	p-value	Keputusan
1.	HI	SKP – ING	0.167	1.461	0.141	Reject
2.	H2	TM- ING	0.312	3.104	0.002	Accept
3.	H3	TM – SKP	0.431	2.067	0.010	Reject
4.	H4	TMD – TM	0.542	1.987	0.000	Accept
5.	H5	TMD – SKP	0.513	2.346	0.054	Reject
6.	H6	KT – TM	0.614	1.765	0.067	Reject
7.	H7	KT – TMD	0.632	1.970	0.075	Reject
8.	H8	EK - TM	0.521	2.431	0.015	Reject
9.	H9	EK - TMD	0.321	1.110	0.134	Accept
10.	H10	EK - ING	0.442	0.986	0.874	Accept
11.	H11	KM - TM	0.545	1.756	0.541	Accept
12.	H12	KM - TMD	0.501	1.594	0.498	Reject
13.	H13	KM - SKP	4.675	1.871	0.765	Accept

4.2 Study 2: Readiness for Information and Communication Technology Integration
The second study was conducted on 40 students in form 4 and 5. The study participants consisted of 23 (76.7%) female students and 7 (23.3%) male students.Figure 3 shows the number of percentages of proposals for the integration of information and communication technology in 21st Century Pedagogy analyzed thematically

Table 5: Information and Communication Technology Integration Proposal

Bil	Integration TMK	Number	Percent
1.	Slide presentation using LCD and projector	34	17
2.	Looking for material on the internet	45	22.5
3.	Use of applications on the computer	98	49
4.	Use of online applications	67	33.5
5.	Show video in T&L	56	28
6.	Using a smartboard	44	22
7.	Using online learning	67	33.5
8.	Frog Chat for students to come up with ideas	23	11.5

5. DISCUSSION AND CONCLUSION
The findings of the study show that students have high confidence in their ability to integrate ICT and the notion that ICT is useful in PdPc contributes to their desire to integrate ICT. As members of the digital society, ICT skills can be learned by students easily and quickly through various social media platforms such as YouTube and Facebook (McLoughlin, & Lee, 2010). The findings of this study are supported by the students' view that complex technology is not a determining factor in the perception of the usefulness of ICT and that ICT is easy to use. This finding is contrary to the findings of studies conducted before and in the early stages of the existence of social media (Sime & Priestley, 2005; Teo, 2010). Therefore, because learning IT software technology and equipment is not particularly difficult, IT course content in teacher education programs should emphasize Media and Information Literacy skills that emphasize the skills of finding, evaluating, using and content development skills digital as recommended by UNESCO (Grizzle, 2011).
However, analysis based on the SAMR Model shows that the majority of students only give suggestions at a low level, which is Substitution. In fact quoting the PPPM Report 2013-25 which was published half a decade ago, the findings of this study coincide with a UNESCO study which states "even though ICT is used during teaching, in most cases its use has not yet reached the use of Power Point presentation applications as a teaching tool" (KPM, 2012). This shows that students are not very creative and

innovative to propose a unique and authentic PdPC task or activity in line with technological developments such as augmented reality, electronic booklet, and gamification (Taspinar, Schmidt, &Schuhbauer, 2016; Moreira, & Rocha, 2017; Leighton, & Crompton, 2017).

Appropriately, focus needs to be given to exposure related to new technology and the latest pedagogy that is compatible with technological sophistication (Luna, 2015). Responses to the ability of ICT to improve work performance are also influenced by the condition of ICT facilities in schools, covering aspects of infrastructure, equipment and software supply, and technical support. Teachers' concerns about the state of TM facilities in schools coincide with the findings of studies conducted in developing countries (Li & Choi; 2014; Teo, Huang, & Cathy, 2017) compared to developed countries (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, &Sendurur, 2012).

The findings of this study are also in line with previous studies that show that good facility conditions affect teachers' attitudes towards the integration of Technology (Ngai, Poon, & Chan, 2007; Teo, 2009). In addition, the findings of this study also coincide with the initial report of the PPPM 2013-2015 which shows that teachers use The reason for the limited use of ICT is due to the condition of facilities such as hardware maintenance and technical support services (KPM, 2012). Therefore, students need to make thorough preparations at school to face Wave 3 (2020-2025) in the implementation of PPPM (KPM, 2012). This is because all schools are expected to have achieved basic minimum standards for infrastructure, facilities, and equipment to integrate ICT in PdPc. In conclusion, the findings of this study show that meaningful and authentic technology integration to support 21st century pedagogy does not depend entirely on technology-related factors alone as shown in previous studies (among others Kimmons, Miller, Amador, Desjardins, & Hall, 2015; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). On the other hand, focus should also be given to teachers' beliefs and skills in making decisions about the best method of integrating ICT in the classroom (Deng et al. 2014; Inan & Lowther, 2010). It is suggested that the school take the initiative to create a sharing of best practices for the integration of ICT in the classroom in order to be a reference for teacher education students in particular and all educators in general.

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