

From: **ali sadikin** <alisadikin@unja.ac.id>
Date: Sun, Aug 16, 2020, 7:39 PM
Subject: Re: [IJIM] Editor Decision
To: Stamatis Papadakis <stpapadakis@gmail.com>
Cc: Michael E. Auer <auer@cti-online.net>

Dear Prof. Stamatis,

Thank you for your email.
Looking forward to hearing from you.

Ali sadikin

On Sun, Aug 16, 2020, 7:34 PM Stamatis Papadakis <stpapadakis@gmail.com> wrote:
Received, thank you.

--Stamatios Papadakis, PhD--
Postdoctoral Fellow/Instructor
Faculty of Education | Department of Preschool Education
The University of Crete, Greece
-EU Code Week Ambassador Greece
-EU Robotics National Coordinator Greece
-eTwinning National Ambassador Greece
Online identities:
ResearchGate: https://www.researchgate.net/profile/Stamatios_Papadakis
Google scholar: <https://scholar.google.com/citations?user=e3vLZegAAAAJ&hl=el&oi=ao>
ORCID: <https://orcid.org/0000-0003-3184-1147>



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On Sun, Aug 16, 2020 at 12:27 PM ali sadikin <alisadikin@unja.ac.id> wrote:
Dear IJiM,
Prof. Stamatios and Prof. Michael

Kindly check our revision.
All files have also been uploaded to the website.

Best regards
Ali sadikin

On Tue, Aug 11, 2020 at 2:01 PM Michael E. Auer <auer@cti-online.net> wrote:

Dear author(s) after collecting reviewers comments I am glad to inform you that your manuscript is suitable for publication if you correct the issues mentioned below:

- The abstract does not give an adequate summary of the paper. This section needs to be rewritten.
- What about the risks, threats to validity of your research? Please mention.
- The research design methodology is unclear. We need more info on the method than just to describe its design.
- What is the actual contribution to the literature and how did you evaluate the findings?
- The discussion and recommendations lack depth.
- The discussion should be more concise, and the outcomes should be discussed in relation to the existing research.
- Methods: The methods do not adequately explain how the research was conducted.
- Results: The results are not clearly explained, and an appropriate analysis has not been conducted.
- Conclusion/Discussion: The claims in this section are not supported adequately by the results. Further the authors don't indicate how the results relate to expectations and to earlier research.
- The standard of the writing, including spelling and grammar must improve.
- Please include if possible up to three references to papers from this journal or other journals from <http://www.online-journals.org> as you agreed in the first step of the submission process.
- /* More recent bibliography is necessary. Remove all outdated references! Furthermore, the reference list of new publications is a little bit weak. Before I can make a final decision on the paper, please refer to more references and upload a new version. It is suggested that the author(s) can consider the following papers related to, teachers beliefs and

attitudes, studies in Europe etc. to strengthen the background and conclusions of the study:

- ♣ Kalogiannakis, M., & Papadakis, S. (2019). Evaluating pre-service kindergarten teachers' intention to adopt and use tablets into teaching practice for natural sciences. *International Journal of Mobile Learning and Organisation*, 13(1), 113-127.
- ♣ Papadakis, S. (2018). Evaluating pre-service teachers' acceptance of mobile devices with regards to their age and gender: a case study in Greece. *International Journal of Mobile Learning and Organisation*, 12(4), 336-352.
- Kalogiannakis, M., & Papadakis, S. (2017). Pre-service kindergarten teachers acceptance of "ScratchJr" as a tool for learning and teaching computational thinking and Science education. In *Proceedings of the 12th Conference of the European Science Education Research Association (ESERA), Research, practice and collaboration in science education* (pp. 21-25).

Please inform me if you plan to upload a paper according to the corrections or you want to withdraw your original manuscript.

With best regards,

iJIM Editor-in-chief
Stamatios Papadakis
School of Education, University of Crete, Greece
stpapadakis@gmail.com

International Journal of Interactive Mobile Technologies
<http://www.i-jim.org>

From: **ali sadikin** <alisadikin@unja.ac.id>
Date: Sun, Aug 16, 2020, 7:39 PM
Subject: Re: [IJIM] Editor Decision
To: Stamatis Papadakis <stpapadakis@gmail.com>
Cc: Michael E. Auer <auer@cti-online.net>

Dear Prof. Stamatis,

Thank you for your email.
Looking forward to hearing from you.

Habibi

On Sun, Aug 16, 2020, 7:34 PM Stamatis Papadakis <stpapadakis@gmail.com> wrote:
Received, thank you.

--Stamatios Papadakis, PhD--
Postdoctoral Fellow/Instructor
Faculty of Education | Department of Preschool Education
The University of Crete, Greece
-EU Code Week Ambassador Greece
-EU Robotics National Coordinator Greece
-eTwinning National Ambassador Greece
Online identities:
ResearchGate: https://www.researchgate.net/profile/Stamatios_Papadakis
Google scholar: <https://scholar.google.com/citations?user=e3vLZegAAAAJ&hl=el&oi=ao>
ORCID: <https://orcid.org/0000-0003-3184-1147>



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Dear Ijim,

Is there any progress of the publication process, schedule?.

Ali sadikin

On Wed, Aug 19, 2020, 4:22 PM Michael E. Auer <auer@cti-online.net> wrote:

Dear author(s):

I am happy to inform you that after receiving reviewers' comments I consider your paper acceptable for publication. Unfortunately, your paper must first correctly be formatted according to the journal guidelines. In the attached files you will find detailed descriptions to correctly format your manuscript.

After that please don't upload your paper but send the manuscript in my email (stpapadakis@gmail.com) to further check it and make additional necessary corrections.

* Please include if possible (in case you haven't done so already) up to three references to papers from this journal or other journals from <http://www.online-journals.org> as you agreed in the first step of the submission process.

* As we appreciate your high level of experience, we welcome you considering the option to join in this journal reviewer team.

With kind regards,

Dr. Stamatios Papadakis
School of Education, Department of Preschool Education, University of Crete,
Greece
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International Journal of Interactive Mobile Technologies
<http://www.i-jim.org>

From: **ali sadikin** <alisadikin@unja.ac.id>
Date: Thu, Sep 24, 2020, 4:15 AM
Subject: Re: Fwd: [iJIM] Editor Decision
To: CTI Office <office@cti-online.net>
Cc: Stamatias Papadakis <stpapadakis@gmail.com>

Dear CTI,

Thank you for your prompt response. We want to pay. But we have not received the payment guidelines.
Kindly re email us the invoice.

Habibi

On Thu, Sep 24, 2020, 12:26 AM CTI Office <office@cti-online.net> wrote:
Papers will be scheduled for an issue after APC has been paid.
CTI Office

On 23.09.2020 15:39, Stamatias Papadakis wrote:

From: **ali sadikin** <alisadikin@unja.ac.id>
Date: Wed, Sep 23, 2020, 10:49
Subject: Re: [iJIM] Editor Decision
To: Stamatias Papadakis <stpapadakis@gmail.com>

Comments	Responses
This paper is difficult to read and understand due to the use of many acronyms. In the first use of an acronym, the authors should write its meaning, like this, for example, Perceived Ease of Use (PEU). This way the authors should rewrite the paper in order to improve the reading.	We introduced the acronym in the first use and eliminate one of them "PSTs"
The abstract first phrase is not understandable, what the authors want to say. All the abstract should be rewritten in order to clarify the main purpose of this study.	Revised as suggested The abstract was rewritten

Factors Influencing PSTs Pre-service Teachers' Satisfaction and Intention to Use the Internet: A Structural Equation Modeling

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Abstract-- In the age of digital era where the Internet is playing an important and dominant role, the concern of the higher education to ensure that the Internet within the reach of the students is very important. However, little research has been reported to indicate the success of the concern in Indonesia. Therefore, This study was conducted to assess factors influencing Indonesian PSTs' satisfaction (ST) and factors influencing Indonesian pre-service teachers' intention to use the Internet for learning (IU) the Internet for learning through technology acceptance model (TAM). Data were gathered from a total of 596 pre-service teachers (PSTs) from five universities in Indonesia. The measurement and assessment of the model were developed-computed through a partial least square structural equation modeling (PLS-SEM). The results informed that Indonesian PSTs pre-service teachers' ST-satisfaction was strongly influenced by perceived ease of use (PEU) and intention to use IU. Besides Meanwhile, PSTs' their intention to use IU the Internet was predicted strongly influenced by a Attitude (AT), perceived usefulness, PU and perceived ease of use PEU.

Keywords: the Internet, Higher education, intention to use, structural equation modeling, technology satisfaction, the internet

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1. Introduction

The world has changed very rapidly where the use of the Internet has expanded in all areas of life such as education, economy, health, business, and industry, and other areas. Governments in developing countries are now in the race of bringing the digital era as their major and top priorities to manage the change. Most of these countries encourage internet access by connecting the service to all people in their country [1]. Regarding the development of technology, internet access has been now widely provided and available as a very important source in education. The Internet, especially wireless technology, has emerged in some forms of learning such as e-learning and m-learning including in not only in developed countries but also in developing countries [2]. Some studies have developed to inform the capability of the Internet application in education to encourage knowledge acquisition [3]. In addition, recent studies have also reported the positive impact of the Internet in promoting PSTs pre-service teachers interaction, flexibility in learning, physical mobility, and self-monitoring, and as well as in improving metacognition improving.

In spite of the ubiquitous studies regarding the application of the Internet in higher education level, there are limited studies about contributing factors of influencing the intention to use the Internet for learning -internet satisfaction (ST) among higher education pre-service teachers users [4]. To achieve the purpose of the study, an extended Technology Acceptance Model (TAM) was implemented; besides the three main factors of the TAM (Perceived Ease of Use or PEU, Perceived Usefulness or PU, and Attitude or AT), Satisfaction (ST) was added in the factors influencing the Intention to Use (IU) the Internet. According to [3] users', especially students, STST is an essential indicator for both e-learning and m-learning. It is reported to have a connection with the improvement of PSTs pre-service teachers' retention, academic persistence, use scale rate and academic success [3] in the programs. Therefore, the main objective of this study is to measure and assess a model of factors influencing Indonesian PSTs' ST and IU the Internet for learning through TAM.

2. Literature review

The adoption of the Internet in higher education is very crucial to achieve transformation in teaching and learning activities [1]. The Internet can function as a transforming tools for all educational stakeholders, especially students, to actively use technology in instruction learning [3]. It can improve the learning environment and encourage innovation. In general, the Internet also supports the establishment of the concept of: group-based learning, practical flexibility, content and learning creativity, and personal learning for better education. Due to these reasons, studies on the ST of the Internet should always be conducted and improved.

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2.1 Technology acceptance model (TAM) and Satisfaction (ST)

TAM was founded by Davis in 1989 [5] extending the theory of reasoned action (TRA). It consists of three main constructs; 1) PEU, PU, and AT to predict -comprising two outcome constructs; Intention to Use (IU) and technology use (TU). PU and PEU are the main variables influencing the two outcomes [5]. These main variables were often completed by some external variables [6]. The concepts, however, differ across studies and therefore need a clear definition in every conducted research. In this research, PU and PEU were not supported by any external constructs; however, we extended the TAM in general to investigate another outcome, ST, as an extended construct for this study.

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Many studies have extended TAM [5] by adding additional factors facilitating its functions [e.g. 6, 7, 8, 9]. However, few studies have been done by extending Satisfaction (ST) into the original TAM [4]. ST is the extent whether the adoption of technology is in line with the needs, and experiences, and as well as emerging values when PSTs use the technology Internet provided by the institution where they study [4]. We applied satisfaction ST as an extended construct factor of TAM in order to understand TAM constructs influences on Indonesian PSTs pre-service teachers' IU (Figure 1) ST. In this proposed model, five constructs were included;

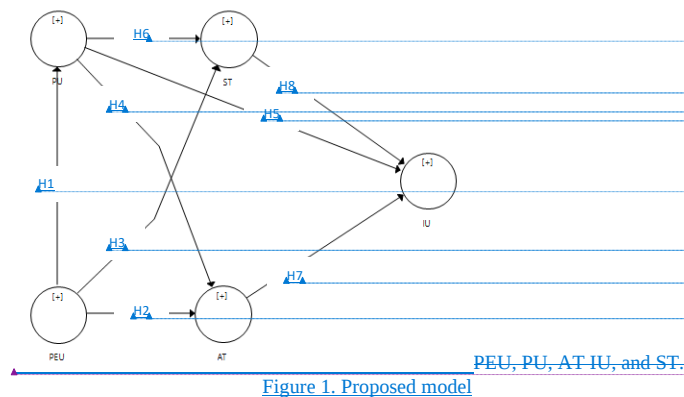


Figure 1. Proposed model

2.2 Perceived ease of use (PEU)

PEU in this study is defined as PSTs' perception of the way of easiness to use the Internet service for their learning. PEU has been informed to significantly influence perceived usefulness PU and AT in many studies involving the Internet and its components (8, 9, 10). YouTubers' PEU had statistically correlation with PU and AT [10]. Meanwhile, [8] reported that PEU has significantly predicted PU and AT in m-learning activities. PEU positively influenced PU and IU regarding Google group applications on the Internet [9]. In affecting ST, PEU is also informed to have a strong correlation to ST in mobile technology [10]. These works of literature guide to three hypotheses for this study;

- H1. PEU will have a positive influence on PU.
- H2. PEU will have a positive influence on AT
- H3. PEU will have a positive influence on ST

2.3 Perceived usefulness (PU)

In this study, PU is informed as PSTs' perceptions about the beneficial factors obtained from using the Internet service provided by the higher education institutions. PU is one of the significant constructs to influence AT, IU, and ST. In some studies, PU was reported to predict AT and IU. For example, [9] informed that PU had a big influence in predicting IU to foster student achievement and promoting knowledge sharing. Similarly, in predicting AT, PU was also among the effective predictors in the adoption of ICT during learning activities [6]. Regarding ST, PU has also been involved in some studies [e.g. 4, 11] who reported strong relationship between PU and ST. However, low path effect between PU and ST ($\beta = .19$) was also informed [2].

- H4. PU will have a positive influence to AT
- H5. PU will have a positive influence to IU
- H6. PU will have a positive influence to ST

2.4 Attitudes (AT)

AT is defined as PSTs' certain behavior connected with the use of the Internet. AT has been a key predictor in influencing IU [6, 12]. Hence, AT was also involved in his study.

- H7. AT will have a positive influence on IU .

2.5 Satisfaction (ST)

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ST is the extent to which the adoption of technology related to the need, experiences, and emerging values when [PSTspre-service teachers](#) use the Internet [4]. The construct has been widely reported to have predicted IU in many studies [e.g. 13, 14].
H8. ST will have a positive influence on IU.

3. Method

The researchers applied a survey as one of the non-experimental in a quantitative culture which has been conducted in numerous fields of knowledge. The target population n of this study is Indonesian [PSTspre-service teachers](#) who have been provided by the service of the Internet in their higher education learning. The whole population is for all Indonesian [PSTspre-service teachers](#) of than 1 million [PSTspre-service teachers](#). The study was funded by Universitas Jambi through its research center, No: 9175/UN/2019.

3.1 Establishing the instrument

This study adapted the questionnaire from previous studies [5, 4] and a 5-point Likert scale from 'strongly disagree' to 'strongly agree' was implemented. There were 22 indicators included in this adaptation stage. Before collecting the main data to empirically measure and assess the model, the questionnaire was validated through face and content validity as well as a pilot test. For face and content validity, five [PSTspre-service teachers](#) as users (face) and five Ph.D. researchers as experts (content) checked the instrument design. Using two sessions of focus group discussions, the users and experts were requested to answer the questions; they could complete the design in 17 minutes. Based on the feedbacks obtained for the design, the sentences' diction and structure of some indicators were modified for the betterment of the understanding of participants in this study; the order of some indicators was revised for facilitating an appropriate sequence. After this phase, two indicators were dropped based on the feedbacks of the experts because the context is not in line with the Indonesian government. All questionnaires were piloted to 57 [PSTspre-service teachers](#) to examine the Cronbach's alpha. The range value of the alpha was from .80 and .94. Twenty indicators were established after all processes, from adaptation to the assessment of pilot study data.

3.2 Data collection

After the instrument draft was translated using back to back translation [15] involving two linguistics experts. The inclusion criterion applied in this study's main data collection was [PSTspre-service teachers](#) with personal computers, laptops, or smartphones with the Internet connection From January to July 2018, in total, 615 [PSTspre-service teachers](#) with equal numbers from four universities filled in the questionnaires. Incomplete questionnaires from 19 participants were removed; 596 complete data were further analyzed. The participants consisted of 95 (15.93%) males and 501 females (84.06%) and between 19 and 22 years old. The sample of this study was deemed sufficient in implementing partial least square structural equation modeling (PLS-SEM) [16]. Data were analyzed using SPSS version 23.0 and PLS-SEM.

3.3 Data analysis

Prior the main data analysis, the raw data were assessed for missing data and outliers using SPSS 23 [17]. Two stages of data analysis were conducted; measuring the model for establishing the data construct validity and assessing the model to determine the relationship between constructs. In measuring the model, three measurements were applied namely reflective indicator loadings with a threshold value of .700, internal consistency reliability using Cronbach's alpha and Composite Reliability ($> .700$), convergent validity with Average Variance Extracted should be $\geq .500$, and discriminant validity using Fornel-Larcker Criterion, cross-loading and Heterotrait-Monotrait. On the other hand, three assessments were used in assessing the model; the examination of Collinearity, path coefficient, coefficient determination, effect size of f^2 , and blindfolding-based cross-validated redundancy measure. The explanation of each stage can be seen in Table 1.

Table 1. Stages of assessing the model [16]

Structural model	Threshold
Collinearity (VIF)	VIF < 3
Path coefficients (β)	$p < .005$
Coefficient determination (R^2)	.75 (substantial), .50 (moderate), and .25 (weak).
Effect size of f^2	.02 (small), .15 (medium), and .35 (large)
cross-validated redundancy measure (Q^2)	.02 (small), .15 (medium), and .35 (large)

4. Findings

4.1 Measuring the model: Reliability and validity

In measuring the measurement model of this study, we assessed reflective indicator loadings, Composite Reliability (CR) and Cronbach's alpha (α) values in addition to average variance extracted (AVE) shown in table 2. However, two indicators, IU 4 and PU5 were dropped due to the detection of low reflective loading values. After the dropping process, the outer loading values range from .773 to .936; no issue emerges regarding the factor loading.

Similarly, CR and α values are also satisfactory with values of more than .700 ensuring the reliability of the data. Besides, the values of AVE also exceed .500 informing the establishment of convergent validity.

Table 2. Measuring the model: loadings, α , CR, and AVE

Construct	Item	loading	α	CR	AVE
Attitude (AT)	AT1	.849	.817	.890	.730
	AT2	.855			
	AT3	.860			
Intention to Use (IU)	IU1	.929	.914	.945	.852
	IU2	.936			
	IU3	.904			
Perceived Ease of Use (PEU)	PEU1	.862	.908	.936	.784
	PEU2	.872			
	PEU3	.909			
	PEU4	.898			
Perceived Usefulness	PU1	.824	.835	.890	.669
	PU2	.857			
	PU3	.778			
	PU4	.810			
Satisfaction (ST)	ST1	.773	.831	.885	.659
	ST2	.813			
	ST3	.853			
	ST4	.805			

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Meanwhile, for the discriminant validity (Tables 3, 4, and 5), the values of Fornell–Larcker criterion are shown by square values of AVEs showing AVEs on its construct are greater than all of its loadings with other constructs [16]. Additionally, Table 4 performs that the indicator's loading value (*italic*) on its construct is greater than that of all of its cross-loadings in other constructs.

Table 3. Discriminant validity: Fornell–Larcker criterion

	AT	IU	PEU	PU	ST
AT					
IU	.805				
PEU	.736	.636			

PU	.726	.634	.804		
ST	.470	.356	.440	.325	

Table 4. Discriminant validity: Cross-loading analysis

	AT	IU	PEU	PU	ST
AT1	.849	.711	.590	.526	.328
AT2	.855	.512	.519	.496	.387
AT3	.860	.568	.517	.517	.339
IU1	.708	.929	.547	.566	.305
IU2	.626	.936	.526	.509	.296
IU3	.619	.904	.530	.461	.304
PEU1	.550	.475	.862	.611	.360
PEU2	.553	.528	.872	.567	.314
PEU3	.570	.531	.909	.629	.373
PEU4	.586	.518	.898	.672	.350
PU1	.506	.490	.572	.824	.262
PU2	.533	.466	.575	.857	.253
PU3	.477	.415	.538	.778	.185
PU4	.452	.449	.610	.810	.241
ST1	.259	.221	.283	.175	.773
ST2	.188	.166	.246	.137	.813
ST3	.437	.346	.358	.309	.853
ST4	.371	.278	.362	.264	.805

The critical value for Heterotrait–Monotrait ratio is below .85 [18]. Shown in Table 5, all values are below the threshold. Through the results of bootstrapping (resampling of 5000) for the Heterotrait–Monotrait value, the confidence intervals shows that the values is below 1 indicating indicates that all HTMT values are significantly different from 1. Based on the result of the three assessments, the discriminant validity of the model is established.

Table 5. Discriminant validity: HTMT

	AT	IU	PEU	PU	ST
AT	.855				
IU	.708	.923			
PEU	.638	.579	.885		
PU	.602	.557	.702	.818	
ST	.409	.327	.395	.289	.811

4.2 Assessing the model

Specifically, the sets of predictors were assessed for Collinearity (VIF) for this study model was AT, PU, PEU, and IU as the predictors. All VIF values shown in Table 6 are lower than 3 which is the threshold value [16]. It indicates that the Collinearity is not a problem for the model. On the assumption of a 10% ($p < .01$) significance level, all relationships but PU to ST and ST to IU ($p > .005$) are significant. The detail elaboration of path coefficient (β), t value, and p value is exhibited in Table 7 and Figure 2.

Table 6. Collinearity (VIF)

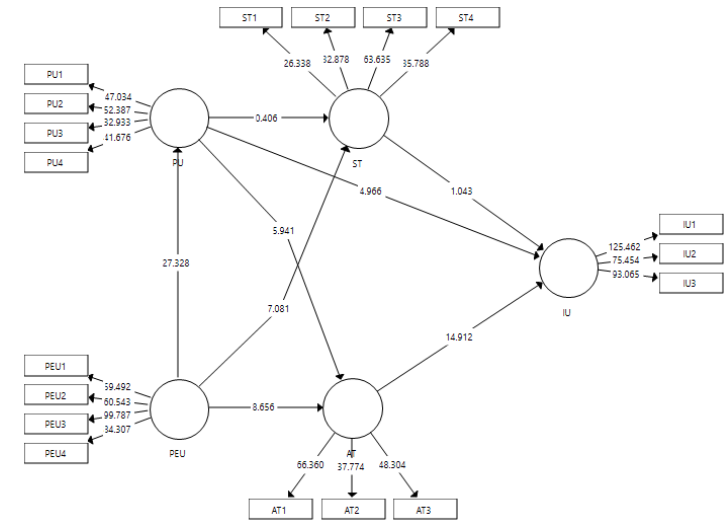
	AT	IU	PEU	PU	ST
AT		1.732			
IU					

PEU	1.969			1.000	1.969
PU	1.969	1.573			1.969
ST		1.205			

Table 7. The relationship among components

	β	p	Significance
AT -> IU	.572	$p < .01$	✓
PEU -> AT	.426	$p < .01$	✓
PEU -> PU	.702	$p < .01$	✓
PEU -> ST	.379	$p < .01$	✓
PU -> AT	.303	$p < .01$	✓
PU -> IU	.203	$p < .01$	✓
PU -> ST	.023	.674	-
ST -> IU	.034	.299	-

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Figure 2. Final model

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The result of the coefficient determination (R^2) was also informed. Based on the result, the R^2 value for AT is .452 (weak), for IU (.527, moderate), and PU (.492, weak), which means that the data have the good level of predicting accuracy; however, ST has no predicting accuracy (.154). For the effect size of f^2 , the value of f^2 of PEU to PU (.969) is the largest followed by AT to IU with .401 (large) and PEU to AT (.168 large). On the other hand, the effect sizes of f^2 between PU and AT (.086), PU and IU (.056), and PEU and ST (.087) are categorized as “small”. No effect sizes of f^2 between IU and ST (.001) as well as PU and ST (.000). Last measurement, cross-validated redundancy measure (Q^2) to measure predictive relevance which was done through the blindfolding process in PLS-SEM resulting IU to have the largest Q^2 value (.423) followed by AT with the value of .310 (medium) and PU with .310 (medium). ST has

the smallest predictive relevance value of .099 (small). From these results, it is proven that the Q^2 values of all constructs support the model's predictive relevance for all five endogenous constructs.

5. Discussion

The main objective of this research was to measure and assess a model of factors influencing Indonesian [PSTspre-service teachers](#)' satisfaction (ST) and intention to use (IU) the Internet for learning through Technology Acceptance Model (TAM) that has also been discussed in numerous previous studies [e.g. 4, 10]. This current study's path analysis informs that the proposed model is valid and reliable for developing county context especially Indonesia.

The result of the analysis also reports PEU has a significant influence to PU. It is in line with the report from [8] and [9] who revealed that PU was significantly predicted by PEU. Similarly, PEU is also reported to be the strongest predictor for AT which agrees to the previous report [10]. PEU is also reported to influence ST. Similar results from [4] who reported that PEU is significant for affecting ST. Nowadays, millennial always count on the Internet. Indonesian users of the Internet are exceeding 100 million users, mostly millennial including pre-service teachers. The fact that PEU has a significant role in predicting PU, ST, and AT could be because these [PSTspre-service teachers](#) are accustomed to using the Internet for a daily basis; their perceived ease of use is highly in line with this fact.

PU in this study have a significant effect on AT. This path relationship is coherent with earlier researches informing that AT was affected by users' PU in using the internet [6] and Google apps [9]. We also did the verification that PU had an essential influence on IU which is similar to some previous studies' results [6, 7, 9]. This means that Indonesian [PSTspre-service teachers](#) IU are dependent on their perceptions of the benefits of technology use in their learning. On the other hand, the results of the PLS-SEM revealed that Indonesian [PSTspre-service teachers](#)' PU does not significantly predict ST meaning that there is no strong correlation between their perceptions of benefits and their satisfaction in using the Internet. This fact contrasts earlier findings which showed a significant correlation between the two, PU and ST [4, 10, 11] however, it is similar to the result of [2] that reported PU had a low effect on ST. It might be triggered by the fact that the infrastructure of the Internet in Indonesian higher institutions is still lacking.

AT is reported to positively predict IU. Indonesian [PSTspre-service teachers](#)' behavior towards the Internet is a key factor predicting their intention to use it in learning which was also reported by earlier studies [6, 12]. Their high positive attitudes towards the Internet might be due to the fact that the Internet has been a very integral part of their learning for sources of knowledge, information, as well as entertainment. However, IU is not predicted by ST; it counters the results of some studies [13, 14] informing that ST was a key determinant for IU or actual use of technology into instruction.

6. Conclusions and Implications

The adoption of the Internet in higher education especially in developing countries is very important in obtaining a betterment of education for the age of 4.0 industrial revolutions. The Internet can have many benefits to change tools for teachers, students, and also future teachers [3]. This study has reaffirmed the TAM framework to be a valid model in predicting factors influencing the intention to use technology, especially the internet, in another setting and context. It has also disseminated the use of PLS-SEM to measure and to assess the proposed model as well as to establish the correctness of the generalizability of the TAM framework assessing Indonesian [PSTspre-service teachers](#)' intention to use the Internet. In addition, the current study has also confirmed that ST can be additional construct included in the TAM framework.

This study possessed some limitations. It was confined to [PSTspre-service teachers](#) who studied in five Indonesian universities while there are many other higher institutions that have implemented the Internet services in Indonesia. This study also excluded the demographic information differences regarding the TAM constructs, perceived ease of use, perceived usefulness, attitudes, intention to use, and an additional construct, satisfaction. The participants of this study should be more various such as school teachers, post graduate students, lecturers, and administrative staff. In order to generalize the findings, future elaboration and investigation on cross-cultural validation of the TAM with satisfaction and other external constructs should be promoted to shed more light on users' intention to use the Internet, online research, m-learning, information systems, e-portfolios, and other objects.

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Dear reviewers, We thank you for your critics and suggestion to improve the quality of the manuscript. Therefore, we did our best to amend it. We are looking forward to having a good news after the revision Regards Authors	
Comments	Responses
1. The abstract does not give an adequate summary of the paper. This section needs to be rewritten.	The abstract was rewritten “The current study aimed at exploring factors influencing Indonesian pre-service teachers’ satisfaction and intention to use the Internet for learning. Implementing an extended technology acceptance model, data were gathered from 596 Indonesian pre-service teachers from five universities. The measurement and the assessment of the model were computed through partial least square structural equation modeling. For the measurement model, we computed data’s reflective indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. Meanwhile, the reports of the constructs’ relationships, coefficient determination (R^2), effect size of f^2 and predictive relevance (Q^2) were addressed for the the assessment of the structural model. The model was valid and reliable that informed six significant relationships out of eight hypotheses. The pre-service teachers’ satisfaction using the Internet for learning was strongly influenced by perceived ease of use and intention to use. Meanwhile, their intention to use the Internet was strongly influenced by their attitude, perceived usefulness, and perceived ease of use. Recommendation and suggestion were offered for the betterment of Indonesian education”
2. What about the risks, threats to validity of your research? Please mention.	Elaboration was added regarding the “threats to validity” The threats of the validity in this survey study are bias of publication selection, data extraction inaccuracy, and misclassification [15]. Through a careful selection and adaptation of items from previous related journals, the instrument of the current study was established. In addition, the face and content validity were conducted. To reduce the issue of data extraction inaccuracy, pilot study was conducted to examine the reliability of the data. For the misclassification, measurement model was chosen to extract factors affecting intention to use the Internet for learning. This study adapted the questionnaire from previous studies [4, 5, 7, 8] and a 5-point Likert scale from ‘strongly disagree’ to ‘strongly agree’ was implemented.
3. The research design methodology is unclear. We need more info on the method than just to describe its design.	We informed more information on the research design “The researchers applied a survey as one of the non-experimental in a quantitative culture which has been conducted in numerous fields of study. The whole population is for all Indonesian pre-service teachers of than 1 million pre-service teachers. In addition, the target population of this study is Indonesian pre-service teachers who have been provided by the service of the Internet in their higher education learning.

	The study was funded by Universitas Jambi through its research center, No: 9175/UN/2019. The researchers established the instrument by adapting items from previous related studies and proceeded 596 responses for the main data analysis through Statistical Package for Social Studies (SPSS) and Partial Least Square Structural Equation Modeling (PLS-SEM); SPSS 23.0 and SmartPLS 3.0 were tools for the data analysis”.
4. What is the actual contribution to the literature and how did you evaluate the findings?	We explored more on this thoroughly, for instance, “The valid and reliable model of the study is expected to address contribution as a guideline for future researchers in assessing the use if the Internet in higher education...”
5. The discussion and recommendations lack depth.	We added and discussed more on the discussion section p. 12-p.13
6. The discussion should be more concise, and the outcomes should be discussed in relation to the existing research.	Revised as suggested The discussion was written to be more concise and more outcomes were revealed p. 12-p.13
7. Methods: The methods do not adequately explain how the research was conducted.	Methods were expanded for more rigorous and detail exploration. e.g. Prior the main data analysis, the raw data were assessed for missing data, outliers, and normality [18]. Missing data with higher percentage of missing data (> 5%) were eliminated while responses with less than 5 % of missing data were fixed by replacing the responses’ missing value with the median value (3). Using the SPSS, outliers procedure was recognized by a box plot for each construct. For the univariate normality of the construct, the values were that the skewness and kurtosis for each indicators ranged between -1.96 and +1.96 at 5% of significance level. No correlation valued at .900 showing that the multicollinearity was not an issue for the data. Therefore, the data were then computed for the assessment of measurement and structural model.
8. Results: The results are not clearly explained, and an appropriate analysis has not been conducted.	Results are re-explained from page 7 to page 11 We also consulted the statistical procedure to one statistician e.g. In examining the relationships between exogenous and endogenous variables, the researchers computed the data through bootstrapping process. Using 5,000 subsamples as suggested by previous studies [17, 19], a 5% significance relationship was reported to be the threshold of the study. All relationships but PU to ST and ST to IU are reported to be significant (Table 2). In detail, hypothesis 1 is supported; PEU is reported to have a significant predicting power to PU ($\beta = .702$; $t = 27.328$; $p < 0.01$). PEU also significantly predicts...
9. Conclusion/Discussion: The claims in this section are not supported adequately by the results. Further the authors don’t indicate how the results relate to expectations and to earlier research.	Revise as suggested

10. The standard of the writing, including spelling and grammar must improve.	We improved the standard of the writing by proofreading the manuscript (Certificate is attached)
11. Please include if possible up to three references to papers from this journal or other journals from http://www.online-journals.org as you agreed in the first step of the submission process. Kalogiannakis, M., & Papadakis, S. (2019). Evaluating pre-service kindergarten teachers' intention to adopt and use tablets into teaching practice for natural sciences. International Journal of Mobile Learning and Organisation, 13(1), 113-127. ♣ Papadakis, S. (2018). Evaluating pre-service teachers' acceptance of mobile devices with regards to their age and gender: a case study in Greece. International Journal of Mobile Learning and Organisation, 12(4), 336-352. Kalogiannakis, M., & Papadakis, S. (2017). Pre-service kindergarten teachers acceptance of "ScratchJr" as a tool for learning and teaching computational thinking and Science education. In Proceedings of the 12th Conference of the European Science Education Research Association (ESERA), Research, practice and collaboration in science education (pp. 21-25).	We added the three references as suggested by the reviewer and one from International Journal of Emerging Technology in Learning [19,20,21,22]

Factors Influencing Pre-service Teachers' Satisfaction and Intention to Use the Internet: A Structural Equation Modeling

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Abstract—The current study aimed at exploring is study was conducted to assess factors influencing Indonesian pre-service teachers' satisfaction and intention to use the Internet for learning. Implementing an extended technology acceptance model, data were gathered from 596 Indonesian pre-service teachers from five universities in Indonesia. The measurement and the assessment of the model were computed through partial least square structural equation modeling. For the measurement model, we computed data's reflective indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. Meanwhile, the reports of the constructs' relationships, coefficient determination (R^2), effect size of f^2 and predictive relevance (Q^2) were addressed for the assessment of the structural model. The results informed that The model was valid and reliable that informed six significant relationships out of eight hypotheses. Indonesian The pre-service teachers' satisfaction using the Internet for learning was strongly influenced by perceived ease of use and intention to use. Meanwhile, their intention to use the Internet was strongly influenced by their attitude, perceived usefulness, and perceived ease of use. Recommendation and suggestion were offered for the betterment of Indonesian education.

Keywords: the Internet, higher education, intention to use, structural equation modeling

7. Introduction

The world has changed rapidly where the use of the Internet has expanded in all areas of life, such as education, economy, health, business, and industry. Governments in developing countries are now in the race of bringing the digital era as their top priorities to manage the change. Most of these countries encourage internet access by connecting the services to all people in their country [1]. Regarding the development of technology, internet access has been widely provided and available as a very important source for education. The Internet, especially wireless technology, has emerged in some forms of learning such as e-learning and m-learning [2]. Some studies have developed to inform the capability of the Internet application in education to encourage knowledge acquisition [3]. In addition, recent studies have also reported the positive impacts of the Internet in promoting pre-service teachers interaction, flexibility in learning, physical mobility, self-monitoring, and metacognition improving.

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In spite of the ubiquitous studies regarding the application of the Internet in higher educational level, there are limited studies about contributing factors influencing the [satisfaction and](#) intention to use the Internet for learning among pre-service teachers [4]. To achieve the purposes of the study, an extended Technology Acceptance Model (TAM) was implemented; besides the three main factors of the TAM (Perceived Ease of Use or PEU, Perceived Usefulness or PU, and Attitude or AT), Satisfaction (ST) was added [in the factors influencing the Intention to Use \(IU\) the Internet as the extended factor](#). ST is an essential indicator for both e-learning and m-learning. It is reported to have a connection with the improvement of pre-service teachers' academic persistence and success [3].

8. Literature review

The adoption of the Internet in higher education is very crucial to achieve transformation in teaching and learning activities [1]. The Internet can function as a transforming tool for all educational stakeholders, especially students to actively use technology in learning [3]. It can improve the learning environment and encourage innovation [in learning](#). In general, the Internet [also](#) supports the establishment of the concept of group-based learning, practical flexibility, content and learning creativity, and personal learning [for better education](#).

2.1 Technology acceptance model (TAM) and Satisfaction (ST)

[In this study, TAM was adapted as a guideline framework accompanied by Satisfaction \(ST\). The TAM](#) was founded by Davis in 1989 [5] extending the theory of reasoned action. [In this study, it](#) consists of three main constructs; 1) PEU, PU, and AT to predict Intention to Use (IU). Many studies have extended TAM [5] by adding additional factors facilitating its functions [e.g. 6, 7, 8, 9]. However, few studies have been done by extending [Satisfaction \(ST\) ST](#) into the original TAM [4]. [ST](#) is the extent [factor](#) whether the adoption of technology is in line with the needs, experiences, and emerging values when users use the technology [4]. We applied ST as an extended factor of TAM in order to understand its influences on Indonesian pre-service teachers' IU (Figure 1).

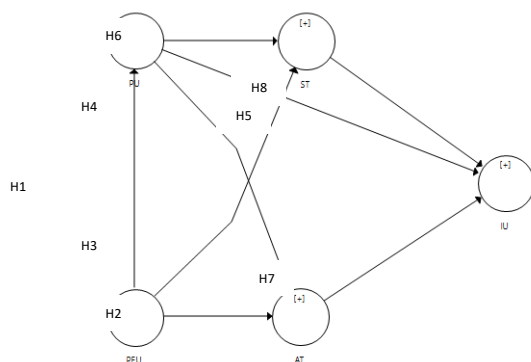


Figure 1. Proposed model

2.2 Perceived ease of use (PEU)

PEU in this study is defined as pre-service teachers' perception of the way of easiness to use the Internet service for their learning. PEU has been informed to significantly influence [PU perceived usefulness](#) and AT in many studies involving the Internet and its components (8, 9, 10). YouTubers' PEU had statistically correlation with PU and AT [10]. Meanwhile, [8] reported that PEU has significantly predicted PU and AT in m-learning activities. [Also](#), PEU positively influenced PU and IU regarding Google group applications on the Internet [9]. In affecting ST, PEU is also informed to have a strong correlation [to ST](#) in mobile technology [10]. These works of literature guide to three hypotheses for this study;

- H1. PEU [would](#) have a positive influence on PU.
- H2. PEU [would](#) have a positive influence on AT

H3. PEU ~~would~~~~will~~ have a positive influence on ST

2.3 Perceived usefulness (PU)

In this study, PU is informed as pre-service teachers' perceptions about the beneficial factors obtained from using the Internet service provided by the higher education institutions. PU is one of the significant constructs to influence AT, IU, and ST. In some studies, PU was reported to predict AT and IU [e.g. 4, 6, 9]. For example, [9] informed that PU had a big influence in predicting IU to foster student achievement and promoting knowledge sharing. Similarly, in predicting AT, PU was also among the effective predictors in the adoption of ICT during learning activities [6]. Regarding ST, PU has also been involved in some studies [e.g. 4, 11] ~~who that~~ reported strong relationships ~~between PU and ST~~. However, a low path effect between PU and ST ($\beta = .190$) was also informed [2].

H4. PU ~~would~~ have a positive influence ~~on~~ AT

H5. PU ~~would~~~~will~~ have a positive influence ~~on~~ ~~to~~ IU

H6. PU ~~would~~~~will~~ have a positive influence ~~to~~ ~~on~~ ST

8.4 Attitudes (AT)

~~The current study refers~~ AT ~~is defined~~ as pre-service teachers' certain behavior connected with the use of the Internet. AT has been a key predictor in influencing IU [6, 12]. Hence, AT was also involved in his study.

H7. AT ~~would~~~~will~~ have a positive influence on IU .

8.5 Satisfaction (ST)

ST ~~in this study is defined as~~ the extent to which the adoption of technology related to the need, experiences, and emerging values when pre-service teachers use the Internet [4]. The construct has been widely reported to have predicted IU in many studies [e.g. 13, 14]

H8. ST ~~would~~~~will~~ have a positive influence on IU.

9. Method

The researchers applied a survey as one of the non-experimental ~~design~~ in a quantitative culture which has been conducted in numerous fields of ~~knowledge~~ ~~study~~. ~~The whole population is all Indonesian pre-service teachers, more than 1 millions. In addition,~~ ~~the target population n~~ of this study is Indonesian pre-service teachers who have been provided by the service of the Internet in their higher education learning. ~~The whole population is for all Indonesian pre-service teachers of than 1 million pre-service teachers.~~ The study was funded by Universitas Jambi through its research center, No: 9175/UN/2019. ~~The researchers established the instrument by adapting items from previous related studies and proceeded 596 responses for the main data analysis through Statistical Package for Social Studies (SPSS) and Partial Least Square Structural Equation Modeling (PLS-SEM); SPSS 23.0 and SmartPLS 3.0 were tools for the data analysis.~~

3.1 Establishing the instrument

~~The threats of the validity in this survey study, are bias of publication selection, data extraction inaccuracy, and misclassification [15]. Through a careful selection and adaptation of the items from previous related journals, the instrument of the current study was established. In addition, face and content validity procedures were conducted. To reduce the issue of data extraction inaccuracy, pilot study was conducted to examine the reliability of the data. For the misclassification, measurement model was chosen to extract factors affecting intention to use the Internet for learning. This study adapted the questionnaire from previous studies [54, 5, 7, 84] and a 5-point Likert scale from 'strongly disagree' to 'strongly agree' was implemented. There were 22 indicators included in this adaptation stage. Before collecting the main data to empirically measure and assess the model, the questionnaire was validated through the face and content validity as well as a pilot test. For face and content validity, f~~ Five pre-service teachers as users (face) and

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five Ph.D. researchers as experts (content) checked the [items of the instrument design](#). Using two sessions of focus group discussions, the users and experts were requested to [discuss and address their concern regarding the items to fit the context and settings of the study](#); [they could complete the design in 17 minutes](#). Based on the feedbacks obtained [for the design from the discussions](#), the sentences' diction and structures of some indicators were modified for the betterment of the understanding of [the participants in this study](#); the order of some indicators was revised for facilitating an appropriate sequence. [After this phase, Finally](#), two indicators were dropped based on the feedbacks of the experts because the context is not in line with the Indonesian [higher education contexts government](#). [After the instrument draft](#) [The items were](#) [translated using back to back translation \[15\] involving two linguistics experts](#). [To further purify the instrument, it](#) [All questionnaires were](#) [piloted to 57 pre-service teachers in order to examine report the instrument's reliability through the examination of Cronbach's alpha for each construct](#); [The values ranged from range value of the alpha was from](#) .800 and .940. The results indicated that [the constructs involved had no issues with the reliability](#). Twenty indicators were established after all processes, from adaptation to the assessment of pilot study data.

3.2 Data collection

[After the instrument draft was translated using back to back translation \[15\] involving two linguistics experts](#). The procedures for the main data collection were begun after the examination of the first reliability from the piloting procedure. The inclusion criterion applied in this study's [main data collectionsamples](#) was pre-service teachers with personal computers, laptops, or smartphones with the Internet connection. [The data collection time was f](#)From January to July 2019. [in total, Six hundred and fifteen](#) 615 pre-service teachers [with equal numbers](#) from four universities filled in the questionnaires. [After Incomplete removing 19 data due to incomplete responses questionnaires from 19 participants were removed](#); 596 complete data responses were further analyzed. The participants consisted of 95 (15.93%) males and 501 females (84.06%) [whose ages and between between](#) 19 and 22 years old. The sample of this study was deemed sufficient in implementing [partial least square structural equation modeling \(PLS-SEM\) PLS-SEM \[167\]](#). Data were analyzed using SPSS version 23.0 and [PLS-SEMSmartPls 3.0](#).

3.3 Data analysis

Prior [to the main data analysis](#), the raw data were assessed for missing data, [and outliers, and normality using SPSS 23 \[187\]](#). [Missing data with higher percentage \(>5%\) were eliminated while responses with less than 5% of missing data were fixed by replacing the responses' missing value with the median value \(3\)](#). Using the SPSS, outliers [was recognized by a box plot for each construct](#). [For the univariate normality of the construct, the values were that the skewness and kurtosis for each indicators should range between -1.96 and +1.96 at 5% of significance level](#). [No correlation valued at .900 showing that the multicollinearity was not an issue for the data](#). The data were then computed for the assessment of measurement and structural model.

Two stages of data analysis were conducted; measuring the model for establishing the data construct validity and assessing the model to determine the relationship between constructs. In measuring the model, [fourthree](#) measurements were applied namely reflective indicator loadings with a threshold value of .700 [\[19, 20, 21\]](#), internal consistency reliability using Cronbach's alpha and Composite Reliability [\(between > .800 and <.950\(>-.700\)](#), convergent validity with Average Variance Extracted [should be of \$\geq .500\$](#) , and discriminant validity using Fornel-Larcker Criterion, cross-loading and Heterotrait-Monotrait. On the other hand, [three-five](#) assessments were used in assessing the model; [the reports of Variance Inflation Factor \(VIF\) values, path coefficient, coefficient determination \(\$R^2\$ \), effect size of \$f^2\$ and predictive relevance \(\$Q^2\$ \)](#) the examination of Collinearity, path coefficient, coefficient determination, effect size of f^2 , and blindfolding-based cross-validated redundancy measure. The explanation of each stage [and the threshold for the structural model assessment](#) can be seen in Table 1.

Table 1. Stages of assessing the model [16]

Structural model	Threshold
Collinearity (VIF)	VIF < 3.000
Path coefficients (β)	p < .005
Coefficient determination (R^2)	.750 (substantial), .500 (moderate), and .250 (weak).

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Effect size of f^2	.020 (small), .150 (medium), and .350 (large)
predictive relevance cross-validated—redundancy measure (Q^2)	.020 (small), .150 (medium), and .350 (large)

10. Findings

4.1 Assessing reflective measurement the model: Reliability and validity

We utilized PLS-SEM algorithm in SmartPLS 3.0 to measure the In measuring the measurement model of this study, we assessed reflective indicator loadings [17]. The indicator loadings recommended for this study were $>.708$ [17]. Two indicators, IU 4 and PU5 were dropped due to the detection of low reflective loadings. After the dropping procedure, most items exceeded the indicator loadings; IU2 achieved the highest loading of .936 while the lowest loading of .773 was earned by ST1.

After the dropping process in the first step of measurement model assessment, the researchers computed the internal consistency reliability, an evaluative procedure to understand the results across items consistency [17]. In PLS-SEM method, Cronbach's alpha and composite reliability should be computed [17, 19]. The values for the reliability should be between 0 and 1; the more a construct has the score, the higher level of reliability is informed. The values of Cronbach's alpha and composite reliability should exceed .800 and be lower than .950 that can be defined as indicator redundancies [17]. Table 2 performs the values of the Cronbach's alpha and composite reliability; all values have met the cut-off points used in this study ($>.800$ and $<.950$).

Composite Reliability (CR) and Cronbach's alpha (α) values in addition to average variance extracted (AVE) shown in table 2. However, two indicators, IU 4 and PU5 were dropped due to the detection of low reflective loading values. After the dropping process, the outer loading values range from .773 to .936; no issue emerges regarding the factor loading.

Similarly, CR and α values are also satisfactory with values of more than .700 ensuring the reliability of the data. Besides, the values of AVE also exceed .500 informing the establishment of convergent validity.

Table 2. Measuring the model: loadings, α , CR, and AVE

Construct	Item	loading	α	CR	AVE
Attitude (AT)	AT1	.849	.817	.890	.730
	AT2	.855			
	AT3	.860			
Intention to Use (IU)	IU1	.929	.914	.945	.852
	IU2	.936			
	IU3	.904			
Perceived Ease of Use (PEU)	PEU1	.862	.908	.936	.784
	PEU2	.872			
	PEU3	.909			
	PEU4	.898			
Perceived Usefulness	PU1	.824	.835	.890	.669
	PU2	.857			
	PU3	.778			
	PU4	.810			
Satisfaction (ST)	ST1	.773	.831	.885	.659
	ST2	.813			
	ST3	.853			
	ST4	.805			

For the convergent validity, AVE is suggested to elaborate as the metric to measure (Hair et al. 2019). In calculating

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the AVE, we applied SmartPLS algorithm. The recommended AVE value should be $>.500$ that explains 50% or more of the variance of the construct items. The values of AVE also exceed $.500$ informing the establishment of convergent validity or 50% of the variance (Table 2).

Meanwhile, for the discriminant validity (Tables 3, 4, and 5), the values of Fornell–Larcker criterion are shown by square values of AVEs showing AVEs on one its construct are greater than all of its loadings with other constructs [167]. Additionally, Table 4 performs that the indicator's loading value (*italic*) on its construct is greater than that of all of its cross-loadings in other constructs. The critical value for Heterotrait–Monotrait ratio should be below $.850$ [17, 19]. Shown in Table 5, all values are below the threshold. Through the results of bootstrapping (resampling of 5000) for the Heterotrait–Monotrait value, the confidence intervals shows that the values are below 1 indicating that all HTMT values are significantly different from 1. Based on the result of the three assessments, the discriminant validity of the model has been established

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Table 3. Discriminant validity: Fornell–Larcker criterion

	AT	IU	PEU	PU	ST
AT					
IU	.805				
PEU	.736	.636			
PU	.726	.634	.804		
ST	.470	.356	.440	.325	

Table 4. Discriminant validity: Cross-loading analysis

	AT	IU	PEU	PU	ST
AT1	.849	.711	.590	.526	.328
AT2	.855	.512	.519	.496	.387
AT3	.860	.568	.517	.517	.339
IU1	.708	.929	.547	.566	.305
IU2	.626	.936	.526	.509	.296
IU3	.619	.904	.530	.461	.304
PEU1	.550	.475	.862	.611	.360
PEU2	.553	.528	.872	.567	.314
PEU3	.570	.531	.909	.629	.373
PEU4	.586	.518	.898	.672	.350
PU1	.506	.490	.572	.824	.262
PU2	.533	.466	.575	.857	.253
PU3	.477	.415	.538	.778	.185
PU4	.452	.449	.610	.810	.241
ST1	.259	.221	.283	.175	.773
ST2	.188	.166	.246	.137	.813
ST3	.437	.346	.358	.309	.853
ST4	.371	.278	.362	.264	.805

The critical value for Heterotrait–Monotrait ratio is below $.85$ [18]. Shown in Table 5, all values are below the threshold. Through the results of bootstrapping (resampling of 5000) for the Heterotrait–Monotrait value, the confidence intervals shows that the values is below 1 indicating indicates that all HTMT values are significantly different from 1. Based on the result of the three assessments, the discriminant validity of the model is established.

Table 5. Discriminant validity: HTMT

	AT	IU	PEU	PU	ST
AT	.855				
IU	.708	.923			

PEU	.638	.579	.885		
PU	.602	.557	.702	.818	
ST	.409	.327	.395	.289	.811

4.2 Assessing the model

Before computing the data for the structural model assessment, Specifically, the sets of predictors were assessed for Collinearity by reporting the (VIF) VIF. For this study model, the VIF was examined for AT, PU, PEU, and IU as the predictors. All VIF values shown in Table 6 are lower than 3.000 which is the threshold value implemented for this study [16]. It indicates that the Collinearity is not a problem for the model.

In examining the relationships between exogenous and endogenous variables, the researchers computed the data through a bootstrapping process. Using 5,000 subsamples as suggested by previous studies [17, 19], a 5% significance relationship was reported to support the hypotheses. On the assumption of a 10% ($p < .01$) significance level, A all relationships but PU to ST and ST to IU ($p > .005$) are reported to be significant (Table 2). In detail, hypothesis 1 is supported; PEU is reported to have a significant predicting power to PU ($\beta = .702$; $t = 27.328$; $p < 0.01$). PEU also significantly predicts AT ($\beta = .426$; $t = 8.656$; $p < 0.01$) that supports the statement of hypothesis 2. In predicting ST (H3), PEU is also reported to be significant ($\beta = .379$; $t = 7.081$; $p < 0.01$). For hypothesis 4 and 5, PU significantly affected AT ($\beta = .303$; $t = 5.941$; $p < 0.01$) and IU ($\beta = .203$; $t = 4.966$; $p < 0.01$) while it does not significantly predict ST ($\beta = .023$; $t = .406$; $p = .674$); therefore, hypothesis 7 is not supported. Similarly, hypothesis 8 was also not supported: ST is not a significant predictor for IU ($\beta = .034$; $t = 1.043$; $p = .299$). However, AT is reported to be significant in predicting IU ($\beta = .572$; $t = 14.912$; $p < 0.01$) supporting hypothesis 8. The detail elaboration of path coefficient (β), t value, and p value is exhibited in Table 7 and Figure 2.

Table 6. Collinearity (VIF)

	AT	IU	PEU	PU	ST
AT		1.732			
IU					
PEU	1.969			1.000	1.969
PU	1.969	1.573			1.969
ST		1.205			

Table 7. The relationship among components

H	Relationship	β	p	Significance
H1	PEU $\rightarrow$ PU	.702	$p < .01$	✓
H2	PEU $\rightarrow$ AT	.426	$p < .01$	✓
H3	PEU $\rightarrow$ ST	.379	$p < .01$	✓
H4	PU $\rightarrow$ AT	.303	$p < .01$	✓
H5	PU $\rightarrow$ IU	.203	$p < .01$	✓
H6	PU $\rightarrow$ ST	.023	.674	No
H7	AT $\rightarrow$ IU	.572	$p < .01$	✓
H8	ST $\rightarrow$ IU	.034	.299	No
AT $\rightarrow$ IU		.572	$p < .01$	✓
PEU $\rightarrow$ AT		.426	$p < .01$	✓
PEU $\rightarrow$ PU		.702	$p < .01$	✓
PEU $\rightarrow$ ST		.379	$p < .01$	✓
PU $\rightarrow$ AT		.303	$p < .01$	✓
PU $\rightarrow$ IU		.203	$p < .01$	✓

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PU→ST	.023	.674	-
ST→IU	.034	.299	-

To support the examination of the path coefficient, t value, and p value of the data, the result of the coefficient determination (R^2), effect size of f^2 , and predictive relevance (Q^2) were also informed. Based on the result, the R^2 value for AT is .452 (weak), for IU (.527, moderate), and PU (.492, weak), which means that the data have a good level of predicting accuracy; however, ST has no predicting accuracy (.154). For the effect size of f^2 , the value of PEU to PU (.969) is the largest followed by AT to IU with .401 (large) and PEU to AT (.168, large). On the other hand, the effect sizes of f^2 between PU and AT (.086), PU and IU (.056), and PEU and ST (.087) are categorized as “small”. No effect sizes of f^2 between IU and ST (.001) as well as PU and ST (.000). Last measurement, cross-validated redundancy measure (Q^2) to measure predictive relevance which was done through the blindfolding process in PLS-SEM resulting IU to have the largest Q^2 value (.423) followed by AT with the value of .310 (medium) and PU with .310 (medium). ST has the smallest predictive relevance value of .099 (small). From these results, it is proven that the Q^2 values of all constructs support the model's predictive relevance for all five endogenous constructs.

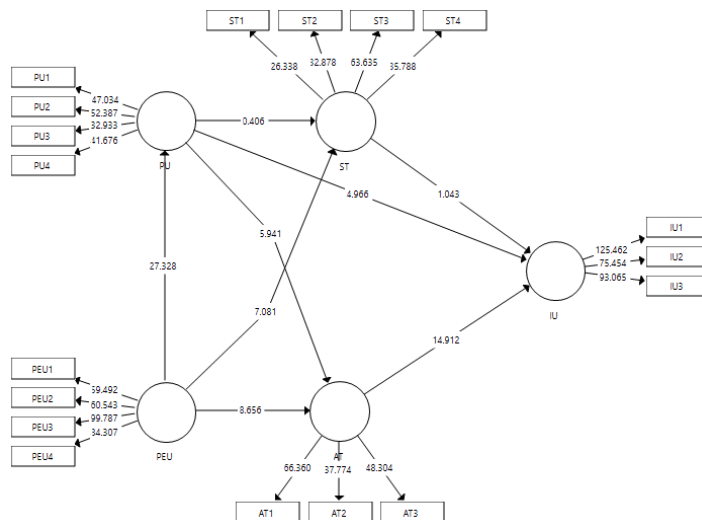


Figure 2. Final model; t value

The result of the coefficient determination (R^2) was also informed. Based on the result, the R^2 value for AT is .452 (weak), for IU (.527, moderate), and PU (.492, weak), which means that the data have the good level of predicting accuracy; however, ST has no predicting accuracy (.154). For the effect size of f^2 , the value of f^2 of PEU to PU (.969) is the largest followed by AT to IU with .401 (large) and PEU to AT (.168 large). On the other hand, the effect sizes of f^2 between PU and AT (.086), PU and IU (.056), and PEU and ST (.087) are categorized as “small”. No effect sizes of f^2 between IU and ST (.001) as well as PU and ST (.000). Last measurement, cross-validated redundancy measure (Q^2) to measure predictive relevance which was done through the blindfolding process in PLS-SEM resulting IU to have the largest Q^2 value (.423) followed by AT with the value of .310 (medium) and PU with .310 (medium). ST has the smallest predictive relevance value of .099 (small). From these results, it is proven that the Q^2 values of all constructs support the model's predictive relevance for all five endogenous constructs.

11. Discussion

The main objective of the current research was to measure and assess a model of factors influencing Indonesian pre-service teachers' satisfaction (ST) and intention to use (IU) the Internet for learning through an extended Technology Acceptance Model (TAM) that has also been discussed in numerous previous studies [e.g. 4, 10, 22]. This current study's path analysis informs that the proposed model is valid and reliable for the context of developing countries, especially Indonesia. The valid and reliable model of the study is expected to address contribution as a guideline for future researchers in assessing the use of the Internet in higher education.

From the assessment of the structural model, the results of the bootstrapping analysis also report that PEU has a significant influence to PU. It is in line with the report from [8] and [9] who revealed that PU was significantly predicted by PEU. Similarly, PEU is also reported to be the strongest predictor for AT which agrees to the previous report [10]. PEU is also reported to influence ST. Similar results from [4] who reported that PEU is significant for affecting ST. With more than 100 million internet users in Indonesia that are dominated by millennial, pre-service teachers' PEU can be a strong foundation for educational stakeholders, especially in developing countries, to improve the integration of technology in pre-service teacher training programs. Nowadays, millennial always count on the Internet. Indonesian users of the Internet are exceeding 100 million users, mostly millennial including pre-service teachers. The fact that PEU has a significant role in predicting PU, ST, and AT could be the reasons why because these pre-service teachers are accustomed to using the Internet for a daily basis and learning; their perceived ease of use is highly in line with this fact. Therefore, the use of the Internet should always be developed, especially for educational institutions in rural areas where the Internet is still considered as an exclusive item.

PU in this study is reported to have a significant effect on AT. This path relationship is coherent with earlier researchers informing that AT was affected by users' PU in using the Internet [6] and Google apps [9]. The findings also verify that we also did the verification that PU had an essential influence on IU which is similar to some previous studies' results [6, 7, 9]. This means that Indonesian pre-service teachers IU are dependent on their perceptions of the benefits of technology use in their learning. On the other hand, the results of the PLS-SEM revealed that Indonesian pre-service teachers' PU does not significantly predict ST meaning that there is no strong correlation between their perceptions of benefits and their satisfaction in using the Internet. This fact contrasts earlier findings which showed a significant correlation between the two, PU and ST (4, 10, 11). However, it is similar to the result of [2] that reported PU had a low effect on ST. It might be triggered by the fact that the infrastructure and facilities of the Internet in Indonesian higher institutions are still lacking. Therefore, appropriate internet network services should be facilitated by the Internet service providers, educational institution and Indonesian telecommunication providers, to improve users' satisfaction.

AT is reported to positively predict IU. Indonesian pre-service teachers' behavior towards the Internet is a key factor predicting their intention to use it in learning which was also reported by earlier studies [6, 12]. Their high positive attitudes towards the Internet might be due to the fact that the Internet has been a very integral part of their learning for sources of knowledge, information, as well as and entertainment. However, IU is not predicted by ST; it counters the results of some studies [13, 14] informing that ST was a key determinant for IU or actual use of technology into instruction. Regarding this, training on the use of the Internet in educational activities is suggested to always be promoted.

12. Conclusions and Implications

The adoption of the Internet in higher education especially in developing countries is very important in obtaining an improvement in betterment of educational sector for the age of the 4.0 industrial revolutions. The Internet can have many benefits to change tools for teachers, students, and also future teachers [3]. This study has reaffirmed an extended TAM framework to be a valid and reliable model in predicting factors influencing the intention to use technology, especially the Internet, in another setting and context. It has also disseminated the use of PLS-SEM to measure and to assess the proposed model as well as to establish the correctness of the generalizability of the extended TAM framework assessing Indonesian pre-service teachers' intention to use the Internet in learning. In addition, the current study has also confirmed that ST as the extended construct involved in the TAM framework can be beneficial for future researchers who have similar interests to conduct studies regarding the use of technology in higher education institutions. additional construct included in the TAM framework. The study is also expected to support findings of previous studies, especially those which reported the findings regarding technology integration in classroom learning, especially in developing countries like Indonesia.

Besides recommendations and suggestions offered for future studies, This the current study possessed some limitations. This study was confined to pre-service teachers who studied in only five Indonesian universities while there are many other higher institutions that have implemented the Internet services in Indonesia. This study also excluded the demographic information differences regarding the TAM constructs, perceived ease of use, perceived usefulness, attitudes, intention to use, and an additional construct, satisfaction. The participants of this study should be more various such as school teachers, post-graduate students, lecturers, and administrative staff. In order to generalize the findings, future elaboration and investigation on cross-cultural validation of the TAM with satisfaction and other external constructs should be promoted to shed more light on users' intention to use the Internet, online research, m-learning, information systems, e-portfolios, and other research objects.

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Factors Influencing Pre-service Teachers' Satisfaction and Intention to Use the Internet: A Structural Equation Modeling

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Abstract—The current study aimed at exploring factors influencing Indonesian pre-service teachers' satisfaction and intention to use the Internet for learning. Implementing an extended technology acceptance model, data were gathered from 596 Indonesian pre-service teachers from five universities. The measurement and the assessment of the model were computed through partial least square structural equation modeling. For the measurement model, we computed data's reflective indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. Meanwhile, the reports of the constructs' relationships, coefficient determination (R^2), effect size of f^2 and predictive relevance (Q^2) were addressed for the assessment of the structural model. The model was valid and reliable that informed six significant relationships out of eight hypotheses. The pre-service teachers' satisfaction using the Internet for learning was strongly influenced by perceived ease of use and intention to use. Meanwhile, their intention to use the Internet was strongly influenced by their attitude, perceived usefulness, and perceived ease of use. Recommendation and suggestion were offered for the betterment of Indonesian education.

Keywords-- Internet, higher education, intention to use, structural equation modeling

1. Introduction

The world has changed rapidly where the use of the Internet has expanded in all areas of life, such as education, economy, health, business, and industry. Governments in developing countries are now in the race of bringing the digital era as their top priorities to manage the change. Most of these countries encourage internet access by connecting the services to all people in their country [1]. Regarding the development of technology, internet access has been widely provided and available as a very important source for education. The Internet, especially wireless technology, has emerged in some forms of learning such as e-learning and m-learning [2]. Some studies have developed to inform

the capability of the Internet application in education to encourage knowledge acquisition [3]. In addition, recent studies have also reported the positive impacts of the Internet in promoting pre-service teachers' interaction, flexibility in learning, physical mobility, self-monitoring, and metacognition improvement.

In spite of the ubiquitous studies regarding the application of the Internet in higher educational level, there are limited studies about contributing factors influencing the satisfaction and intention to use the Internet for learning among pre-service teachers [4]. To achieve the purposes of the study, an extended Technology Acceptance Model (TAM) was implemented; besides the three main factors of the TAM (Perceived Ease of Use or PEU, Perceived Usefulness or PU, and Attitude or AT), Satisfaction (ST) was added as the extended factor. ST is an essential indicator for both e-learning and m-learning. It is reported to have a connection with the improvement of pre-service teachers' academic persistence and success [3].

2. Literature review

The adoption of the Internet in higher education is very crucial to achieve transformation in teaching and learning activities [1]. The Internet can function as a transforming tool for all educational stakeholders, especially students to actively use technology in learning [3]. It can improve the learning environment and encourage innovation in learning. In general, the Internet supports the establishment of the concept of group-based learning, practical flexibility, content and learning creativity, and personal learning.

2.1 Technology acceptance model (TAM) and Satisfaction (ST)

In this study, TAM was adapted as a guideline framework accompanied by Satisfaction (ST). The TAM was founded by Davis in 1989 [5] extending the theory of reasoned action. In this study, it consists of three main constructs; 1) PEU, PU, and AT to predict Intention to Use (IU). Many studies have extended TAM [5] by adding additional factors facilitating its functions [e.g. 6, 7, 8, 9]. However, few studies have been done by extending ST into the original TAM [4]. ST is the extent factor whether the adoption of technology is in line with the needs, experiences, and emerging values when users use the technology [4]. We applied ST as an extended factor of TAM in order to understand its influences on Indonesian pre-service teachers' IU (Figure 1).

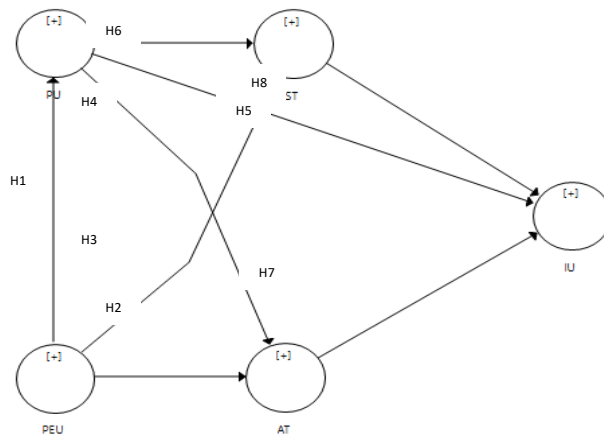


Fig. 1. Proposed model

2.2 Perceived ease of use (PEU)

PEU in this study is defined as pre-service teachers' perception of the way of easiness to use the Internet service for their learning. PEU has been informed to significantly influence PU and AT in many studies involving the Internet and its components (8, 9, 10). YouTubers' PEU had statistically correlation with PU and AT [10]. Meanwhile, [8] reported that PEU has significantly predicted PU and AT in m-learning activities. Also, PEU positively influenced PU and IU regarding Google group applications on the Internet [9]. In affecting ST, PEU is also informed to have a strong correlation in mobile technology [10]. These works of literature guide to three hypotheses for this study;

- H1. PEU would have a positive influence on PU.
- H2. PEU would have a positive influence on AT
- H3. PEU would have a positive influence on ST

2.3 Perceived usefulness (PU)

In this study, PU is informed as pre-service teachers' perceptions about the beneficial factors obtained from using the Internet service provided by the higher education institutions. PU is one of the significant constructs to influence AT, IU, and ST. In some studies, PU was reported to predict AT and IU [e.g. 4, 6, 9]. For example, [9] informed that PU had a big influence in predicting IU to foster student achievement and promoting knowledge sharing. Similarly, in predicting AT, PU was also among the effective predictors in the adoption of ICT during learning activities [6]. Regarding ST, PU has also been involved in some studies [e.g. 4, 11] that reported strong relationships. However, a low path effect between PU and ST ($\beta = .190$) was also informed [2].

- H4. PU would have a positive influence on AT
- H5. PU would have a positive influence on IU
- H6. PU would have a positive influence on ST

2.4 Attitudes (AT)

The current study refers AT as pre-service teachers' certain behavior connected with the use of the Internet. AT has been a key predictor in influencing IU [6, 12]. Hence, AT was also involved in this study.

- H7. AT would have a positive influence on IU.

2.5 Satisfaction (ST)

ST in this study is defined as the extent to which the adoption of technology related to the need, experiences, and emerging values when pre-service teachers use the Internet [4]. The construct has been widely reported to have predicted IU in many studies [e.g. 13, 14]

- H8. ST would have a positive influence on IU.

3. Method

The researchers applied a survey as one of the non-experimental designs in a quantitative culture which has been conducted in numerous fields of study. The entire population is all Indonesian pre-service teachers, more than 1 million. In addition, the target population of this study is Indonesian pre-service teachers who have been provided by the service of the Internet in their higher education learning. The study was funded by Universitas Jambi through its research center, No: 9175/UN/2019. The researchers established the instrument by adapting items from previous related studies and proceeded 596 responses for the main data analysis through Statistical Package for Social Studies (SPSS) and Partial Least Square Structural Equation Modeling (PLS-SEM); SPSS 23.0 and SmartPLS 3.0 were tools for the data analysis.

3.1 Establishing the instrument

The threats of the validity in this survey study are bias of publication selection, data extraction inaccuracy, and misclassification [15]. Through a careful selection and adaptation of the items from previous related journals, the instrument of the current study was established. In addition, face and content validity procedures were conducted. To reduce the issue of data extraction inaccuracy, pilot study was conducted to examine the reliability of the data. For the misclassification, measurement model was chosen to extract factors affecting intention to use the Internet for learning. This study adapted the questionnaire from previous studies [4, 5, 7, 8] and a 5-point Likert scale from 'strongly disagree' to 'strongly agree' was implemented. There were 22 indicators included in this adaptation stage. Before collecting the main data to empirically measure and assess the model, the questionnaire was validated through the face and content validity as well as a pilot test. Five pre-service teachers as users (face) and five Ph.D. researchers as experts (content) checked the items of the instrument. Using two sessions of focus group discussion, the users and experts were requested to discuss and address their concern regarding the items to fit the context and settings of the study. Based on the feedback obtained from the discussions, the sentences' dictions and structures of some indicators were modified for the betterment of the understanding of the participants; the order of some indicators was revised for facilitating an appropriate sequence. Finally, two indicators were dropped based on the feedback of the experts because the context is not in line with the Indonesian higher education contexts. The items were translated using back translation [16] involving two linguistics experts. To further purify the instrument, it was piloted to 57 pre-service teachers in order to report the instrument's reliability through the examination of Cronbach's alpha for each construct; the values ranged from .800 and .940. The results indicated that the constructs involved had no issues with the reliability. Twenty indicators were established after all processes, from adaptation to the assessment of pilot study data.

3.2 Data collection

The procedures for the main data collection were begun after the examination of the first reliability from the piloting procedure. The inclusion criterion applied in this study's samples was pre-service teachers with personal computers, laptops, or smartphones with the Internet connection. The data collection time was from January to July 2019. Six hundred and fifteen pre-service teachers from four universities filled in the questionnaires. After removing 19 data due to incomplete responses, 596 responses were further analyzed. The participants consisted of 95 (15.93%) males and 501 females (84.06%) whose ages between 19 and 22 years old. The sample of this study was deemed sufficient in implementing PLS-SEM [17]. Data were analyzed using SPSS version 23.0 and SmartPls 3.0.

3.3 Data analysis

Prior to the main data analysis, the raw data were assessed for missing data, outliers, and normality [18]. Missing data with higher percentage (>5%) were eliminated while responses with less than 5% of missing data were fixed by replacing the responses' missing value with the median value (3). Using the SPSS, outliers were recognized by a box plot for each construct. For the univariate normality of the construct, the values were that the skewness and kurtosis for each indicator should range between -1.96 and +1.96 at 5% of significance level. No correlation valued at .900 showing that the multicollinearity was not an issue for the data. The data were then computed for the assessment of measurement and structural model.

Two stages of data analysis were conducted; measuring the model for establishing the data construct validity and assessing the model to determine the relationship between constructs. In measuring the model, four measurements were applied namely reflective indicator loadings with a threshold value of .700 [19, 20, 21], internal consistency reliability using Cronbach's alpha and Composite Reliability (between > .800 and <.950), convergent validity with Average Variance Extracted of $\geq .500$, and discriminant validity using Fornel-Larcker Criterion, cross-loading and Heterotrait–Monotrait. On the other hand, five assessments were used in assessing the model; the reports of Variance Inflation Factor (VIF) values, path coefficient, coefficient determination (R^2), effect size of f^2 and predictive relevance (Q^2). The explanation of each stage and the threshold for the structural model assessment can be seen in Table 1.

Table 1. Stages of assessing the model [16]

Structural model	Threshold
Collinearity (VIF)	VIF < 3.000
Path coefficients (β)	$p < .005$
Coefficient determination (R^2)	.750 (substantial), .500 (moderate), and .250 (weak).
Effect size of f^2	.020 (small), .150 (medium), and .350 (large)
predictive relevance (Q^2)	.020 (small), .150 (medium), and .350 (large)

4. Findings

4.1 Assessing reflective measurement the model

We utilized PLS-SEM algorithm in SmartPLS 3.0 to measure the reflective indicator loadings [17]. The indicator loadings recommended for this study were $>.708$ [17]. Two indicators, IU 4 and PU5 were dropped due to the detection of low reflective loadings. After the dropping procedure, most items exceeded the indicator loadings; IU2 achieved the highest loading of .936 while the lowest loading of .773 was earned by ST1.

After the dropping process in the first step of measurement model assessment, the researchers computed the internal consistency reliability, an evaluative procedure to understand the results across items consistency [17]. In PLS-SEM method, Cronbach's alpha and composite reliability should be computed [17, 19]. The values for the reliability should be between 0 and 1; the more a construct has the score, the higher level of reliability is informed. The values of Cronbach's alpha and composite reliability should exceed .800 and be lower than .950 that can be defined as indicator redundancies [17]. Table 2 performs the values of the Cronbach's alpha and composite reliability; all values have met the cut-off points used in this study ($>.800$ and $<.950$).

Table 2. Measuring the model: loadings, α , CR, and AVE

Construct	Item	loading	α	CR	AVE
Attitude (AT)	AT1	.849	.817	.890	.730
	AT2	.855			
	AT3	.860			
Intention to Use (IU)	IU1	.929	.914	.945	.852
	IU2	.936			
	IU3	.904			
Perceived Ease of Use (PEU)	PEU1	.862	.908	.936	.784
	PEU2	.872			
	PEU3	.909			
	PEU4	.898			
Perceived Usefulness	PU1	.824	.835	.890	.669
	PU2	.857			
	PU3	.778			
	PU4	.810			
Satisfaction (ST)	ST1	.773	.831	.885	.659
	ST2	.813			
	ST3	.853			
	ST4	.805			

For the convergent validity, AVE is suggested to elaborate as the metric to measure [17]. In calculating the AVE, we applied SmartPLS algorithm. The recommended AVE value should be $\geq .500$ that explains 50% or more of the variance of the construct items. The values of AVE also exceed .500 informing the establishment of convergent validity or 50% of the variance (Table 2).

Meanwhile, for the discriminant validity (Tables 3, 4, and 5), the values of Fornell–Larcker criterion are shown by square values of AVEs showing AVEs on one construct are greater than all of its loadings with other constructs [17].

Table 4 performs that the indicator's loading value (*italic*) on its construct is greater than that of all of its cross-loadings in other constructs. The critical value for Heterotrait–Monotrait ratio should be below .850 [17, 19]. Shown in Table 5, all values are below the threshold. Through the results of bootstrapping (resampling of 5000) for the Heterotrait–Monotrait value, the confidence intervals show that the values are below 1 indicating that all HTMT values are significantly different from 1. Based on the result of the three assessments, the discriminant validity of the model has been established.

Table 3. Discriminant validity: Fornell–Larcker criterion

	AT	IU	PEU	PU	ST
AT					
IU	.805				
PEU	.736	.636			
PU	.726	.634	.804		
ST	.470	.356	.440	.325	

Table 4. Discriminant validity: Cross-loading analysis

	AT	IU	PEU	PU	ST
AT1	.849	.711	.590	.526	.328
AT2	.855	.512	.519	.496	.387
AT3	.860	.568	.517	.517	.339
IU1	.708	.929	.547	.566	.305
IU2	.626	.936	.526	.509	.296
IU3	.619	.904	.530	.461	.304
PEU1	.550	.475	.862	.611	.360
PEU2	.553	.528	.872	.567	.314
PEU3	.570	.531	.909	.629	.373
PEU4	.586	.518	.898	.672	.350
PU1	.506	.490	.572	.824	.262
PU2	.533	.466	.575	.857	.253
PU3	.477	.415	.538	.778	.185
PU4	.452	.449	.610	.810	.241
ST1	.259	.221	.283	.175	.773
ST2	.188	.166	.246	.137	.813
ST3	.437	.346	.358	.309	.853
ST4	.371	.278	.362	.264	.805

Table 5. Discriminant validity: HTMT

	AT	IU	PEU	PU	ST
AT	.855				
IU	.708	.923			
PEU	.638	.579	.885		
PU	.602	.557	.702	.818	
ST	.409	.327	.395	.289	.811

4.2 Assessing the model

Before computing the data for the structural model assessment, the sets of predictors were assessed for Collinearity by reporting the VIF. For this study model, the VIF was examined for AT, PU, PEU, and IU as the predictors. All VIF values shown in Table 6 are lower than 3.000 which is the threshold implemented for this study [16]. It indicates that the Collinearity is not a problem for the model.

In examining the relationships between exogenous and endogenous variables, the researchers computed the data through a bootstrapping process. Using 5,000 subsamples as suggested by previous studies [17, 19], a 5% significance relationship was reported to support the hypotheses. All relationships but PU to ST and ST to IU are reported to be significant (Table 2). In detail, hypothesis 1 is supported; PEU is reported to have a significant predicting power to PU ($\beta = .702$; $t = 27.328$; $p < 0.01$). PEU also significantly predicts AT ($\beta = .426$; $t = 8.656$; $p < 0.01$) that supports the statement of hypothesis 2. In predicting ST (H3), PEU is also reported to be significant ($\beta = .379$; $t = 7.081$; $p < 0.01$). For hypothesis 4 and 5, PU significantly affected AT ($\beta = .303$; $t = 5.941$; $p < 0.01$) and IU ($\beta = .203$; $t = 4.966$; $p < 0.01$) while it does not significantly predict ST ($\beta = .023$; $t = .406$; $p = .674$); therefore, hypothesis 7 is not supported. Similarly, hypothesis 8 was also not supported; ST is not a significant predictor for IU ($\beta = .034$; $t = 1.043$; $p = .299$). However, AT is reported to be significant in predicting IU ($\beta = .572$; $t = 14.912$; $p < 0.01$) supporting hypothesis 8.

Table 6. Collinearity (VIF)

	AT	IU	PEU	PU	ST
AT		1.732			
IU					
PEU	1.969			1.000	1.969
PU	1.969	1.573			1.969
ST		1.205			

Table 7. The relationship among components

H	Relationship	β	p	Significance
H1	PEU $\rightarrow$ PU	.702	$p < .01$	✓
H2	PEU $\rightarrow$ AT	.426	$p < .01$	✓
H3	PEU $\rightarrow$ ST	.379	$p < .01$	✓
H4	PU $\rightarrow$ AT	.303	$p < .01$	✓
H5	PU $\rightarrow$ IU	.203	$p < .01$	✓
H6	PU $\rightarrow$ ST	.023	.674	No
H7	AT $\rightarrow$ IU	.572	$p < .01$	✓
H8	ST $\rightarrow$ IU	.034	.299	No

To support the examination of the path coefficient, t value, and p value of the data, the result of the coefficient determination (R^2), effect size of f^2 , and predictive relevance (Q^2) were also informed. Based on the result, the R^2 value for AT is .452 (weak), for IU (.527, moderate), and PU (.492, weak), which means that the data have a good level of predicting accuracy; however, ST has no predicting accuracy (.154). For the effect size of f^2 , the value of PEU to PU (.969) is the largest followed by AT to IU with .401 (large) and PEU to AT (.168, large). On the other hand, the effect sizes of f^2 between PU and AT (.086), PU and IU (.056), and PEU and ST (.087) are categorized as “small”. No effect sizes of f^2 between IU and ST (.001) as well as PU and ST (.000). Last measurement, cross-validated redundancy measure (Q^2) to measure predictive relevance which was done through the blindfolding process in PLS-SEM resulting IU to have the largest Q^2 value (.423) followed by AT with the value of .310 (medium) and PU with .310 (medium). ST has the smallest predictive relevance value of .099 (small). From these results, it is proven that the Q^2 values of all constructs support the model’s predictive relevance for all five endogenous constructs.

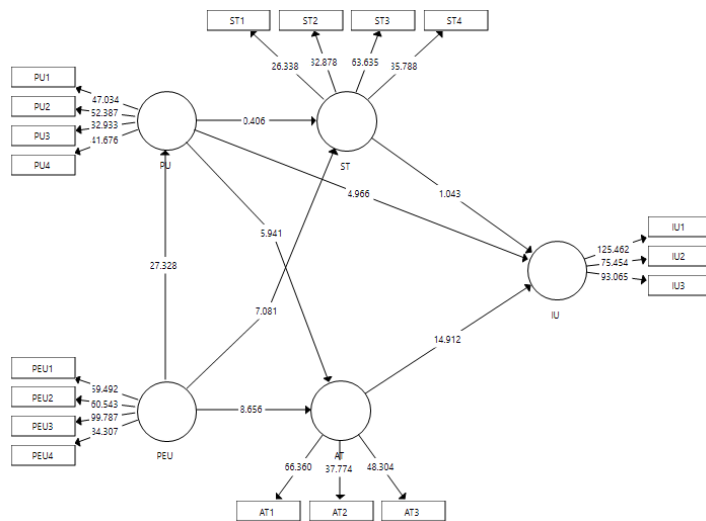


Fig. 2. Final model; t value

5. Discussion

One of the purposes of the current research was to measure and assess a model of factors influencing Indonesian pre-service teachers' satisfaction (ST) and intention to use (IU) the Internet for learning through an extended Technology Acceptance Model (TAM) that has also been discussed in numerous previous studies [e.g. 4, 10, 22, 23]. This current study's path analysis informs that the proposed model is valid and reliable for the context of developing countries, especially Indonesia. The valid and reliable model of the study is expected to address contribution as a guideline for future researchers in assessing the use of the Internet in higher education.

From the assessment of the structural model, the results of the bootstrapping analysis report that PEU has a significant influence on PU. It is in line with the report from [8] and [9] who revealed that PU was significantly predicted by PEU. Similarly, PEU is also reported to be the strongest predictor for AT which agrees to the previous report [10]. PEU is also reported to influence ST. Similar results from [4] who reported that PEU is significant for affecting ST. With more than 100 million internet users in Indonesia that are dominated by millennial, pre-service teachers' PEU can be a strong foundation for educational stakeholders, especially in developing countries, to improve the integration of technology in pre-service teacher training programs. The fact that PEU has a significant role in predicting PU, ST, and AT could be the reasons why the pre-service teachers are accustomed to using the Internet for a daily basis and learning; their perceived ease of use is highly in line with this fact. Therefore, the use of the Internet should always be developed, especially for educational institutions in rural areas where the Internet is still considered as an exclusive item.

PU in this study is reported to have a significant effect on AT. This path relationship is coherent with earlier researchers informing that AT was affected by users' PU in using the Internet [6] and Google apps [9]. The findings also verify that PU has an essential influence on IU which is similar to some previous studies' results [6, 7, 9]. This means that Indonesian pre-service teachers IU are dependent on their perceptions of the benefits of technology use in their learning. On the other hand, the results of the PLS-SEM revealed that Indonesian pre-service teachers' PU does not significantly predict ST meaning that there is no strong correlation between their perceptions of benefits and their satisfaction in using the Internet. This fact contrasts earlier findings which showed a significant correlation between the two, PU and ST [4, 10, 11]. However, it is similar to the result of [2] that reported PU had a low effect on ST. It might be triggered by the fact that the infrastructure and facilities of the Internet in Indonesian higher institutions are

still lacking. Therefore, the Internet service providers, educational institution and Indonesian telecommunication providers should facilitate appropriate internet network services, to improve users' satisfaction.

AT is reported to positively predict IU. Indonesian pre-service teachers' behavior towards the Internet is a key factor predicting their intention to use it in learning which was also reported by earlier studies [6, 12]. Their high positive attitudes towards the Internet might be due to the fact that the Internet has been a very integral part of their learning for sources of knowledge, information, and entertainment. However, IU is not predicted by ST; it counters the results of some studies [13, 14] informing that ST was a key determinant for IU or actual use of technology into instruction. Regarding this, training on the use of the Internet in educational activities is suggested to always be promoted.

6. Conclusions and Implications

The adoption of the Internet in higher education especially in developing countries is very important in obtaining an improvement in educational sector for the 4.0 industrial revolutions. The Internet can have many benefits to change tools for teachers, students [3]. This study has reaffirmed an extended TAM framework to be a valid and reliable model in predicting factors influencing the intention to use technology, especially the Internet, in another setting and context. It has also disseminated the use of PLS-SEM to measure and assess the proposed model as well as establish the correctness of the generalizability of the extended TAM framework assessing Indonesian pre-service teachers' intention to use the Internet in learning. In addition, the current study has also confirmed that ST as the extended construct involved in the TAM framework can be beneficial for future researchers who have similar interests to conduct studies regarding the use of technology in higher education institutions. The study is also expected to support findings of previous studies, especially those which reported the findings regarding technology integration in classroom learning, especially in developing countries like Indonesia.

Besides recommendations and suggestions offered for future studies, the current study possessed some limitations. This study was confined to pre-service teachers who studied in only five Indonesian universities while there are many other higher institutions that have implemented the Internet services in Indonesia. This study also excluded the demographic information differences regarding the TAM constructs, perceived ease of use, perceived usefulness, attitudes, intention to use, and an additional construct, satisfaction. The participants of this study should be more various such as schoolteachers, post-graduate students, lecturers, and administrative staff. In order to generalize the findings, future elaboration and investigation on cross-cultural validation of the TAM with satisfaction and other external constructs should be promoted to shed more light on users' intention to use the Internet, online research, m-learning, information systems, e-portfolios, and other research objects.

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