TIERS Information Technology Journal
Vol.3, No.1, June 2022, pp. 11~16
ISSN: 2723-4533 / E-ISSN: 2723-4541
DOI: 10.38043/tiers.v3i1.3517

Selection of External Factors for Enhanced Technological Acceptance Model for E-Learning

Abdul Cader Mohamed Nafrees
nafrees55@gmail.com
Office of the Dean, Faculty of Islamic Studies and Arabic Language, South Eastern University of Sri Lanka

ABSTRACT

A properly regulated e-learning process is one of the utmost needs of this globe these days due to the pandemic. In that sense, researchers have been conducting research but none of those provide a global solution because of selected external factors and sample size. Researchers have used different EFs to develop the TAM for E-Learning but there were no common highly related EFs used in any research. Therefore, this study provides a significant suggestion to select most suitable and common EFs and future research direction by conducting a systematic review study. Therefore, EFs must include not only student perspectives but also staff and parents, similarly, EFs must include not only user-friendliness, system quality, content quality, satisfaction, and self-efficacy but also technical support, anxiety, privacy, and security. Furthermore, the same study analyzes and suggested the most required future research direction for TAM for E-learning such as Developing VR and augmented reality e-learning tools, understanding the use of e-learning from qualitative perspectives through interview or focus group discussions, and Game-based educational tools. Furthermore, selecting the articles for this study was challengeable due to less number of articles published recently and closed access permission.

Keywords: TAM; E-Learning; Pandemic; Systematic Review;

Article Info

Accepted : 03-05-2022
Revised : 01-04-2022
Published Online : 25-06-2022

Correspondence Author:

Abdul Cader Mohamed Nafrees
Office of the Dean, Faculty of Islamic Studies and Arabic Langugae,
Sout Eastern University of Sri Lanka,
62/1, Small Mosque North, Sainthamaruthu – 11, 32280, Eastern, Sri Lanka.
Email: nafrees@seu.ac.lk

1. INTRODUCTION

Electronic Learning (E-Learning (EL)) or Distance Learning is not the new concept to the educational organizations but there were no standard mechanisms developed in many countries around the globe. A sudden move towards pure e-learning process due to the pandemic since 2019 for both students and staff create a lots of confusion and difficulties for teaching, learning, and conducting assessment. It is because, not all user friendly with digital device use, internet speed issues, security & privacy issues, and no separate place in their home for studies [1].

There were multiple kinds of research have been conducted across the globe on the development of the Technology Acceptance Model (TAM) for EL but all those studies consider different EF selections for the development of TAM. It creates a huge gap between these researches due to no common EFs used in their studies. Because of this, developed TAMs cannot be used as a common framework for EL purposes. Therefore,

research needs to be done by considering the most suitable and common EFs when developing TAM for EL. This study focus on the selection of the most suitable and common EFs for the enhanced TAM for EL.

Technology Acceptance Model (TAM) is globally accepted model for accessing use of actual system by analyzing user's motivation factors such as information system features and capabilities [2]. It is required to know Actual Use (AU) and Net Benefit (NB) of clients of e-learning through few factors such as Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Trust in e-learning Technologies, Behavioral Intension Use (BIU), and User Satisfaction (US) by using some selected variables to reduce the issues discussed above. The below figure 1 illustrates the overall view of TAM diagram.

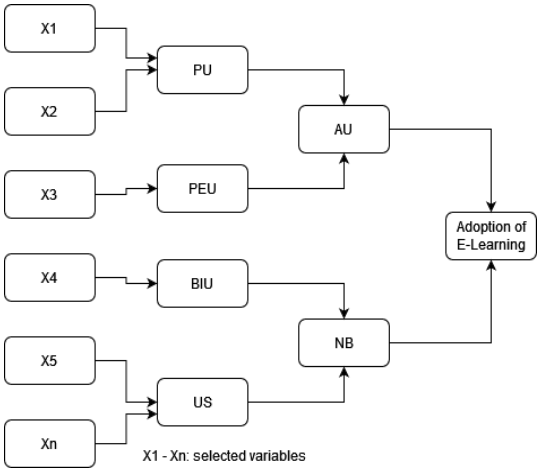

Figure 1: overview of TAM for E-Learning adoption

This paper focused on overview of TAM for the adoption of e-learning, especially after the pandemic has been started. Furthermore, this study comprises majorly based on e-learning and TAM that were published after the pandemic. It was used systematic review technique to extract required data based on the formulated research questions to collect the evidence [3]. Conclusions were drawn according to the formulated research questions.

2. EXISTING RESEARCHES

This section summarizes the previous studies in tabularized format to find most important external variable for TAM and utmost needful research direction for the future research purposes.

Furthermore, this section tabularized all the required data from the existing studies rather than making paragraphs. Also, this section mainly focuses on EFs used in the previous studies and research gaps provided in the same study. Where these summarized data use for the selection of utmost and common EFs that can be used for future research studies.

Table 1: Summarized TAM and E-Learning researches

Article	External Factors (EF)	Future Research direction	Limitations
[4]	Computer self-efficacy, subjective/social norm, system quality, information quality, content quality, accessibility, and computer playfulness.	The same research can be done for large data set including both government and private universities and for long period of time rather than single point in time.	Instructors not included in sampling. Only few private universities included for data collection.
[5]	System quality, prior e-learning experience	It can be done with the participation of more number of universities while increase the number of external factors.	Less external factors, Male participation low, and Single University.
[6]	Academic motivation, Knowledge quality, Technology fit.	N/ A	N/ A
[7]	Accessibility, subjective/social norm, computer playfulness.	Adding other variables that affect the acceptance of online learning applications for parents as companions.	Limited Sample collected region. School only.
[8]	Educational Technology, Content quality, Motivation, attitude	N/A	Time restriction, Single Institution.
[9]	Learning styles, Self-efficacy	N/A	N/A

[10]	Teacher's E-Learning experience.	Consider other EFs, such as school facilities and support for the integration of E-learning.	Single EF, only mathematics teachers included from a single institute.
[11]	Motivation, Anxiety, Satisfaction, Attitude, Technological experience, Self-efficacy	N/ A	Single college.
[12]	User-friendly, Satisfaction, E-retention	Need to conduct the same research across other countries for generalize.	Single university.
[13]	Usefulness of the system.	Participants' pre- and post perceptions of the technology's value and ease of use	Less sample size, short duration.
[14]	Social Influence, Satisfaction, User-friendly	Suggested to include staff and privacy & security EFs.	Only private universities included.
[15]	Self-confident, usefulness, easiness.	N/ A	Less EFs and narrowed sample.
[16]	Anxiety, Content quality, Experience, Facilitating conditions, Individual innovativeness, Self-efficacy, Service/System quality, Social norm	technology acceptance in VR innovations and task-level TAM applications	N/ A
[17]	Computer Self-efficacy, Individual innovativeness, Computer anxiety, Enjoyment, Experience, Content quality, facilitation condition.	N/A	N/A
[18]	Experiences, Challenges and Barriers, User-friendliness,	N/A	Single university and short duration for data collection.
[19]	Computer self-efficacy, Social influence, Enjoyment, System interactivity, Computer anxiety, Technical support.	Same study can be extended by adding EF such as user satisfaction.	Less responses.
[20]	Security and Privacy	Examine the relationship of perceived security with E-Learning acceptance in the presence of different antecedents to compare the effect of different variables.	N/ A
[21]	Instructor characters, student characters, severity of COVID-19	N/A	N/A
[22]	Attitude, Facilitating condition, Use of e-learning during Covid-19	Understand the use of e-learning from qualitative perspectives through the interview or focus group discussions.	Respondents are only from sport science education
[23]	Attitude, affect, motivation, self-efficacy, challenges, ease of use, Accessibility.	Test if a short training about self-efficacy and motivation strategies for students can improve their cognitive engagement during online learning.	Narrowed range of data collection and Online survey.
[24]	Facilitating conditions, available resource, Job relevance, Computer self-efficacy, Subjective norm, Age, Computer anxiety.	Test and validate this augmentation of the TAM model in other agricultural settings around the globe and with larger and more diverse sample sizes.	N/A
[25]	Usefulness of the Technology, Easiness of the system.	Investigate adopting gamification in e-learning.	N/A

3. METHODOLOGY

This study was focused on TAM for the adoption of E-Learning. It was used research articles and similar works that were conducted and published after the pandemic started in 2019. Therefore, a systematic review approach has been adopted to collect the required data and evidence based on the research questions tabulated below in table 1.

3.1 Article Selection

There were 25 published articles were selected from 189 downloaded research works. And, these articles were selected from world renowned Journal, Book, and Conference proceeding publishers such as Emerald, IEEE, Sage, and Springer. Furthermore, a few selected key words were used to search these articles; that is; TAM, E-Learning, Pandemic, Technology adoption, Security issues, and privacy issues. Below are the main criteria for select the articles, and Figure 2 summarized the classification diagram for the systematic review process,

1. Open access journals, book chapters, and conference proceedings
2. High index publishers
3. English articles
4. Published after mid 2019

3.2 Research Questions (RQs)

The following table 2 shows the RQs that have been formulated to conclude this study,

Table 2: Research Questions and Motivations

S.No	RQ	Motivation
1	What are the factors must be included when developing TAM?	Find the most suitable variables to reduce time consumption when developing questionnaire
2	What are most needful future research directions when developing TAM for E-Learning?	Find the utmost needful research GAP/ GAPs, rather conducting existing studies.

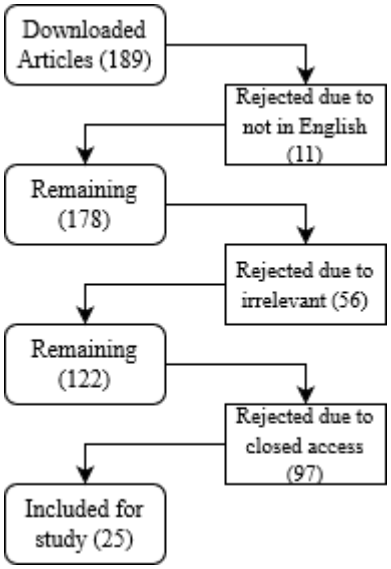

Figure 2 Classification diagram of Research articles

4. RESULTS AND DISCUSSION

E-Learning is not a new method of teaching and learning but it is being implemented since a few decades ago. Although, due to the pandemic, a sudden spike in the e-learning process creates many issues in the learning process for students, staff, and parents across the globe. For example, privacy issues, security problems, unfamiliarity, internet connectivity issues, and many more. It is all happening because the users of e-learning tools and devices are forced to use them without proper awareness and testing. Therefore, a globally accepted policy is needed to reduce these problems. Therefore, it is strongly suggested to develop TAM by the researchers and academies. Despite the fact that many researchers facing issues in selecting the EFs to develop the TAM. Therefore, this study mainly focuses on selecting all the required EFs when developing the TAM and identifying the utmost needed research direction in the near future.

This study is conducted by using a systematic review approach to collect the required data from research articles or case studies published by reputed publishers as discussed in the methodology section. And, all the EFs, research gaps, and limitations were summarized in the Literature review section.

Therefore, the following paragraph and next summarized the purpose of this study, that is it is represented the most needful and common EFs that can be used in the future research purposes for the development of TAM for EL and what kind of research direction can be initiated for EL.

According to table 1, there are many EFs influencing while developing TAM for e-learning and it is concluded to include utmost usable factors to increase the validity of the TAM. Namely, computer self-efficacy, system quality, content quality, the user (staff and student)-friendliness of the system, user awareness of the system, academic motivation, user satisfaction, e-retention, the usefulness of the system, self-confidence, technical support, computer anxiety, social norm, security, privacy, the severity of the pandemic, challenges, and user characters.

Similarly, in the same table 1, it is found that there are some possible future research directions without some limitations as follows,

1. Developing VR and augmented reality e-learning tools for practical subjects.
2. Understand the use of e-learning from qualitative perspectives through the interview or focus group discussions. Sample must be large from vast region.
3. Researchers need to conduct for teaching staff to understand their needs for e-learning.
4. Game-based educational tools can be developed to assess school students' e-learning activities.

For all the above suggested research gaps, data must be collected globally within a long period of time frame in both public and private educational institutes. And, all the above researches must try to include the EFs discussed above for the better generalization of results.

Apart from the above, there were a few limitations that arose during this study, such as less number of articles published after the pandemic and cannot access many articles due to closed access.

5. CONCLUSION

E-Learning is one of the utmost prominent essential of human development after the pandemic as it significantly helps to reduce the spreading. Therefore, it is the responsibility of the researchers and academians to develop a globally accepted policy for better e-learning practice. In that sense, this study uses a systematic review process to find the utmost useful EFs for TAM, where the TAM makes a way to reduce issues arising in the e-learning process and those EFs mentioned in the results and discussion section. Therefore, EFs must include not only student perspectives but also staff and parents, similarly, EFs must include not only user-friendliness, system quality, content quality, satisfaction, and self-efficacy but also technical support, anxiety, privacy, and security. Furthermore, the same study analyzes and suggested the most required future research direction for TAM for E-learning such as, Developing VR and augmented reality e-learning tools, understand the use of e-learning from qualitative perspectives through the interview or focus group discussions, and Game-based educational tools. In addition to these, data must be collected globally within a long period of time frame in both public and private educational institutes.

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