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Adoption of technology on E-learning effectiveness

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ABSTRACT

The incorporation of E-learning in both private and public tertiary education can help expedite the learning process. The utilization of fast-paced technology with E-learning also allows for a more flexible and convenient learning process. E-learning platforms can be accessed anywhere as long as there is an internet connection, including at home, the workplace, restaurants or while travelling. This allows for the benefit of distance learning. As such, the current study aims to examine the factor effectiveness of E-learning based on three variables, namely technology, instructors' characteristics and students' characteristics and their impact on distance learning. The education system has greatly evolved from the use of apparatus such as chalk and blackboards to the modern use of projectors to conduct lessons. In the current age, E-learning will have an effect on both instructors and teaching technology, aside from the students themselves. As an example, students are expected to know how to utilize these systems in their lessons, instructors must receive training in E-learning systems management and in terms of technology, the E-learning systems must be updated and operated using the most recent upgrades. E-learning is also cost-efficient, less time consuming and reduces the burden on both students and educators.

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1. INTRODUCTION

The modern learning environment widely employs technology, specifically in the form of E-learning systems. E-learning is an electronic module that functions through the use of the student's computer, and thus does not require the direct presence of an instructor or teacher. E-learning exists for the benefit of internet-based education which can also be facilitated across distances. This form of learning requires plenty of active interaction in order to attract and engage students. Such elements include examinations, quizzes and other enrichment tasks. E-learning systems must be implemented and conducted within the parameters of established guidelines, due to the fact that this program does not utilize a facilitator to carry out the teaching process [1]. E-learning is an online educational system which allows for learning at any place or time. Initial E-learning formats employed a combination of various PC-centric functions such as compact disc programs. Modern E-learning however, is primarily conducted through the internet. E-learning systems use electronic media to facilitate these guidelines or preparation phases. However, such instructions only serve to highlight the accessibility of the resources as opposed to the expected outcomes or proven results of the system [2]. E-learning functions as a form of communication between students and teachers and a medium which requires mutual effort. It is also offered on an optional basis, with its foundation placed on the education field and the communications industry. This is a tactic in order to evolve learning processes

in the current global and modern context. The traditional "board and talk" method" of teaching where the educator conducts lectures and offers handouts with minimal interaction and engagement from students is no longer considered an effective learning or teaching processes.

The function of the E-learning module in adapting to current trends of knowledge acquisition is a suitable and necessary evolution in educational methods. Typically, higher level education involving college or university students will require improved and more productive methods to gain knowledge and foster ideas. This modern approach to seeking knowledge will encourage students and provide them with the necessary confidence in their own potential and achievements. E-learning must not be conflated with M-learning systems, which emphasize the utilization of internet-enabled devices such as tablets, laptops or mobile phones. E-learning on the other hand, is specifically constructed for PCs, web communication and the internet. The ability to exchange ideas, perspectives and data through the internet with multiple parties in a flexible manner allows for more impactful communication [1]. As such, the current study has the objective of assessing the students' characteristics, instructors' characteristics and the technology, and their collective impact on the effectiveness of E-learning.

E-learning technology is accessible to students regardless of physical location or the presence of an instructor. E-learning is a viable alternative to traditional teaching environments where the lecturer and students occupy the same physical space. Research reveals that E-learning has an impact on students' academic outcomes. This can be seen in good assessment or examination results, as well as a general positive attitude from the students. This reflects the fact that good results and positive reviews are necessary in order to encourage the intention to utilize E-learning. Studies indicate that opinions regarding E-learning and intention are among the strongest factors which influence the actual usage of E-learning sustems. Attitudes also significantly impact intention, but the actual utilization of E-learning is what carries the most powerful effect on academic performance [3]. In the educational environment, students' characteristics are fostered through the encouragement gained in the learning process. Enhanced utilization of technology in this process will develop competency and motivate students to take more initiative, and this can result in more productivity. The compelling element of E-learning methods is the capacity for allowing students to acquire basic skills and competency with electronic devices, and for them to continue to take the initiative to learn more on their own. This provides a greater sense of fulfillment in learning. As such, educational institutions are encouraged to offer greater access to the relevant facilities and offer training regarding the proper ways to productively utilize this technology [4]. Aside from students, such learning or training is also essential for the instructors. In addition to the skillset they already possess, this will assist instructors in developing more creative teaching methods as well as more effective student evaluation systems.

Some researchers are of the opinion that training and skills are sufficient to sustain the effectiveness of E-learning. Students and lecturers with strong skills and training also make for excellent prospects in terms of future human resources [1, 5]. In addition to cutting down on time spent, E-learning also simplifies the materials and resources necessary for teaching. This is due to the fact that various programs and gadgets already exist within the system and are accessible to participating students and instructors. Such resources reduce the burden of work for lecturers and also make things more convenient for long-distance students. These students can take it upon themselves to work independently with some guidance from instructors when necessary [6-16]. The method of instruction and the demographics of students have undergone tremendous change over time [7, 9]. The approach to education and the resources available have markedly evolved in order to accommodate the varying needs, abilities and levels of accessibility of students and instructors. A notable element among the various changes that have occurred in this field is the growing role played by innovation in the context of training. Students utilizing information technology (IT) is also a reflection of how crucial the role of the internet has become in educational environments [10-12, 15]. This can be used as evidence for the outcome of the studied variables in this research [5]. Based on the discussion above, three hypotheses were constructed as follows:

a. Hypothesis 1: Instructors' characteristic is statistically significant to e-learning effectiveness.
b. Hypothesis 2: Students' characteristic is statistically significant to e-learning effectiveness.
c. Hypothesis 3: Technology is statistically significant to e-learning effectiveness.

2. METHODOLOGY

A total of 181 undergraduate students in Human Resource Management were chosen from local universities to participate in a survey. This study incorporates 28 items used to distinguish and assess students' characteristics, instructors' characteristics, technology and E-learning effectiveness. These items were adapted from [6] and [4]. The interval scale was employed as a measurement to assess responses to the adapted questions and the degree to which the respondent agreed or disagreed with the statements given as outlined in Table 1. These are indicated on a four-point scale whereby 1- Strongly Disagree, 2-Disagree, 3-Agree and 4–Strongly Agree. The data collected was subjected to more analysis through partial least square (PLS) in order to distinguish the predictors of E-learning effectiveness. The results reveal that the distribution

of gender was higher for females as compared to males. The number of female respondents encompass 70.0% (n=119) of total respondents while 30.0% (n=51) of respondents consist of males. As such, it can be seen that the vast majority of respondents in this study were dominated by female students. Most respondents are between the ages of 21 years old to 30 years old with the percentage of 68.2% (n=116). This is followed by respondents aged 31 years old to 40 years old with the percentage of 28.8% (n=49). While those aged above 40 years old constitute 2.9% (n=5) of all respondents. Most of the respondents utilize the computer for educational purposes for more than 5 hours, with the percentage being 43.5% (n=74). This is then followed by those who use the computer for learning for 2-4 hours with the percentage of 32.9%% (n=56), while usage between 1-2 Hours is 20.6% (n=35). Those who use the computer for educational purposes for under 1 hour is 2.9 % (n=5).

The reason for utilizing PLS in this research is in order to identify the causal structure proposed and to verify the hypothesis to the point where the respondents' data supports the established structure. The students' characteristics, instructors' characteristics and technology are all modeled as reflective constructs due to the fact that these variables are interchangeable, unidimensional and reliable to an identical degree. In other words, when one of the variables is removed from the model, the construct is not altered [7, 17]. In PLS, there exist measurements and structural models to evaluate the validity and reliability of constructs, as well as methods to test the hypothesis within the models. A measurement model evaluates construct measurement and the process of validation by examining composite reliability (CR), average variance extracted (AVE) and discriminant validity. The combination of the results of these assessments create the measurement model. A set range of values must be acquired in order to establish high reliability and zero error in terms of discriminant issues. In terms of composite reliability, the threshold value must be higher than 0.5. The [8] analysis is utilized to assess discriminant validity, whereby the square root of AVE for every construct must be greater than its correlations with other constructs.

3. RESULTS AND DISCUSSION

Table 1 shows the convergent validity values which are made up of factor loadings of items, composite reliability and average variance extracted of E-learning effectiveness (CR=0.912, AVE=0.597), instructors' characteristics (CR=0.931, AVE=0.662), students' characteristics (CR=0.875, AVE=0.517) and technology (CR=0.899, AVE=0.563).

Table 1. Convergent validity

Variables	Factor loading	CR	AVE
E-Learning effectiveness		0.912	0.597
E1: E-Learning will improve quality of education.	0.717		
E2: The E-Learning approach is better than the traditional approach.	0.749		
E3: The E-Learning approach is more enjoyable than the traditional approach.	0.857		
E4: E-Learning does not offer me any advantages.	0.764		
E5: Communication with the instructor in the E-Learning environment was better than the traditional environment	0.806		
E6: The E-Learning interface to be flexible to interact with learning.	0.692		
E7: My interaction with the E-Learning interface was clear and understandable.	0.808		
Instructors characteristics		0.931	0.662
IC1: Instructors are friendly and approachable.	0.785		
IC2: Instructors are easily contacted.	0.871		
IC3: Instructors explain how to use the website at the beginning of the semester.	0.589		
IC4: Instructors encourage student interactions	0.804		
IC5: Instructors provide sufficient learning resources online.	0.887		
IC6: Instructors solve emerging problem efficiently.	0.876		
IC7: Instructors provide fast feedback to queries in the discussion forum.	0.846		
Student characteristic		0.875	0.517
SC1: I am anxious in completing my degree.	0.785		
SC2: I have belief in my capability to interact with technology.	0.871		
SC3: I am cognitively engaged in doing the E– Learning activities.	0.589		
SC4: I have the initiative and motivation to learn and use the system.	0.804		
SC5: I have high level of self – confidence in using the system.	0.887		
SC6: I am willing to participate in E – Learning activities.	0.876		
SC7: I am satisfied with time and place flexibility of the system.	0.846		
Technology		0.899	0.563
T1: The system allows easy access to information.	0.824		
T2: There is information credibility in the system.	0.787		
T3: The guidance screen is clear and easy to use.	0.854		
T4: The IT infrastructure is reliable and secure.	0.798		
T5: There is adequate investment in infrastructure to support electronic performance.	0.721		
T6: I am rarely disconnected during online tutorial	0.552		
T7: I am satisfied with the browsing speed.	0.671		

The results indicate that every item and construct within the model meet the threshold values of CR which are greater than 0.7 and with AVE greater than 0.5. The factor loading of the items tested were greater than 0.5 and suitable for use in the analysis. In terms of the measurement model, Table 2 depicts the outcome of [18-20] analysis and establishes that the discriminant is reached. As such it can be concluded that the main construct measures different aspects. Figure 1 shows the measurement model. As can be seen in this figure, the student characteristics, instruction characteristics and technology are the main parameters which affected e-learning effectiveness.

Table 2. Lerning results

Constructs	1	2	3	4
1. E-learning effectiveness	0.772			
2. Instructors characteristics	0.55	0.814		
3.Student characteristic	0.753	0.499	0.719	
4.Technology	0.707	0.62	0.606	0.75

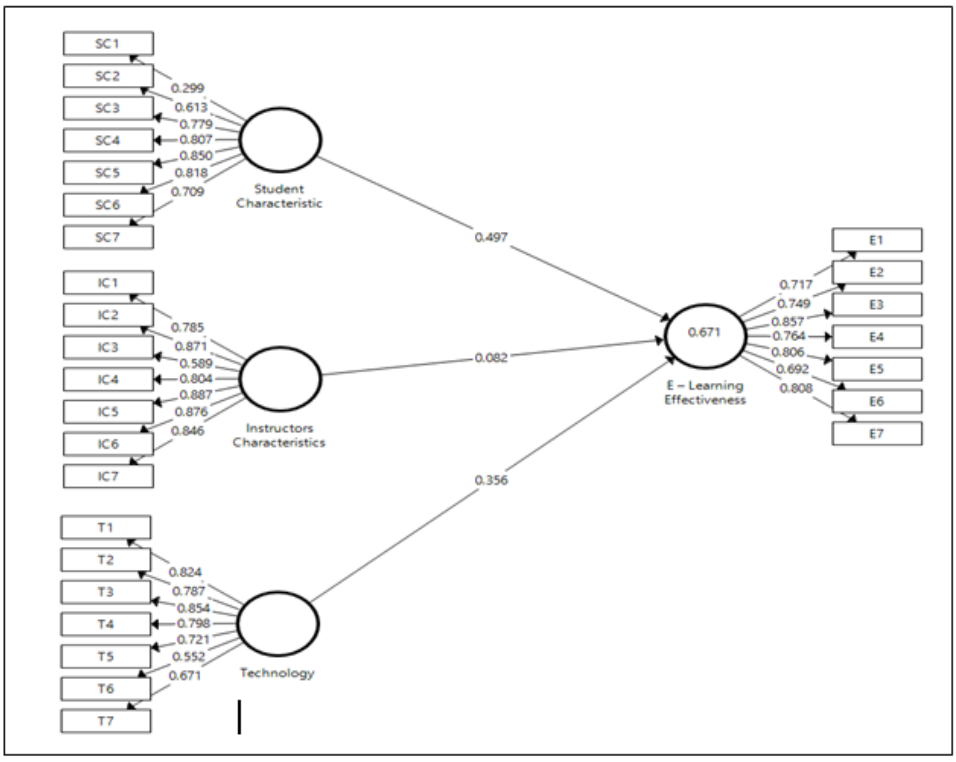

Figure 1. Measurement model

3.1. Structural Model

The structural model was assessed based on the significance of the structural path coefficient, the R square values (R^2) [21]. To test the significance, [22] suggest that the bootstrapping of 500 resamples be utilized to generate standard error (SE), t-statistic (t-values) and the percentile of 95 percent confidence interval. The relationship between variables are indicated in Table 3.

Table 3. Relationship between variables

Relationship	Beta	STD	T-Values	P Values	LL 2.50%	UL 97.50%	Result
Instructors characteristics →E-learning effectiveness	0.082	0.054	1.512	0.131	-0.018	0.186	H1: Not supported
Student characteristic →E-learning effectiveness	0.497	0.06	8.342	0	0.375	0.594	H2: Supported
Technology →E-learning effectiveness	0.356	0.082	4.323	0	0.172	0.502	H3: Supported

The results in Table 3 indicate that the constructs achieve higher values of R^2 with 0.671 than the substantial level indicated [23-25]. The two direct relationships which are students' characteristics (β=0.497, t-values=8.342, $p<0.05$) and technology (β=0.356, t-values=4.323, $p<0.05$) included in Figure 1 are statistically significant and accepted for instructors' characteristics (β=0.082, t-values=1.512, $p>0.05$) As such, Hypothesis 2 and 3 were supported in this study. The significance estimated are obtained using a percentile bootstrap [26]. Results show that the lower limit and upper limit values do not contain zero, and explained how the direct effects are significantly different from zero with 95 percent confidence [23].

4. CONCLUSION

In the current study, three independent variables, namely Students' Characteristics, Instructors' Characteristics and Technology, were comparatively assessed against E-learning effectiveness. The collected data was analyzed using PLS statistics and the findings revealed that students' characteristics and technology influenced E-learning effectiveness, in contrast to the lack of support from the variable of instructors' characteristics. This study highlights the elements of attitude, motivation and behavior in the context of the role played by students and in the effective and productive use of E-learning.

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