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Investigating the Role of Screen Design in e-Learning System Acceptance

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Abstract: This study incorporated screen design in a classical Technology Acceptance Model (TAM) in order to understand the students' acceptance and usage of e-Learning system (ELS). The model was tested using Structural Equation Modeling Technique. Results revealed that screen design had a positive and significant effect on both perceived ease of use and perceived usefulness of the ELS. These findings will not only be helpful for designers and developers but will also help policy makers particularly in the education sector to design usable and well-accepted e-Learning systems.

Keyword: E-Learning System, TAM, Screen Design

1. INTRODUCTION

E-learning entails a learning system that depends on the power and opportunities provided by the Internet and the World Wide Web (WEB). The enhanced method of learning has allowed students to engage in personalized learning through the flexibility provided by the Web and the Internet related to location and autonomy. According to Lee, Yoon, and Lee (2009), e-learning provides an inexpensive method in education delivery relevant to the working costs required in running an education facility.

The advantages have compelled educational institutions globally to invest considerably in the technologies that would enhance e-learning. As such, higher education institutions have started considering e-learning as a crucial tool for the acquisition of a competitive advantage (Al-Adwan, *et al.*, 2013). The implementation of e-learning in institutions of higher learning aims at the provision of a common platform that would facilitate effective course delivery and management. Moreover, it aims at the creation of a common space for exchanging and sharing educational information in an effective manner. The adoption of e-learning will help in the development of a participatory model for teaching and learning through enhancing self-regulation and interactions.

While some researchers believe that innovation and flexibility in teaching and learning will have an immense value on the education system (Ellis and Goodyear, 2013), others maintain that the changes will depend on how effective the users utilize the e-learning tools (Islam, 2013). (Persico *et al.* 2014) suggest that institutions of higher education face the risk of failure in the adoption of e-learning systems because of the complexity of the systems implemented. Consequently, such criticism has attracted the attention of practitioners and academicians on the topic.

Traditionally, the research on e-learning systems has largely focused on the technology itself with minimal focus on the implementation of the systems in enhancing a user-centric approach to learning. As such, this study seeks to fill this gap by exploring the role of e-learning in enabling a learner-centric approach to learning. The study aims at identifying and investigating the factors that influence the acceptance and use of web-based learning systems through the development of an integrated model of the factors. It incorporates interface design characteristics such as terminology, personalization, e-learning self-efficacy in the technology acceptance model (TAM).

2. RESEARCH BACKGROUND, MODEL AND HYPOTHESES

Technology Acceptance Model

Since its inception, TAM has undergone to significant improvements because of the continued growth and advancement of technology (Chandio *et al.*, 2017; Chandio *et al.*, 2013a; Chandio *et al.*, 2013b; Abbasi *et al.*, 2015a,2015b;Naqvi *et al.*, 2016). Consequently, a multiplicity of models has emerged to explain the challenge and offer in-depth insights regarding the effective use of technology. Indeed, Chandio *et al.* 2013b and Burdi *et al.* 2017) suggest that TAM remains as one of the best models explaining the adoption of technology today. Fundamentally, TAM is an extension of TRA as identified by Kimar and Priyanka (2014).

Fred Davis initiated the theory in 1986 but the model has undergone significant changes since then. The theory aims at describing the factors that determine technology acceptance and IT use behavior (Bertrand and Bouchard, 2008). TAM engrosses several components including Perceived Ease-of-Use (PEOU) and Perceived Usefulness (PU), which determine acceptance and use (Ducey, 2013).

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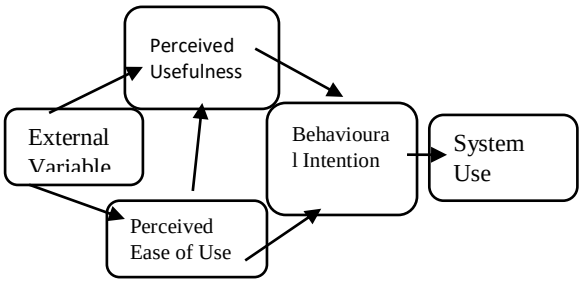

Fig. 1: TAM Model

Screen Design

Screen design is basically the technique with which data is displayed on a screen (Lindgaard, 1994). Conventionally, the Human-Computer Interaction (HCI) domain focuses on the usability and functionality factors of interface design. Nonetheless, of late, there is a new trend in the area that emphasizes the significance of the appealing aspects in interface design and HCI, and in research and design development generally (Norman 2004; Liu 2003). Earlier studies have stressed the significance of layout and screen design as a factor impacting users' preference in regard to the usage of information systems. For example, some study participants (Tractinsky, 1997) had the notion that graphically attractive interface designs are easier to use in practice.

The (ibid) test was done again in a different context incorporating more demanding methodologies; a similar high association was discovered in all the assessed circumstances. Previous research has gathered the similar feedback, the manner in which the data is displayed on the monitor is likely to influence users' information search strategies as well as performance (e.g. Todd and Benbasat, 1992; Lim, *et al.,* 1996). Information organized in such a way that students easily interact with ELS as in past there are so many irrelevant information appears on the screen. On the other hand users can easily identify the related information on the screen if screen design is carefully organized and well managed. Based on the empirical results from studies following hypotheses are proposed in this study related to screen design.

Research Model and Proposed Hypotheses

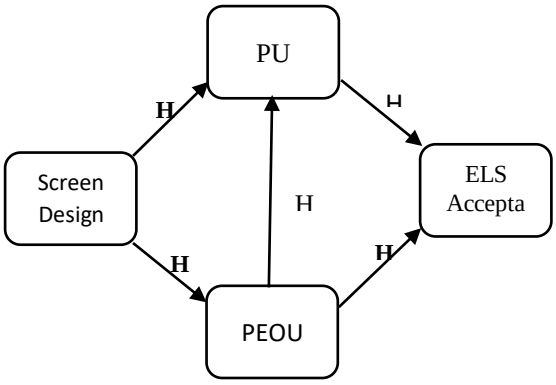

Fig. 2: E-learning acceptance model

Research Hypotheses developed for this model.

Following Hypotheses are drawn for this study.

H1: PU is positively and significantly correlated to ELS Acceptance.

H2a: PEOUis positively and significantly correlated to ELS Acceptance.

H2b: PEOU is positively and significantly correlated to PU

H3a: SDis positively and significantly correlated to PU.

H3b: SD is positively and significantly correlated to PEOU**.**

3. RESULTS AND DISCUSSION

3.1. Preliminary Analysis

Data for this study was obtained from students using a questionnaire survey approach. After coding data into SPSS, reliability of the questionnaire was tested using Cronbach's alpha (Nunnly, 1978). This reliability statistics is most widely applied test for checking internal consistency among instrument items (Hair *et al.,* 2006). Results of Cronbach's alpha test are presented in (Table 3.1).

Table 3.1: Cronbach's Alpha Test

Construct	Cronbach's Alpha Value
PU	0.81
PEOU	0.91
SD	0.92
ELS	0.92

Results revealed that all the value of Alpha coefficient were higher than the threshold value i.e. >=0.7). This suggests that the instrument applied was reliable.

Structural Equation Modelling

In order to test the hypothesized model, this research applied advanced and sophisticated statistical approach known as structural equation modeling (SEM). SEM is most widely applied technique in research that involve complex models, and test relationships among its components simultaneously (Hair *et al.,* 2006: Mahesar, 2015). This research applied SEM technique in two phases. First phase consisted of measurement model **(Fig. 4)** while second phase involved structural model. The measurement model was used to test construct, convergent and discriminant validities. **(Table 3.2**) presents convergent validity matrices.

Table 3.2: Convergent Validity

	CR	AVE
PU	0.906	0.762
ELS	0.936	0.786
PEOU	0.896	0.741
SD	0.855	0.747

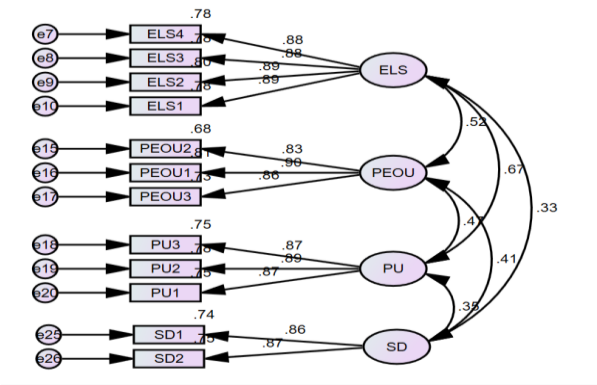

Fig. 3: Standardized Measurement model

According to (Hair *et al.* 2006), if construct reliability (CR) value of each construct is greater than 0.7 and average variance extracted (AVE) is above 0.5, the convergent validity of the constructs is established. As revealed in the table 3.2 both CR and AVE values are greater than the cut-off point. This confirms convergent validity of the constructs incorporated in the model. Discriminant validity of the constructs was also established, as AVE extracted from each construct was higher than the corresponding inter constructs correlations (Hair *et al.*, 2006). Results of discriminant validity are shown in **(Table 3.3).**

Table3.3: Discriminant Validity

	PU	ELS	PEOU	SD
PU	**0.873**			
ELS	0.674	**0.887**		
PEOU	0.471	0.524	**0.861**	
SD	0.349	0.326	0.406	**0.864**

3.3 Hypotheses Testing

All of the hypotheses, proposed in this study, were found strongly significant **(Table 3.3), (Fig. 4).** As mentioned earlier hypotheses related to PU and PEOU were drawn from TAM. These hypotheses were also proven significant in this study, thus establishes external validity of the TAM model in new contextual setting (e-Leaning system).

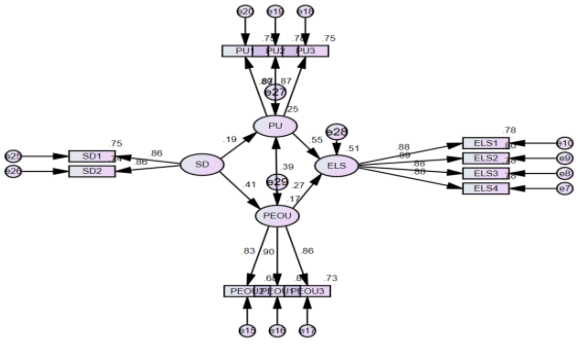

Fig. 4: Standardized Structural Model

For screen design (SD) two hypotheses were proposed in the model. It was hypothesized that SD would influence both PEOU and PU in e-Learning system acceptance. Results suggested that SD had shown strong impact in PEOU (i.e. C.R=6.218) at p<0.001 significance level. Similarly, PU of the e-Learning system was significantly influenced by the SD (C.R=2.884). These findings suggested that in order to increase e-learning system acceptance usage, designers, developers and policy makers of the given system should focus on issues related to the interface design of the such system.

Table: 3.4 Hypotheses Testing

Regression Weights						
Constructs	**Correlations**	**Code Name**	**Estimate**	**S.E.**	**Critical Ratio**	**P**
PEOU	<---	SD	0.375	0.06	6.218	***
PU	<---	SD	0.177	0.061	2.884	0.004
PU	<---	PEOU	0.396	0.066	5.954	***
ELS	<---	PU	0.542	0.057	9.438	***
ELS	<---	PEOU	0.264	0.055	4.817	***

4. CONCLUSION

This study investigated the role of screen design in e-learning systems acceptance. The findings suggested that screen design plays vital role on learners' acceptance and usage of such systems. These findings are encouraging and satisfactory and serve the main purpose of the study. It is however, important to mention here that caution needs to be taken while generalizing the findings of this study. This is because the model was tested with one particular group of users i.e. students. It is recommended that future research may apply and test this model in other contextual settings, such as mobile or pervasive learning.

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