

STUDENTS' EXPERIENCES, LEARNING OUTCOMES AND SATISFACTION IN E-LEARNING

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Keywords: Course design, Interaction with the instructor, Interaction with peer students,
Learning outcomes, Learning satisfaction.

This study was aimed to examine whether students' experiences in e-learning are related to learning outcomes and satisfaction. Three learning experiences, which are course design, interaction with the instructor and interaction with peer students were identified as the predictors of learning outcomes and satisfaction. Self-administered questionnaire was adopted. The paper questionnaires were distributed to students at a university in Malaysia. In total, 670 valid responses were obtained. Exploratory factor analysis was performed to confirm the underlying factor structure for the observed variables. Regression analyses indicated that course design, interaction with the instructor and interaction with peer students are positively related to the learning outcomes and satisfaction. Among all learning experiences, interaction with peer students make the strongest contributions to learning outcomes and satisfaction. This study demonstrates the importance for University administrators and instructors to design e-learning course to

optimal students' experiences to enhance their learning outcomes and satisfaction.

1 Introduction

The traditional face-to-face teaching relies on the instructors to control and regulate the course contents and teaching effectiveness (Horton, 2001). In these two decades, the evolvement of information systems has provided an alternative way on teaching delivery through e-learning. E-learning is a method that adopts technology to complement traditional teaching practices. E-learning can take place without some restrictions such as geographical location and time (Richardson & Swan, 2003).

Instructors can use e-learning to enhance teaching effectiveness (Al-Adwan *et al.*, 2013). For example, learning materials can be updated regularly, and students can access the latest materials instantly. E-learning also offers a collaborative learning environment to enhance richer learning experiences and learning process. E-learning represents a vehicle for educational industry to transform traditional face-to-face teaching to flexible individual-based learning.

It is important to note that most of the higher-education institutions in Malaysia have incorporated e-learning as part of teaching vehicle in two ways (Hussin *et al.*, 2009). First, some Malaysian higher-education institutions have introduced full e-learning courses. Second, many higher-education institutions have adopted blended learning by combining the traditional teaching with the e-learning (Hung & Chou, 2015).

To date, there are limited studies available to examine the effectiveness of e-learning implementation in the Malaysian higher-education context (Embi *et al.*, 2011; Oye *et al.*, 2012; Al-rahmi *et al.*, 2015). Previous studies have investigated learning satisfaction of using e-learning (Ramayah & Lee, 2012), e-learning continuance intention (Ismail *et al.*, 2012), the effectiveness of e-learning (Al-rahmi *et al.*, 2015). However, there is lack of study on perceived learning outcomes and satisfaction among students using e-learning in the Malaysian higher-education context. There is also lack of studies to investigate the impact of learning experiences on both learning outcomes and satisfaction in the e-learning context. Thus, this study aims to examine whether learning experiences contribute to learning outcomes and satisfaction. This study also intends to identify the relative impact of predictors on learning outcomes and satisfaction. Therefore, the following research questions are formulated:

1. Do learning experiences relate to learning outcomes?
2. Do learning experiences relate to learning satisfaction?
3. Which learning experiences are significant predictors of learning outcomes?
4. Which learning experiences are significant predictors of learning

satisfaction?

2 Literature Review

The framework of students' experiences in e-learning is rooted in the work by Moore *et al.* (1996). Such students' experience can be classified as three type of interactions, which are interaction with course content, interaction with the instructor, interaction with peer students (Moore, 1989; Moore *et al.*, 1996). These interactions are believed to close the transactional distance in the e-learning context. Experience with course design is viewed as interaction with course content and learning material (Paechter & Maier, 2010). The researchers believe that these three types of experiences can provide insights with regard to the learning outcomes and satisfaction in e-learning.

2.1 Experiences concerning course design

Interaction with course content typically refer to the total of time spent with the course content and learning material, such as textbooks, PowerPoint, Web pages and discussion forums (Su *et al.*, 2005). Kuo *et al.* (2014) assert that a good course design will ensure course content be presented in a well-organized manner while it is easy to be accessed by students. Experiences concerning course design is a one-way communication. It can be understood to be the student's internal conversation to comprehend course content (Moore, 1989). That is, students interact with information and knowledge from the course content (Kuo *et al.*, 2014). Students will intricate, systematize, and demonstrate the new knowledge from the cognitive perspective by synthesizing the previous knowledge (Moore & Kearsley, 1996). Thus, course design and learning material is a major factor to enable meaningful learning among students.

2.2 Interaction with the instructor

An instructor acts as a course designer and organizer, facilitator, social supporter, technology facilitator and assessment designer. Interaction between students and instructor occurs not only when the instructor delivers information and knowledge but also involves other interactions such as gives encouragement to students, provides a timely response to students and facilitates an open communication (Sher, 2009). In this regard, teaching presence can trigger motivation among students (Garrison *et al.*, 1999). That is, an instructor can provide assistance and performs a variety of tasks in the teaching process, which includes content structure and feedback of students' accomplishment to sustain learning motivation among students. The timely response and the presence of instructor are the strong contributors to students' experience toward

e-learning (Bolliger, 2004; Lee *et al.*, 2011). Such interaction will boost the social relationship between students and an instructor and eventually lead to socio-emotional exchange (Paechter & Maier, 2010). It will also influence students' intrinsic and extrinsic motivation in the learning process (Paechter *et al.*, 2010).

2.3 Interaction with peer students

Peer interaction refers to peer support which students actively support each other during learning process. Peer interaction can foster an active learning process through collaborative knowledge sharing, for example, group discussions and group based projects, where communication can take place through many channels such as emails, chat groups or newsgroup (Sher, 2009). Paechter *et al.* (2010) argue that interaction with peer students enable students to exchange information concerning course contents and to form socio-emotional support. Students are expected to enhance learning effectiveness in such a positive environment. For example, students who involve in group work can enhance their learning in a cohesive learning environment (Paechter & Maier, 2010). The study by Hussin *et al.* (2009) also shows that an effective learning environment is based on whether a meaningful interaction happens among students. Thus, interaction with peer students is likely to represent a contributor to learning outcomes and satisfaction (Broadbent & Poon, 2015).

2.4 Learning outcomes and satisfaction

Learning outcomes measure whether students attain competences in their learning (Weinert, 2001). The competence aspects comprise of factual and conceptual knowledge, methodical knowledge, social and personal competences as well as media competence (Paechter & Maier, 2010; Paechter *et al.*, 2010). It typically represents the cognitive side of the course outcomes, and thus it is important to be evaluated in e-learning context. On the contrary, learning satisfaction represents the attitudinal construct and it measures the affective aspect. A satisfied student typically has positive learning experiences in e-learning.

2.5 Conceptual Framework and Hypotheses

This study identified three important predictors in learning outcomes and satisfaction in the e-learning context. These predictors are experience with course design, interaction with the instructor and interaction with peer students. Three hypotheses are formulated to address the research objectives:

H1A: Course design is positively related to learning outcomes.

H1B: Course design is positively related to learning satisfaction.

H2A: Interaction with the instructor is positively related to learning outcomes.

H2B: Interaction with the instructor is positively related to learning satisfaction.

H3A: Interaction with peer students is positively related to learning outcomes.

H3B: Interaction with peer students is positively related to learning satisfaction.

3 Method

3.1 Measures

In this study, self-administered questionnaire was used to collect the data from students who enrolled into e-learning courses. The researchers developed the survey instruments based on the prior literature. In total, there are 5 survey instruments in the questionnaire, which are course design, interaction with the instructor, interaction with peer students, learning outcomes and learning satisfaction. The survey instruments were adapted from prior studies that relate to e-learning (Kuo *et al.*, 2014; Paechter & Maier, 2010; Paechter *et al.*, 2010).

The survey instrument for course design (4 items) measures the curriculum components and learning material in the learning environment. Course design instrument measures whether online course materials help students to understand the class content, stimulate students' learning interest and relate students' personal experience to new knowledge as well as ease of access to the materials. Interaction with the instructor (6 items) measures the two-way communication between instructor and students. This includes the frequency of interactions between students and instructors via various electronic means and whether students receive enough feedback from instructors. Interaction with peer students instrument (8 items) measures two-way reciprocated communication among students. Such interaction covers feedback, sharing and comment on the course content through class projects, group activities via different electronic means. Learning outcomes instrument (6 items) measures whether students acquire subject-specific conceptual and methodical knowledge, social, personal and media competences. Finally, learning satisfaction (5 items) measures to what extent students are satisfied with the class and course contribution to their educational and professional development.

The questionnaire consists of two main sections: (i) demographic information and (ii) course design, interaction with the instructor, interaction with peer students, learning outcomes and learning satisfaction. Five-point likert scale

was used to measure respondents' perception on the survey questions.

3.2 Sample

In total, 700 questionnaires were distributed to undergraduate students in a Malaysian university. The researchers managed to collect 690 questionnaires, which indicates a 98.6% response rate. During screening, 10 incomplete questionnaires were discarded, and another 10 questionnaires were excluded due to the presence of extreme outliers. The researchers used Statistical Package for the Social Science (SPSS) 18.0 to perform Pearson correlation, exploratory factor analysis and multiple regression in this study.

4 Findings

4.1 Descriptive and Correlation Analys

Table 1 presents the demographic statistics the valid responses (670 respondents) in this study. The results show that females represent the majority (73.15%) in the sample. Most participants are between 19-21 years old. Furthermore, most students spend more than 6 hours online based on online frequency results.

Table 1
 DEMOGRAPHIC ANALYSIS

Variable		Number	Percentage
Gender	Male	180	26.9%
	Female	490	73.1%
Age	Less than 18	7	1.0%
	19-21	561	83.7%
	22-24	98	14.6%
	More than 25	4	0.6%
Online Frequency (per Week)	5 or less than 5 hours	183	27.3%
	6-10 hours	152	22.7%
	11-15 hours	125	18.7%
	16-20 hours	72	10.7%
	Above 20 hours	138	20.6%

Pearson Correlation Coefficient was performed to examine strength and direction of linear relationships among variables, i.e., course design, interaction with the instructor, interaction with peer students, learning outcomes and learning satisfaction (see Table 2). Correlation analysis shows that all variables

are positively correlated ($p < 0.01$). Interaction with the instructor and interaction with peer students have strong correlation with learning outcomes and learning satisfaction because the correlation coefficients are greater than 0.5.

Table 2
CORRELATION ANALYSIS

Variable	1.	2.	3.	4.	5.
1. Course design	1	0.50**	0.48**	0.44**	0.37**
2. Interaction with the instructor		1	0.63**	0.53**	0.56**
3. Interaction with peer students			1	0.62**	0.59**
4. Learning outcomes				1	0.61**
5. Learning satisfaction					1

4.2 Exploratory factor analysis

Exploratory factor analysis (EFA) was performed to the survey instruments, i.e., 29 questions from 5 variables in the questionnaire. EFA is a statistical technique to identify the underlying factor structure for the observed variables. It is observed that KMO value is 0.943 and the Barlett's test ($p < 0.01$), which suggesting the data in this study is suitable for further analysis. The communality analysis shows that the community of all items are greater than 0.5, suggesting these items can be classified into respective groups.

In the EFA, eigenvalue cutoff of 1.0 was specified and the results show that 27 questions produce only 5 factors, which is consistent with our proposed 5 variables. The total variance explained by the 5 factors solution is 65.46%, which exceeds the minimum threshold of 50% variance explained. Each of the 5 factors can be broken down as interaction with peer students (16.03%), learning outcomes (13.62%), interaction with the instructor (13.23%), learning satisfaction (11.96%) and course design (10.63%). Furthermore, it is observed that first four items are all loading high on the *fifth factor*, the next 6 items are all loading high on the *third factor*, followed by the next 8 items are loading high on the *first factor*, the next 6 items are loading high at *second factor* and finally the last 5 items are loading high at *fourth factor* (see Table 3). Furthermore, the assessment of factor loadings for all factors range from 0.57 to 0.83, exceed the threshold of 0.4.

Table 3
ROTATED COMPONENT MATRIX

	1	2	3	4	5
LC1					0.82
LC2					0.83
LC3					0.79
LC4					0.74
SI1			0.60		
SI2			0.69		
SI3			0.74		
SI4			0.72		
SI5			0.77		
SI6			0.68		
SS1	0.63				
SS2	0.69				
SS3	0.76				
SS4	0.71				
SS5	0.66				
SS6	0.57				
SS7	0.70				
SS8	0.68				
LO1		0.71			
LO2		0.75			
LO3		0.78			
LO4		0.69			
LO5		0.72			
LO6		0.65			
S1				0.77	
S2				0.75	
S3				0.75	
S4				0.75	
S5				0.64	

In addition to EFA, internal reliability test was performed. The results show that Cronbach's Alpha for all variables exceeds the minimum threshold of 0.7, indicating sufficient internal reliability.

4.3 Multiple Regression Analysis

Multiple regression analysis was performed to examine whether course

design, interaction with the instructor, interaction with peer students affect learning outcomes and learning satisfaction.

Two multiple regression models were applied to examine the impact of course design, interaction with the instructor, interaction with peer students on learning outcomes and learning satisfaction (see Tables 4 and 5). The F statistic values for both regression analyses are significant ($p < 0.001$), confirm the validity of the regression models. Furthermore, the variance inflation factor (VIF) for all independent variables are less than 3, suggesting the absence of multicollinearity in both regression models. The normal P-P plot shows that all points lie in a reasonable straight diagonal line and thus the normality assumption is fulfilled for both regression models.

Table 4
REGRESSION ANALYSIS (DEPENDENT VARIABLE = LEARNING OUTCOMES)

Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
(Constant)	6.45		9.00	0.00
Course design	0.17	0.13	3.73	0.00
Interaction with the instructor	0.18	0.19	4.91	0.00
Interaction with peer students	0.32	0.44	11.55	0.00
R-Squared = 0.43; F statistic = 172.16				

Table 5
REGRESSION ANALYSIS (DEPENDENT VARIABLE = LEARNING SATISFACTION)

Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
(Constant)	5.02		7.42	0.00
Course design	0.04	0.04	0.99	0.32
Interaction with the instructor	0.26	0.30	7.68	0.00
Interaction with peer students	0.26	0.39	9.86	0.00
R-Squared = 0.41; F statistic = 157.59				

5 Discussions

Multiple regression analyses show that interaction with the instructor and interaction with peer students are positively related to learning outcomes and learning satisfaction, respectively. As a result, the hypotheses of H_{1A} , H_{2A} , H_{3A} , H_{2B} and H_{3B} are supported. First, the positive effect of course design suggests that course content and learning material are well-designed and presented in the e-learning system. This result is consistent with a previous study which stating course design is related to learning outcomes (Kuo *et al.*, 2014). Second,

interaction with the instructor is positively related to learning outcomes and satisfaction. That is, students seem able to interact with instructors and get feedback from the instructor through internet mediated tools for an e-learning course (Eom *et al.*, 2006; Lee *et al.*, 2011; Paechter & Maier, 2010; Paechter *et al.*, 2010). Third, interaction with peer students is positively related to learning outcomes and satisfaction. This indicates that e-learning environment allows students to exchange information and sharing knowledge, which leads to better learning outcomes and satisfaction. This finding is consistent with prior studies (Broadbent & Poon, 2015; Paechter & Maier, 2010; Paechter *et al.*, 2010). Overall, the study suggests that students' learning experiences, i.e., course design, interaction with the instructor, interaction with peer students, are important considerations in planning e-learning courses.

Standardised coefficients in multiple regression were examined to identify relative contribution in explaining the learning outcomes and satisfaction. The largest beta coefficient denotes that the independent variable has the strongest contribution to the dependent variable. The results show that interaction with peer students is the most important predictor of learning outcomes and satisfaction. This denotes that peer interaction is important in an e-learning course because peer interaction not only facilitates learning process among students, but also provides socioemotional supports in a computer-mediated learning environment.

Conclusion

The purpose of this study is to examine whether course design, interaction with the instructor, interaction with peer students affect learning outcomes and satisfaction in e-learning courses. This study confirms that such students' experiences are salient predictors on learning outcomes and satisfaction in e-learning. This study provides empirical evidence to the e-learning literature by investigating learning outcomes and satisfaction (Paechter & Maier, 2010; Paechter *et al.*, 2010). University administrators should recognize that interactions are the crucial constructs in determining the quality of e-learning courses. Interactive teaching styles should be adopted by an instructor in e-learning courses. Course design and learning material are equally important. Furthermore, instructor should design a teaching plan that can encourage peer interaction among students in e-learning courses.

Acknowledgements

The authors acknowledge the support from UTM Vote 4J252 and Ministry of Education Malaysia.

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