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Attitudes of undergraduate nursing students towards e-learning at the University of the Western Cape, South Africa

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Abstract

The development of the Internet has provided an opportunity for offering e-learning as a new addition to modern education. Substantial evidence indicates that many universities across the world are offering study programmes through a variety of e-learning methods. Although e-learning environments are becoming popular, there is limited research on learners' attitudes toward online learning environments. Past research has identified a variety of factors affecting user attitude in relation to e-learning. It is against this background that this article seeks to determine the attitudes of undergraduate nursing students toward e-learning at the University of the Western Cape. A survey was conducted among 213 undergraduate nursing students to assess their attitudes toward e-learning. The study employed a survey methodology based on the questionnaire that was distributed randomly to students to assess their attitudes towards e-learning, and to establish whether any existing demographical factors impacted on the students' use of e-learning. From a valid response rate of 86%, the statistical analysis revealed that learner satisfaction was influenced by perceived ease of use, gender, and study-year level of respondents. The findings demonstrate a favourable attitude towards e-learning among nursing students at the University of the Western Cape.

Keywords: Nursing education, information technology, web-supplemented, learner attitude, blended learning.

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Introduction

Worldwide, the concept 'e-learning' refers to all forms of teaching and learning through information and communication technologies (Choi, 2003). This may include any course content that is delivered through the use of the Internet, audio-visual media, CD-ROM, satellite broadcast, podcasts, interactive television, PDAs, email, and blogs. Certainly, e-learning is significantly growing at a large number of universities around the world, enhancing the teaching and learning processes, such as combining text, audio-visual content, and animation with course lectures. Such integration

includes simulations and multi-media presentations in the classroom, enhanced communication and collaboration between lecturers and students, as well as uploading course content and tests to university websites.

According to Kenny (2002), there has been astonishing progress in the use of e-learning in the past few years; this assists educators and students in overcoming the barriers of time and space. In addition, e-learning can also assist students and institutions in terms of course availability, affordability, and convenience (Kirkwood, 2003; Dziuban, Hartman & Moskal, 2004; Horton, 2006). E-learning offers students opportunities to interact independently with facilitators and other students, hence providing the content of the course for a longer period of time compared to the classroom environment, and providing other methods while reaching a larger number of students. However, most research done about e-learning is convinced that the successful use of e-learning relies mainly on the use of computers as assisting tools. This is clarified by the existence of different physical environments and the distance between the teacher and the students – the most significant characteristics of e-learning. The communication during the entire teaching and learning process is carried out effectively, via e-mail, forums, and by means of the Internet (Al-Dujaily & Ryu, 2006). Consequently, teaching materials are conveyed electronically through the Internet or course software by harnessing computer technologies. Because of this, it is imperative that students possess appropriate computer skills in order to access e-learning materials (Saade & Bahli, 2005; Akkoyunlu & Soylu, 2008). With reference to the School of Nursing (SoN) at the University of the Western Cape (UWC), e-learning was introduced in 2005 as a method of supplementing teaching and learning. This creativity, in conjunction with face-to-face class sessions, commenced with the third-year nursing students and was extended to the rest of the academic staff and students in 2006. The purpose of introducing e-learning was to enhance the knowledge and clinical skills of undergraduate nursing students and to improve the efficiency and effectiveness of educational interventions in the face of social, scientific, and pedagogical challenges (Hala & Kling, 2001).

Methodology

Research design

A quantitative cross-sectional survey was adopted. A survey was used to obtain answers to the research questions. It was specifically designed to obtain information about people's actions, knowledge, intentions, opinions, attitudes, and values.

Target population

The target population of this study involved all Bachelor of Nursing (BNur) students at the School of Nursing, University of the Western Cape.

Sample size and procedure

The appropriate sampling technique for this research project was random sampling. To avoid biases, the researcher used stratified random sampling per year level which had the advantage of less complexity given to the size of the study population. Based on the population parameter of 700 students with a 5% margin of error and a 95% confidence interval, the recommended size of the survey was established at 249 students. Using a computer, the researcher systematically selected students from an updated class list.

Data collection method

Data were collected by administering a questionnaire approved by the research committee of the UWC. The purpose of the questionnaire was to assess the knowledge, skills, and attitudes of the students who took part in the study, in relation to the use of the computer, Internet, and e-learning. Information was collected by means of self-administered questionnaires, which incorporated SCALES (semantic differential scales) to measure attitudes. A five-point Likert scale ranging from 'strongly disagree' to 'strongly agree' was used for the measurement of attitudes. The questionnaire was distributed to the different study-year levels and respondents had one week to complete the questionnaires.

Reliability test

The instrument was tested for validity and reliability using the Cronbach alpha (α) coefficient before it was distributed and administered. Normally, the Cronbach coefficient of items' scale should be above 0.7 (Nunnally, 1978). The Cronbach coefficient of this questionnaire was 0.834, which indicated that the instrument had a good internal consistency, i.e. items that make up the used scale hang together, or if the items used measure the concept of interest. In other words, no single item in the scale had suppressed the alpha value. Therefore, the e-learning attitudes scale used was a reliable instrument to measure attitudes about e-learning.

Pilot study

A pilot study was conducted amongst 30 undergraduate nursing students who were exposed to e-learning. Face-to-face questionnaires were distributed by the researcher in order to get more details, with the purpose of examining the validity of the instrument. No changes were made to the questionnaire based on the results of the pilot test. However, students who participated in the pilot study were excluded from the subsequent study.

Data analysis

The data collected were processed and analysed using the Statistical Package for Social Sciences (SPSS) version 22. The SPSS is one of the most widely used statistical software packages in the academic community throughout the world (Foster, 1998). Data were analysed and presented using descriptive statistics (mean values and standard deviations) for univariate analysis, while bivariate analysis was conducted by using Pearson's correlation, independent samples t-test, and one-way analysis of variance (ANOVA). Those tools were used to determine the association between independent and dependent variables (attitudes towards e-learning). Finally, a multivariate analysis (stepwise multiple regression) was used to prove the significance of the variables (predictors).

Ethical considerations

The researcher had obtained all the formal consents, including a letter of approval from the Senate of the UWC, to carry out the study. In addition, the consent of the lecturers of the study-year levels was obtained to allow the researcher to administer the questionnaires in their classes. Respondents agreed to participate in the study after being briefed about the nature and the purpose of it, as well as about the methods of data collection and the instrument that would be used in the study. They were also informed that they would, at any time, have the freedom to withdraw from the study or not to participate. Respondents were assured that all information related to them would be treated confidentially and would not be used for any other purpose without their consent.

Results

Description of demographic characteristics of respondents and variables measuring their attitudes towards e-learning

In this study, 213 respondents participated (86%), of whom 91.2% (194) were females and 8.8 % (19) were males. The respondents' ages ranged from 19 to 50 years with the majority of 67.6% (145) being aged between 19 and 25. The majority of respondents who comprised 67.1% (143), were Black African, followed by Coloured, 29.6% (64), and White, 3.3% (6). The sample did not include any Indian respondents. More than half of the respondents had access to a computer at home and had computer training experience.

Sixty-six (31%) BNur 2, 45 (21.1%) BNur 3, and 102 (47.9%) BNur 4 students agreed to participate. The reason why BNur 4 students outnumbered the other two levels was that most students at that level had been exposed to e-learning for a longer period of time; the BNur 4 group included the students who had repeated the junior years of the programme. BNur 4 students, unlike the other levels, were not split into smaller groups for clinical/class attendance; they all attended classes simultaneously. The results are shown in Table 1.

Table 1: Frequency distribution of respondents' socio-demographic characteristics (N = 213)

Variable	Frequency(n)	Percentage (%)
Gender:		
Male	40	8.8
Female	173	91.2
Age group:		
19-25 years	144	67.6
26-50 years	69	32.4
Race:		
Black African	143	67.1
White	7	3.3
Coloured	63	29.6
Asian / Indian	0	0.0
Marital status:		
Single	180	84.5
Married	26	12.2
Divorced	4	1.9
Widowed	0	0.0
Living together	3	1.4
Year level:		
BNur 2	66	31.0
BNur 3	45	21.1
BNur 4	102	47.9
Computer facility at home:		
Yes	97	45.5
No	116	54.5
Computer training experience:		
Yes	90	42.3
No	123	57.7

Total scale scores in this study had been calculated first, before any statistical analysis occurred. Those calculations included learners' satisfaction, attitude

towards computers, learner computer anxiety, learner Internet self-efficacy, e-learning course flexibility, computer technology, Internet quality, instructor feedback, diversity in assessment, perceived interaction with other interested parties, and perceived ease to use. The mean values and standard deviations of those variables were then computed (Table 2). The outcome variable of this study was learner satisfaction, which had a mean of 17.91 and a standard deviation of 3.603 (Table 2).

Table 2: Descriptive statistics of learners’ satisfaction and variables measuring respondents’ attitudes about e-learning

Variable	Mean	Std. Deviation	N
Perceived ease of use	6.42	2.444	213
Attitude towards computers	26.04	4.241	211
Learner computer anxiety	17.06	2.891	213
Learner Internet self-efficacy	22.01	8.373	213
E-learning course flexibility	13.32	4.158	212
Computer technology	13.87	3.756	212
Internet quality	13.6	3.736	212
Instructor feedback	2.78	1.182	213
Diversity in assessment	2.5	1.119	213
Perceived interaction with others	18.67	3.859	213
Learner satisfaction	17.91	3.603	212

The independent samples t-test results (Table 3) indicated that there was a statistical difference in mean values in relation to learner satisfaction of males and females; it was statistically significant at 5% level [t (55) =-2.263, p =0.028]. In other words, males and females differed significantly in terms of their satisfaction levels as learners. The same analysis was performed for other demographic variables with two outcome levels (age group, computer facility at home, computer training experience, and experience in e-learning prior to registering at the UWC), but no statistically significant difference in mean values with regard to learner satisfaction between those groups was recorded, since the p-values associated with their test statistics were above the 5% level of significance.

Table 3: Test for equality of learner satisfaction – mean values for males and females (equal variances not assumed)

t-test for equality of mean values					95% Confidence interval of the difference	
t	df	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
-2.263	55.364	.028*	-1.492	.659	-2.813	-.171

*Significant at 5% level

An analysis of variance (ANOVA) was also conducted to examine whether there were differences in mean values in relation to learner satisfaction and demographic variables with more than two outcome levels (marital status, race, and study year level). The results (Table 4) revealed that there was only a statistically significant difference at 5% level in mean values with regard to learner satisfaction for the three study-year levels (BNur 2, BNur 3, and BNur 4) [$F_{2,209}=3.535$, $p = 0.031$].

Table 4: ANOVA test of mean learner satisfaction by study year level

Source of variation	Sum of squares	Mean square
Between groups	89.641	44.820
Within groups	2649.657	12.678
Total	2739.297	

Post-hoc comparisons using the Tukey's honest significant difference (HSD) test (Table 5) indicated that the mean value for BNur 2 ($M = 18.82$, $SD = 3.73$) was statistically different from BNur 4 ($M = 17.31$, $SD = 3.34$). BNur 3 ($M = 17.96$, $SD = 3.80$) did not statistically differ from either BNur 2 or BNur 4.

Table 5: Post-hoc comparisons using Tukey's HSD test

(I) Year level	(J) Year level	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
BNur 2	BNur 3	.860	.690	.428	-.77	2.49
	BNur 4	1.502*	.565	.023	.17	2.84
BNur 3	BNur 2	-.860	.690	.428	-2.49	.77
	BNur 4	.642	.637	.573	-.86	2.15
BNur 4	BNur 2	-1.502*	.565	.023	-2.84	-.17
	BNur 3	-.642	.637	.573	-2.15	.86

*The mean difference is significant at 5%

Relationship between learners' satisfaction and variables measuring respondents' attitudes about e-learning

A Pearson correlation analysis was conducted to determine the relationship between respondents' satisfaction and variables measuring respondents' attitude towards e-learning. This analysis is presented in the form of a correlation matrix in Table 6.

Table 6: Pearson correlation analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Learner satisfaction										
(2) Attitude towards computers	-.028									
(3) Learner computer anxiety	-.101	.420**								
(4) Learner Internet self-efficacy	.123	-.232**	-							
(5) E-learning course flexibility	.253**	-.002	.532*	-						
(6) Computer technology	.236**	.001	.177*	.271**	-					
(7) Internet quality	.119	-.061	.136*	.275**	.493**	-				
(8) Instructor feedback	.113	.076	-.125	.220**	.232**	.217**	-			
(9) Diversity in assessment	.159*	.024	.038	.010	.224**	.238**	.143*	-		
(10) Perceived interaction with others	.206**	.127	.025	.012	.395**	.209**	.034	.225**	-	
(11) Perceived ease of use	.346**	-.153*	-.008	.060	.369**	.437**	.103	.372**	.350**	-
			.201*	.268**	.416**	.378**	.227**	.071	.219**	.298**

The results indicate that learner satisfaction was positively correlated with e-learning course flexibility ($r = 0.253$, $p < 0.001$), computer technology ($r = 0.236$, $p < 0.001$), diversity in assessment ($r = 0.159$, $p < 0.05$), perceived interaction with other people ($r = 0.206$, $p < 0.001$), and perceived ease of use ($r = 0.346$, $p < 0.001$). The remaining variables were not statistically associated with learner satisfaction, since their p-values exceeded the 5% level of significance.

Multivariate analysis

A multiple regression (backward elimination) model analysis was used to examine how well a set of variables (variables used in previous studies, namely the attitude about computers, learner computer anxiety, learner Internet self-efficacy, e-learning course flexibility, computer technology, Internet quality, instructor feedback, diversity in assessment, perceived interaction with other people, and perceived ease of use) were suited for predicting learner satisfaction. An attempt was also made to verify whether particular predictor variables were also suited for predicting learner satisfaction when the effects of other variables were controlled (demographic

variables in the case of this study). The choice of this model was based on the fact that the dependent or outcome variable was continuous. All independent variables were entered in the model and the ones that were not significant at a 5% level were deleted, in order to remain with a model with statistically significant predictors.

The correlation matrix (Table 6) indicates that there was no multicollinearity problem, since no higher correlations were found between the independent variables ($r < 0.90$).

The variables used in previous studies had first been entered in the model (Table 7) and, afterwards, social demographic variables of respondents were added to create a second and final model (Table 8). The first model explained 11.85% of the variance whereas the second model (the comprehensive model) explained 15.8% of the variance. It is important to realise that this second R change value included all the variables from both models, not just the ones included in the second step. It can be seen that the addition of the demographic variables of respondents had contributed to the increase in R or variance explained by the model.

The ANOVA test indicates that the comprehensive model (model that includes all types of variables) is statistically significant [$F(3, 205) = 12.87$; $p < 0.001$]. The first model (Table 7) shows that the only factor influencing learner satisfaction is perceived to be ease of use ($\beta = 0.05$, $p < 0.001$).

Table 7: Model 1 with variables used in previous studies

Variable	Coefficient	Standard error	t	P > t	95% Confidence interval (C.I.)
Perceived ease of use	0.509	0.096	5.270	0.000	[.318, .699]
Constant	14.651	0.663	22.10	0.000	[13.344, 15.958]
F(1, 207) = 27.82					
Prob > F = 0.000					
R-squared = 0.1185					

On analysis of the demographic characteristics of respondents, it was found that in addition to perceived ease of use, the gender and study-year level of respondents were also important predictors of learner satisfaction with e-learning of nursing students at the UWC. The results (Table 8) indicate that

Table 8: Model 2 with variables used in previous studies and demographic characteristics of respondents

Variable	Coefficient	Standard error	t	P > t	95% Confidence interval (CI)
Perceived ease of use	0.47	0.095	4.92	0	[0.281, 0.658]
Year level:					
BNur 2*					
BNur 4	-1.066	0.469	-2.27	0.024	[-1.991, -0.140]
Gender:					
Male*					
Female	1.443	0.601	2.4	0.017	[0.258, 2.629]
Constant	14.231	0.815	17.46	0	[12.624, 15.838]
F(3, 205) = 12.87					
Prob > F = 0.001					
R-squared = 0.158					

for one unit increase in perceived ease of use, learner satisfaction increases by 0.508 unit points, while other variables (independent variables) remain constant. Learner satisfaction reduces by more than one unit point for the BNur 4 students than for the BNur 2 students, and increases by 1.44 unit points more for females than in males. This indicates that BNur4 students are less likely to be satisfied with e-learning than BNur 2 students, whereas female nursing students are more likely to be satisfied with e-learning than male nursing students.

Discussion

Level of satisfaction of undergraduate nursing students

The level of satisfaction of undergraduate nursing students towards e-learning was measured by using variables, including: i) e-learning course flexibility, ii) computer technology, iii) diversity in assessment, iv) perceived interaction with other people, and v) perceived ease of use. The correlation analysis indicated that there was a positive relationship between learner satisfaction and the aforementioned variables.

i) E-learning course flexibility

E-learning course flexibility, which was proven to be significant in this research, had a positive relationship with e-learning. The literature on e-

learning agrees that flexibility of an e-learning course is a strong indication of student satisfaction. This corresponds with Arbaugh and Duray (2002), whose findings reveal that e-learning course flexibility plays an important role in perceived e-learners' satisfaction.

In contrast to traditional classroom learning, e-learning is not constrained by space, time, or location. Therefore, students have a high degree of flexibility and many self-paced learning opportunities (Pei-Chen et al., 2008). This explains the positive attitude of the UWC undergraduate nursing students towards e-learning because e-learning offers the opportunity to effectively balance their practical work at the hospital with their theoretical studies on campus.

ii) Perceived interaction with other people and perceived ease of use

In this study, perceived ease of use by undergraduate nursing students was proven to be significant and thus influenced their attitude about e-learning. Literature confirms that perceived ease of use has a significant impact on e-learner attitude. The ease of use of an e-learning system makes it possible for students to devote their attention to learning the course material instead of spending additional effort learning the online system. Consequently, a higher learning satisfaction should exist. This correlates with the study conducted by Wong and Teo (2009) on, "The determinants of the intention to use technology: Comparison between Malaysian and Singaporean female student teachers". These authors state that perceived ease of use is an important predictor of student teachers' acceptance of computer technology use. The results further confirm that the students' attitude is determined by perceived ease of use. Hence, their study concludes that perceived ease of use is a significant predictor for using an e-learning system.

iii) Computer technology measurement

The results of this study show that computer technology has a significant effect on undergraduate nursing students' attitude about e-learning at the UWC. From interactions with students and observations of the technology in use today, it is reasonable to state that the technologies used in e-learning environments are fairly reputable. E-learning systems are developed in a high-speed network environment where software and hardware are superior to the ones in a non-e-learning environment. Since undergraduate nursing students at the UWC use blended learning (both traditional and e-learning), the use and availability of technology remains a big challenge for most students. As discussed earlier, the significant effect exhibited in this study

suggests that technology is important. However, it must be noted that the technology used in the e-learning environment seems to be unsatisfactory for undergraduate nursing students at the UWC. These results correspond to the findings of Smart and Cappel (2006) who explain that student with more technological exposure respond more positively to e-learning. They conclude that the users' prior experience with computers affects students' attitudes about e-learning.

iv) Diversity in assessment

Diversity in assessment has a significant impact on perceived e-learner satisfaction. As illustrated by Thurmond, Wambach and Connors (2002), when diverse evaluation methods exist to assess effectiveness of e-learning, students' activities and processes might either be corrected or improved by multiple feedback sources to achieve better performance. Therefore, a variety of assessment methods enables facilitators to apply a plethora of learning effects from different aspects with the purpose of augmenting instruction more effectively. As far as students are concerned, diversified assessment methods motivate them to display their best efforts in different evaluation schemes in order to proceed with e-learning activities seriously and effectively.

v) Perceived ease of use, gender and study year level of respondents

The multiple regression model analysis shows that these variables predict and shape learner satisfaction of nursing students at the UWC. This is depicted in the following regression model:

$$LS = \beta_0 + \beta_1 \text{Perceived ease of use} + \beta_2 \text{Gender} + \beta_3 \text{Year level}$$

From the above model, LS denotes learner satisfaction and β_1 is the regression coefficients that indicate the unit points increase or decrease in the independent variables or predictors (perceived ease of use, gender, and study-year level of respondents). Female respondents were found to be more satisfied with e-learning than male nursing students, whereas BNur 4 students appeared less likely to be satisfied with e-learning than BNur 2 students. It can, therefore, be concluded that, in conjunction with gender and study-year level of nursing students at UWC, perceived ease of use of e-learning is the only other factor that influences e-learner satisfaction of nursing students at the UWC.

These variables (perceived ease of use, gender, and study-year level) have an impact on the students' satisfaction and they greatly seem to motivate

learners' attitudes about e-learning. This result agrees with previous research done by Malik (2010) that demonstrates the importance of ease of use in the context of information technology. Therefore, e-learning could become more effective when administrators take into account the effect of these variables on the students' satisfaction when designing e-learning programmes. It can be assumed from the findings of this study that higher student satisfaction may be achieved when these variables are taken into account.

Recommendations

E-learning as a supplement to traditional face-to-face education has come of age. It has emerged as a convenient method of teaching that is better suited to students or individuals who are constrained by time, distance, and other factors that make it impossible for them to have a more regular physical engagement with a facilitator. E-learning is conducted through a medium of technology, specifically the Internet, the World Wide Web, and other computer-assisted tools. This implies that learners' ability to use these tools is critical for a successful e-learning programme or course.

Students' technological skills, to a large extent, influence their satisfaction with e-learning methods and programmes. This may also determine the success of e-learning courses in a learning environment. Therefore, in order to increase satisfaction levels of students with e-learning, it is important for students to be equipped with knowledge and skills about how to use computers and the Internet, since these technological components are the main tools for e-learning. Hence, a fundamental computer course for first-year nursing students (for both males and females) is essential for better equipping them, as well as reducing their anxiety towards e-learning for the remainder of their studies (they will need this skill for the rest of their studies).

It is noteworthy that facilitators' attitudes towards e-learning are yet another factor that could influence students' satisfaction levels. Students' perception of ease of using e-learning methods may also depend on the facilitators' attitude towards e-learning. A facilitator demonstrating commitment and a positive attitude towards e-learning is more likely to erase the students' usually negative perception that e-learning is difficult to use. A more positive attitude from facilitators will boost learners' interest in e-learning. In this regard, it would be helpful to carefully design criteria for selecting facilitators and to implement specific training for facilitators.

The study also found that e-learning course flexibility was an important factor that influenced students' satisfaction with e-learning. Course administrators should, therefore, design flexible e-learning courses or modules that broadly capture the diverse needs of students. It is important for students to be given the chance to select from various e-learning courses or modules the ones that conveniently enhance their learning.

The quality of the content of e-learning courses or modules is also vital for effective e-learning. Closely related to this is the technology that is used to conduct these courses. Both the content and technology should be designed to ensure that students grasp them easily. Students' perceived ease of use of the technology and the entire course quality will have an impact on their satisfaction levels.

This research article provides insight into students' attitudes towards e-learning, and how e-learning and students' knowledge and skills can be enhanced by ensuring successful e-learning programmes and methods at educational institutions. The researcher is convinced that the incorporation of the above elements will improve students' attitudes towards e-learning and facilitate or inform e-learning at the School of Nursing of the University of the Western Cape.

Conclusion

In this study, several variables were designed to measure the attitudes of students towards e-learning. Those variables included attitudes towards computers, learner computer anxiety, learner Internet self-efficacy, e-learning course flexibility, computer technology, Internet quality, facilitator feedback, diversity in assessment, perceived interaction with other people, and perceived ease of use. In this study, student satisfaction was also considered as a function of many variables, including demographic characteristics of the respondents.

With an 85.54% response rate, the statistical analysis (independent sample t-test) of the aforementioned variables that influence learner satisfaction, show that males and females differ significantly in terms of satisfaction levels. However, the same analysis applied to specific demographic variables having the outcome levels of age group, computer facility at home, computer training experience, and experience in e-learning prior to registering at UWC revealed no statistically significant difference in student satisfaction between these groups. Pearson's correlation revealed that student satisfaction, as a dependent variable, positively correlated with e-learning course flexibility, computer technology, diversity in assessment, perceived interaction with

other people, and perceived ease of use. The remaining variables were not statistically associated with learner satisfaction, since their p-values exceeded the 5% level of significance.

With respect to the factors that influenced students' satisfaction, a multivariate analysis (multiple regression) used in this study indicated that perceived ease of use, gender, and study-year level of respondents were the only factors that predicted or shaped the students' satisfaction with e-learning.

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