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Evaluation of Readiness and Attitude towards e-Learning among Newly Enrolled Medical Imaging Students

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Abstract

Electronic learning (e-learning) has become an integral part of education in line with the rapid advancement of technology. The recent outbreak of COVID-19 had caused the educational institution to shift from traditional learning to e-learning to ensure continuation of learning activities. This shift in learning approach may affect the students' performance if they were not prepared to embrace the changes especially for the newly enrolled students. Therefore, this study was conducted to evaluate the readiness and attitude of newly enrolled, undergraduate medical imaging (MI) students toward e-learning during COVID-19 pandemic. A total of 81 newly-enrolled, undergraduate MI students participated in this study. Information on socio-demographic factors, attitude and readiness on e-learning were acquired using an online self-administered questionnaire. Data collected were analyzed using the Statistical Package for Social Sciences (SPSS) Version 25.0. Majority of the newly enrolled MI students have average readiness (61%, n = 49) and less positive attitude (61%, n = 49) towards e-learning. Age, gender and internet connectivity were found to be correlated with student's readiness. Furthermore, there is significantly positive, very strong correlation between readiness and attitude toward e-learning ($p < 0.05$, $v = 0.359$). The result of this study, in summary, is that newly enrolled, undergraduate students had an average readiness and less positive attitude.

Keywords: E-learning, Readiness, Attitude, Medical Imaging

Introduction

E-learning has become a popular alternative approach in education which transformed the way in which learning is imparted to students. E-learning is defined as an extension of traditional learning paradigms into new dynamic learners models through computer and web technologies (Suresh et al., 2018; Liaw et al., 2007). Besides, e-learning can be categorised into blended learning, computer-based learning, web-based learning, and online/virtual

learning (Zafar *et al.*, 2014). Nowadays, various platform of e-learning has been used such as Google Meet, Cisco, WebEx, Zoom, and Microsoft teams (Pokhrel & Chhetri, 2021). E-learning offer various range of flexibility, allowing users to access on the educational material while taking online classes anywhere, anytime, and at their pace as necessary (Kimathi & Zhang, 2019; Suresh *et al.*, 2018). Furthermore, e-learning is a cost-effective method as travelling are not required while vast amount of information is easily accessible which are very helpful in enhancing someone knowledge.

Among the key factor which contributes to the success of e-learning is e-learning readiness, without which even the best e-learning program can be a mere waste (Prakasha *et al.*, 2022; Rohayani *et al.*, 2015). Various studies have been conducted to determine the factors that could affect the readiness of the students towards e-learning. Study done by Carlo & Yazon (2020) stated that readiness was strongly influenced by familiarity and capability with online learning, device and connectivity, preparation for the online learning experience, self-efficacy and prior technology experience. Besides, Yilmaz (2017) suggested that students' success through e-learning can be improve in every possible aspect with e-learning readiness. In addition, student's attitudes on e-learning also play a role in ensuring effective e-learning. Studies on nursing students had found that they have positive attitude toward e-learning (Karaman, 2011; Chong *et al.*, 2016). Additionally, learners are far more likely to adopt with new teaching method when they have a positive attitude towards e-learning (Sánchez & Karaksha, 2022).

Even though higher education has started e-learning implementation for the past decade, other educational level such as primary and secondary education has only recently started using e-learning amid COVID-19 pandemic. Therefore, the newly-enrolled students at higher institution might face difficulty in adapting as they are not familiar with the e-learning environment. Sani (2020) stated that first-time user of e-learning especially students that newly enrolled in higher education might have different level of readiness compared to the students with experienced on e-learning. Therefore, the aim of this study to evaluate the readiness and attitude of e-learning with demographic characteristics among newly enrolled Medical Imaging (MI) students.

Materials and Methods

Study Design

This cross-sectional survey study was conducted among newly-enrolled, undergraduate medical imaging students at a public university. A total of 81 respondents were recruited in this study by using a convenience sampling. The questionnaire was distributed online. Respondents were assured of their data confidentiality and their participation were kept anonymous.

Study Instrument

This survey study used self-administered questionnaires. The questionnaire consisted of 37 questions which was adapted from previous studies (Bauk, 2015; Liaw *et al.*, 2007; & Watkins *et al.*, 2008). A total of 30 students were recruited in a pilot study for questionnaire reliability testing. Reliability test was conducted using test–retest reliability method. Cohen's kappa coefficient was used to determine the reliability of the questionnaire using SPSS, and it yielded a value of 0.88, which reflected a substantial agreement of reliability. The questionnaire consisted of three sections. Section A consists of 7 questions on demographic information. Section B was used to identify student's readiness toward e-learning. It consisted

of 23 Likert questions, which asked the respondents to rate their readiness from "1 = strongly disagree" to "5 = strongly agree". Section C which was used to evaluate student's attitude toward e-learning. Respondents were asked to answers 7 Likert questions and give rating from "1 = strongly disagree" to "5 = strongly agree".

The responses to Section B and C were scored individually per respondent. For Section B, the responses were scored from 1 (strongly disagree) to 5 (strongly agree), which give a total score of 115. An average score for each respondent was calculated with a value range from 1 to 5. The average score was categorized into four levels which are high (4.2 – 5), average (3.4 – 4.2), low (2.6 – 3.4), and unprepared (1 – 2.6). This method was adopted from a study done by (Rasouli *et al.,* 2016). For section C, responses were scored from 1 (strongly disagree) to 5 (strongly agree), which give a total score of 35. An average score for each respondent was calculated with a value range from 1 to 5. The average score was categorized into two which are more positive attitude (≥ 25) and less positive attitude (< 25). This scoring method was adapted from study done by (Chong *et al.*, 2016).

Statistical Analysis

Both descriptive and inferential data analysis were performed using IBM SPSS Statistics for Windows, version 25.0, Armonk, NY: IBM Corp, with a value of $p < 0.05$ being considered statistically significant. Normality test was performed, which showed normally distributed data. Hence, Pearson chi-square analysis was used to evaluate the relationship between variables. Cramer's V coefficient was used to analyse the strength of the relationship between variables.

Ethical Consideration

The study was conducted in accordance with the Declaration of Helsinki, and approved by the UiTM Research Ethics Committee (REC/12/2020 (UG/MR/269).

Results

A total of 70 (86.4%) female and 11 (13.6%) male students participated in this study. The age of the respondents ranges from 19 to 22 years old, with 54% (N = 44) of the respondents being bachelor's degree students. 54% of the respondents reside at urban areas and majority of the students has low-moderate internet strength during their e-learning.

Readiness Toward E-learning

This study reveals that the newly enrolled MI students that participated in this study have high readiness (12%), average readiness (61%), low readiness (26%) and unprepared (1%). In addition, this study found that the respondents were well-prepared with the technology access. However, it was found that they had average readiness on online skills and low readiness on self- motivation. Table 1 show that between gender, most female students have average readiness (67%, n =47) while most male students have low readiness (73%, n=8) toward e-learning. It was also found that younger students have lower readiness (28%, n=19) whereas majority of older students have average-high level of readiness (86%). Majority of degree and diploma students have average readiness, although 1 diploma students were unprepared during the online learning. In addition, Table 1 revealed that most of students reported an average readiness regardless of internet connectivity.

Correlation between demographic factors and e-learning readiness was analyzed using Pearson chi-square test and Cramer's V coefficient. It showed that some of the demographic

characteristics are significantly correlated with readiness such as age ($p < 0.028$, $v = 0.277$), gender ($p < 0.002$, $v = 0.427$) and internet connection ($p < 0.003$, $v = 0.352$). However, their resident area and education level does not significantly correlate with the readiness toward e-learning.

Table 1
Readiness toward e-learning (N=81)

Variable	n (%) High (Mean 4.2 – 5)	Average (Mean 3.4 – 4.2)	Low (Mean 2.6 – 3.4)	Unprepared (Mean 1 – 2.6)	χ^2 (df)	P-value	V-value
Age							
19	2 (5.3)	24 (63.2)	11 (28.9)	1 (2.6)	18.711 (9)	.028	.277
20	3 (10.3)	18 (62.1)	8 (27.6)	0 (0)			
21	5 (50)	5 (50)	0 (0)	0 (0)			
22	0 (0)	2 (50)	2 (50)	0 (0)			
Gender							
Male	1 (9.1)	2 (18.2)	8 (72.7)	0 (0)	14.787 (3)	.002	.427
Female	9 (12.9)	47 (67.1)	13 (18.6)	1 (1.4)			
Education							
Diploma	2 (5.4)	23 (62.2)	11 (29.7)	1 (2.7)	5.386 (9)	.799	.149
Degree	8 (18.2)	26 (59.1)	10 (22.7)	0 (0)			
Current home resident							
Rural	5 (13.5)	21 (56.8)	11 (29.7)	0 (0)	1.454 (3)	.693	.134
Urban	5 (11.4)	28 (63.6)	10 (22.7)	1 (2.3)			
Internet connection							
Strong	1 (9.1)	7 (63.6)	3 (27.3)	0 (0)	20.028 (6)	.003	.352
Moderate	9 (13.6)	40 (60.6)	17 (25.8)	0 (0)			
Weak	0 (0)	2 (50)	1 (25)	1 (25)			

Attitudes TOWARD E-learning

In addition, it was found that majority of newly enrolled MI students have a less positive attitude (62%, n = 50) toward e-learning. Table 2 reveal that majority of younger students have a less positive attitude (67%) whereas most of older students have a more positive attitude (64%) towards e-learning. Furthermore, this study found that students show a less positive attitude towards e-learning regardless of gender, home resident and internet strength. Pearson chi-square test was performed to determine the correlation between

attitude and demographic factor. However, it is found that the demographic factors do not significantly correlate with attitude toward e-learning.

Table 2
Attitude toward e-learning (N=81)

Variable	N (%)		χ^2 (df)	P-value	V-value
	More positive attitude (Score ≥ 25)	Less positive attitude (Score < 25)			
Age					
19	14 (17.3)	24 (29.6)	5.717	.126	.266
20	8 (9.9)	21 (25.9)	(3)		
21	6 (7.4)	4 (4.9)			
22	3 (3.7)	1 (1.2)			
Gender					
Male	4 (4.9)	7 (8.6)	0.020	1.000	.016
Female	27 (33.3)	43 (53.1)	(1)		
Education					
Diploma	13 (16.0)	24 (29.6)	3.748	.290	.215
Degree	18 (22.2)	26 (32.1)	(3)		
Current home resident					
Rural	13 (16.0)	24 (29.6)	0.306	.594	.059
Urban	18 (22.2)	26 (32.1)	(1)		
Internet connection					
Strong	5 (6.2)	6 (7.4)	0.575	.750	.084
Moderate	24 (29.6)	42 (51.9)	(2)		
Weak	2 (2.5)	2 (2.5)			

Correlation between Readiness and Attitude toward E-learning

Table 3 shows the distribution of students based on their readiness and attitude toward e-learning. It shows that majority of students who possess a more positive attitude recorded a high level of readiness toward e-learning. Nevertheless, majority of students who have a less positive attitude show a low-average readiness. Pearson chi-square test and Cramer's V coefficient was performed which revealed that there is a positive, very strong relationship between attitude and readiness toward e-learning ($p < 0.015$, $v = 0.359$).

Table 3
Correlation between readiness and attitude toward e-learning (N=81)

Variable	N (%)		χ^2 (df)	*p*-value	V-value
	More positive attitude (Score ≥ 25)	Less positive attitude (Score < 25)			
Level of Readiness					
High	7 (8.6)	3 (3.7)	10.431 (3)	.015	.359
Average	21 (25.9)	28 (34.6)			
Low	3 (9.7)	18 (22.2)			
Un-prepared	0 (0)	1 (1.2)			

Discussion

The results of this study reflect an average level of readiness for majority of newly enrolled, undergraduate medical imaging students. In addition, this study found that the respondents were well-prepared with the technology access, but they had an average readiness on online skills and low readiness on self- motivation. Hung *et al* (2010) stated that technology access skills are requisite for e-learning while Qazi *et al* (2021) mentioned that adaptation with the current COVID-19 pandemic situations while learning the of using technology would greatly help in preparedness and readiness toward e-learning. These factors may contribute to the average level of readiness reported in this study. As stated by previous studies, various factors may affect student's readiness such as support for online learning, motivation, device and connectivity (Naji *et al.*, 2020; Callo & Yazon, 2020). Yilmaz (2017) stated that factor related with readiness is motivation. To create supportive learning environment, increasing the self-directed learning skills and technology access could increase the readiness level at the same time increasing the student's motivation to face e-learning. Therefore, before the implementation of e-learning program, preparation and readiness on technology is required for successful e-learning (Coopasami *et al.*, 2017).

Furthermore, it is found that female students were more prepared with online learning as compared to male. This is in agreement with study done by Lee (2020) which was conducted among students during online learning amid COVID-19 pandemic. Besides, it was found that younger students were less prepared as compared to older students. This is similar with study done by Chung *et al* (2020) and Lee, Yeung and Ip (2016), which stated that older students tended to show better readiness than the younger students. Furthermore, online readiness found to be strongly predicted by age (Rafique *et al.*, 2021). This study also found that most students have an average readiness regardless of the strength of their internet connection. This is in contrast with studies by Azlan *et al* (2020); Coman *et al* (2020) which stated that weak internet connection would disrupt the quality of e-learning and cause the students' readiness level to be low especially students that stay at rural areas with limited internet infrastructure and from poor financial background family. This might be due to the fact that those students with low internet connection frequently seek a better place that has stronger internet connection.

In addition, the results of this study reveal that majority of newly enrolled, undergraduate medical imaging students has less positive attitude toward e-learning. It is in agreement with previous study reported that the students had negative attitude toward online learning, implying that they prefer online learning over traditional learning (Abbasi *et al.*, 2022). On the other hand, other studies found that the students have positive attitude toward e-learning due to broad range of advantages offered by e-learning such as knowledge retention and learning flexibility (Karaman, 2011; Odit-Dookhan, 2018). Between gender, results showed that there are no differences between gender as both have a less positive attitude toward e-learning. Similar study by Nadeem *et al.* (2021) stated that online learning was not affected by gender, however their study found that both genders have a positive attitude toward e-learning. However, other study found that gender has influence on attitude toward e-learning with male students were considerably more confident in accessing the internet (Sánchez & Karaksha, 2022). This might be due to different target group used in this study whereby the respondents were recruited among newly-enrolled students who might have no or less experience in e-learning.

Furthermore, the results of this study showed that students had less positive attitude regardless their living area. However, study by Muflih *et al* (2021) reported that students in rural areas possess better attitude, implying that they were less likely experienced internet connectivity issues. This study also found that there is a positive correlation between readiness and attitude toward e-learning. This is in agreement with Muflih *et al* (2021) which suggested that students who exhibit readiness to participate in e-learning had more favorable attitude toward e-learning.

Strength and Limitation

This study presented some limitations. First, since students were asked to recollect experience for the past semester, recall bias may have affected the data. Besides, the data are relied on self-reports, which could make them vulnerable to social response bias due to sensitive subject matter. However, it was mitigated because the researcher guaranteed complete anonymity and stressing the importance of honest responses to the questions. Furthermore, the authors listed numerous studies related to e-learning that were conducted prior to COVID-19 pandemic, which could have influenced how certain results were interpreted. Despite the limitation, this study has provided some insight on readiness and attitude toward e-learning among newly enrolled students.

Conclusion

Finally, this study achieved the overall goal which was to evaluate student's readiness and attitude toward e-learning. Furthermore, the particular aim of determining the relationship between sociodemographic factor and readiness and attitude toward e-learning has been effectively achieved.

A descriptive statistic has been administered to define the frequency of student readiness and attitude. The results of this study are, in summary, that the majority of students had average readiness and less positive attitude toward e-learning. Factors such as student's online skills, self-efficacy and motivation should be considered when designing e-learning program. Proper training and intervention should also be conducted to ensure the newly enrolled students can better equip themselves with the necessary knowledge and skills needed for e-learning environment.

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